AI
in the media sector

A mapping of Artificial Intelligence applications in the media sector

France Television's Directorate of Innovation and Prospective

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AI and the media: too hot, too cold, just right? A mapping of Artificial Intelligence applications

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Algorithms are made to solve problems. Generating **suspicion** in some, perceived as a **miracle solution** by others, **Artificial Intelligence (AI)** is everywhere, impacting every industry. Some, though, struggle a bit more to fully embrace it, **an example being the media**. Compared to the financial or health sectors, the media's capacity to acquire the necessary tools to integrate AI is less flexible and dynamic. In its latest AI <u>Predictions Report</u>, the **PwC** firm pinpoints these differences, reporting that 20% of interviewed executives plan to deploy AI in their enterprise, but only **7% in the media sector.**

However, the application fields for AI in the mediums of **written press, cinema, radio, television and advertising** are broad: automation of business processes and customer relationships, social network monitoring and listening, information verification, predictive analysis of success, video creation and post-production, voice and conversation assistants, automated drafting, personalization, recommendation, optimization of content dissemination, emotion tracking and accessibility.

The following panorama does not claim to be exhaustive but offers an illustration of the ways in which **AI is used throughout the value chain of information and entertainment media.**
These applications hold the potential to spark momentum into an industry that is reinventing itself.

Why now?

Though it emerged in the 50s, Artificial Intelligence has been experiencing a second spring in the past years thanks to a combination of **three beneficial factors:** the exponential growth of computers' capacity, the mass of available data, and open source software **rendering the technology more generally available**, such as Tensorflow, Keras, Torch, Pytorch, Python language.

The algorithms and platforms necessary to run them are now accessible on the **cloud** (often made available by GAFA) and allow the media to embark on the adventure of algorithms. **Machine learning** has turned into **deep learning**, which is characterized by an AI that no longer needs humans to feed it with calculations, but which instead feeds itself with billions of data to build cognitive functions on its own. **Performing** AI becomes **learning** AI. Google's AutoML system even created a network of AI neurons without human intervention. AI becomes **contextual, multidisciplinary**, and perhaps soon self-aware...
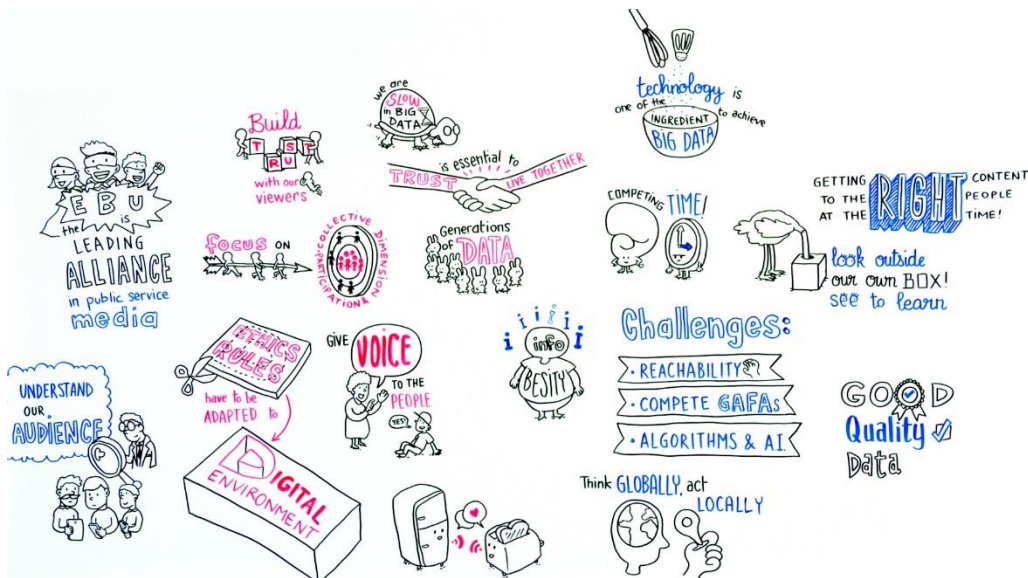
Uses of AI throughout the media as viewed by EBU

Audience-wise, adopting AI has the advantage of being **easily apprehended** by its users, among other things. Humans don't need to adapt to AI, or acquire new skills (as was the case in prehistory with MS DOS for example). We interact with AI using the most simple and natural tool: our voice, or even images. Some **ethical questions** remain, which we will address at the end of this text.

Four major categories for the use of IA in the media are emerging: Marketing and Advertising, Research and Documentation, Innovation in user experience and Services.

Time has therefore come to adopt this new technology for the benefit of the audience. In the words of Antonio Arcidiacono, the new technical director of the EBU, "*AI is becoming mainstream*". Proof in 12 examples of uses:

Artificial intelligence as a tool for augmented information

The fear of being replaced by robots, shared by journalists as well, is not a new one. AI will indeed come to replace certain tasks and lead certain trades to become obsolete. In that regard, the year 2020 will be pivotal. According to Gartner, AI will by then eliminate 1.8 million existing jobs while creating 2.3 million new jobs. The future of journalists, however, is not jeopardized. Though there is a reality to "**robot reporters**", which many newsrooms already use to speed up the production process, the content to which they are assigned remains confined to very specific typologies.

The **Associated Press** agency has been publishing robot reporters-produced wires for standardized financial news announcements since 2015. That same year, Le Monde called upon a Syllabs journalist-robot to cover the departmental and regional elections. With **Heliograf**, which was developed in 2016 for the Olympic Games, The Washington Post uses AI to ensure coverage of small-scale events such as local student sporting events that attract audiences too small to justify sending a human reporter to cover them. Finland's YLE television uses its **Voitto** bot to generate 100 articles and 250 images per week. However, **cultural differences are observable in how newsrooms adopt new technology.**

It varies between Northern and Southern countries, but also between **public** and **private** media services, private services being more focused on a performance-based logic.

Though one speaks of robot reporters, the extent of their accomplishment is not so much creation of content, but rather the assembling of existing material into predetermined templates. However, the technology is advancing and language generators are increasingly able to take context into account in order to select the most suitable format.
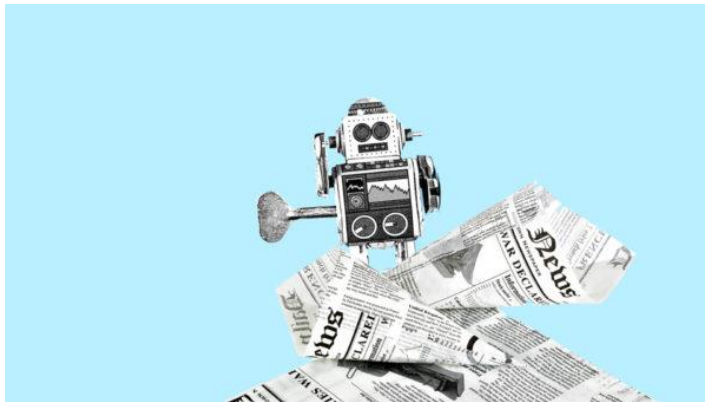
AI can also help journalists to analyze data and **detect trends based on multiple sources of information** varying from conventional open sources to new sources such as the data published by Wikileaks. With its capacity to scan and analyze massive quantities of data, AI enables the constant monitoring of trends on social networks and the detection of weak signals. In that, it contributes to the accomplishment of **one of the public service's mission**: enabling the public to easily find the information it is searching for to be better informed. Associated Press uses **NewsWhip** to detect trends on Twitter, Facebook, Pinterest and LinkedIn. The Reuters agency uses **News Tracer** to detect trends and breaking news on Twitter as well as to support the production of content. The system, designed with Alibaba, collects, categorizes, annotates and sorts news items.

Beyond the detection of trends on social networks, **AI is also able to analyze massive volumes of data, in a manner that humans would not be able to**. A new type of investigative journalism is thereby emerging, built on a collaboration between humans and machines. Monitoring has the ability to tap into multiple sources of information varying from conventional open sources to new sources such as the data published by Wikileaks, or the data each person generates via connected objects (smartphone, connected watch, electric scooter...). The **Panama Papers** result from the processing of 2.6 terabytes of data and pattern tracking through algorithms.

Seeing as part of the journalist's work is automated, AI forces us to rethink and reaffirm journalistic values to return to an "authentic" form of journalism by taking individual users into consideration. However, beware of adding uselessly to an already **enormous mass of information**: the content generated by AI must remain relevant and that is only possible through smart collaboration between man and machine. The right balance needs to be struck between human judgment and automation, intuition, experience and creativity to increase efficiency levels when it comes to the collection, processing and validation of information.

Artificial intelligence as a tool to counter fake news

Though AI is able to **generate fake news, it can also contribute to detecting it**. From false information circulated by bots with a Slavic accent to Deep Fakes imitating Barack Obama speaking, the progress made by AI towards harmful purposes is impressive. So much so that **Open AI** recently put an end to its GPT-2 project; its creators being frightened by the level of sophistication the AI had attained. AI has at times been touted as a miracle remedy, including by Mark Zuckerberg at his first hearing before the US Congress in the wake of the Cambridge Analytica scandal, during which he kept responding to all of the embarrassing questions: "*I don't know, our AI team will fix it*". Needless to say, truth does not magically result from Big Data. However, the very technology used to create a fake is also the one used to detect it, and AI is thus an important ally to be harnessed when fighting misinformation.

As we know, the problem with fake news is not so much that people no longer trust in the media, but rather that they so readily trust in any fake news. With its advanced analytical capabilities, AI can automate, at least in part, the **verification of information** and the validation of photos/videos authenticity using image recognition, metadata analysis, and real-time comparison of information with databanks.

Combined with blockchain, AI can also be used to authenticate information. [Facebook](), more or less successfully, uses AI to detect "semantic patterns" said to be characteristic of fake news. **Truepic** and **Serelay**, used by the Wall Street Journal's team in charge of verifying information, rely on blockchain technology to authenticate images. [ADOBE]() uses an algorithm to detect manipulated image. **DeepNews.ai** is a tool that is thought mainly for aggregation platforms. It selects the most relevant news stories on the Internet, and the algorithm then takes into consideration the breadth of treatment of the topic, the expertise, the analytical qualities as well as the means implemented - relying on a convolutional neural network.

AFP's Medialab team has led several projects - [WeVerify]() being the latest to date - that support journalists in detecting fake news, including by searching for the precise source of photos and videos when these are possibly not corresponding to the events they are supposed to describe.

Again, the algorithm is not a miracle solution. Most initiatives and tools work **hand in hand with human beings**, whose abilities to analyze and verify sources—even through a quick phone call—still exceed those of robots. While an algorithm can simply be trained to optimize searches by using a given content's click rate data, this is of no use when it comes to fake news detection; the datasets used to train the algorithm must here be coded by human fact-checkers.

Artificial intelligence as a tool to improve conversations on the Internet

Hate speech, discrimination, violence and trolls plague the Internet. AI can use natural language processing (NLP) to automatically analyze contents, sort them and **implement automatic moderation on a 24/7 basis**. However, the automatic analysis of content has its limits. Even the most sophisticated forms of AI used by the platforms cannot **prevent the dissemination of violent images** in real time, as was recently witnessed once again during the Christchurch shooting. Platforms do not fully rely on AI moderation but choose instead to moderate content using a combination of AI and human moderators. AI is not going to solve the problem of content moderation online – and relieve the misery of Facebook's human moderators – anytime soon. As matter of fact, it may never do, if technology doesn't progress to the point where it can perceive and understand certain nuances such as humor.

Automatic systems are nevertheless a must in order to analyze massive amounts of content available on social networks, detect nuisances, determine which contents are to be potentially deleted (referring to humans in cases of doubt) and even prevent the online transfer of questionable content by blocking the upload of hate-filled images. Algorithms also pave the way for the return of comment sections on websites, which had often been shut down by editors for lack of moderating resources. **The New York Times uses the Perspective tool** in order to assess the level of toxicity of **comments** through keyword recognition. Its hope is to thereby pass from 10% of articles being open to comments to 80%. The Guardian and The Economist have also adopted this tool.

AI can thus be used to give audiences greater opportunities to express themselves by automating a certain number of tasks, even though it doesn't replace humans when it comes to dealing with nuances that go beyond robots' capacity to understand.

Artificial intelligence as a tool to harness the potential of voice

Natural language processing and voice recognition have contributed to the development of conversational assistants (chatbots, smart speakers) capable of dialoguing with humans. Voice control already accounts for 20% of searches (Meeker), and is forecasted to reach 50% by 2020 (ThinkWithGoogle). **Voice assistants are a new media portal.**

When we give voice commands to Google Home, Amazon's Alexa or Apple's Siri, AI is used to process our voice. This same neural network and Natural Language Processing technology can be used to design specific concepts and determine keywords that will trigger actions. Conversely, through Natural Language Generation, AI can transform text into voice. Billions of data pieces are needed to train algorithms to translate our accents, dialects, outlandish formulations and other language distinctiveness into mathematical formulas that can be understood by a robot. That's also why Alexa needs to listen in on all of our conversations, according to Jeff Bezos.

Google developed Bidirectional Encoder Representations from Transformers (BERT), whose release marks a significant evolution in the development of voice AI: with an accuracy rate of 93.2%, computers are now capable of **learning language contingencies** and can apply what they learn to a multitude of tasks.

Many tools are being developed to better harness the full potential of the voice, the most natural of all means of communication. **Lyrebird** is a Canadian start-up that creates ultra-realistic artificial voices and voice avatars. **Alexa** now has a professional newscaster voice for the reading of news. Google's AI is now capable of recognizing a voice even if it never heard it before. The AI-powered voice takes on the intonations and style of a human newscaster after a text-to-speech training of only a few hours. **Snips.ai** offers a fully embedded voice assistant service for professional builders, whatever the medium used is, that is respectful of users' privacy. **VSO** is becoming the new **SEO**, a major issue for the media, and Google now proposes podcasts in its search results.

However, though Google's virtual assistant **Duplex** is capable of imitating your voice and your faults to make appointments, there is a 25% of it that are actually human beings working in a call center.

Artificial intelligence as a tool to foster interactivity and engagement

In 1960, MIT's Artificial Intelligence Lab created the **ELIZA** machine, which simulated a Rogerian psychotherapist by rephrasing most of the claims made by the "patient" into questions directed at him/her. Thanks to AI, the possibilities for interactions are much more developed today. **Chatbots** originally used question and answer libraries, but advances in artificial intelligence increasingly allow them to "analyze" and "understand" messages through Natural Language Processing (NLP) technologies and to have learning capabilities empowered by Machine Learning. Whether for the purposes of **information consumption or customer interaction** (Gartner Marketing forecasts 85% of human-free interactions by 2020), the automation of dialogue is becoming more sophisticated and **personalized.**

Building basic bots is made more easily accessible, with turnkey solutions such as Facebook's Messenger service, or platforms such as Omnibot, Politibot and **Sently** that distribute plug-and-play solutions – the latter having developed specific formats for the media.

Conversational interaction is a way for the media to provide a closer user experience, be it through bots **embedded in messaging services** to directly reach users (1.6 billion users for WhatsApp, 1.3 billion for Facebook Messenger), or **bots directly integrated within the websites and apps.**
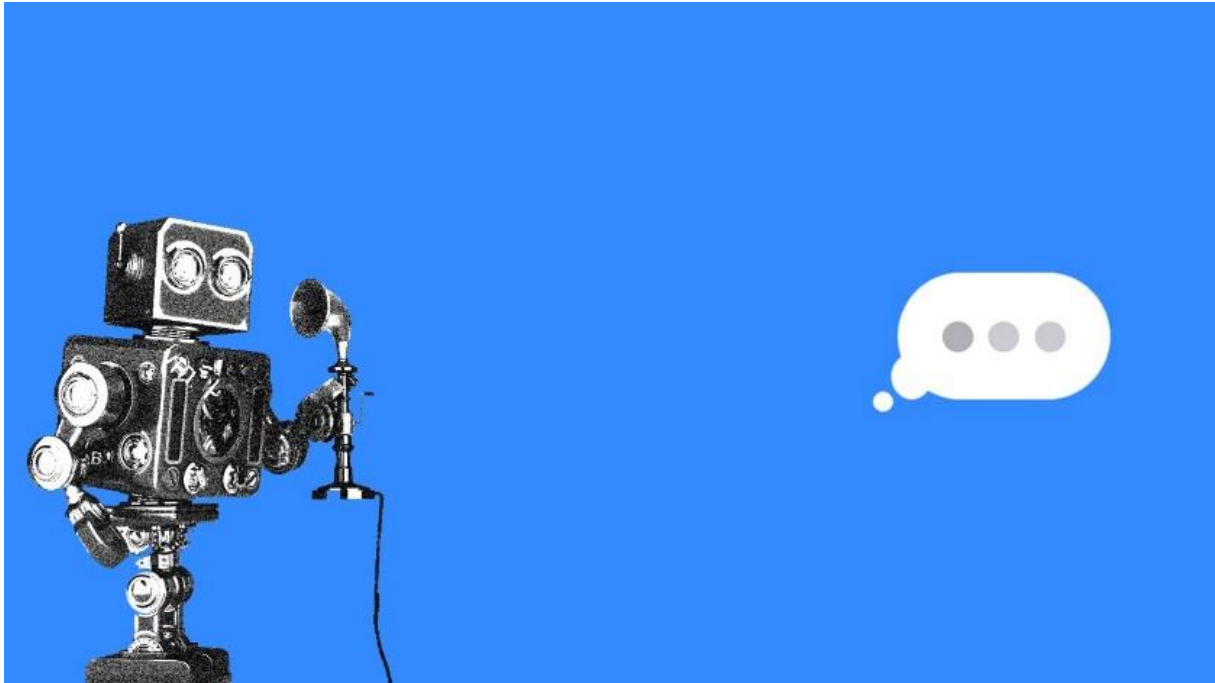
Chatbots **automate the relationship, foster engagement and offer immediate personalization. Quartz** developed its Bot Studio to propose personalized conversational narratives. **The Guardian** has its own chatbot since 2016, CNN and The Wall Street Journal use Facebook Messenger to disseminate information, and **NBC** offers breaking news through the **Slack** app. The BBC incorporated a bot in its articles for the purpose of interacting with the audience.

Interactive fiction content is also developed: **The Inspection Chamber** is a format that the BBC created to interact through conversation, **StoryFlow** offers interactive audio stories targeting children, **The Wayne Investigation** is an interactive sound fiction available through connected speakers using Amazon's Alexa. Alexa also adapts **Choose Your Own Adventure** into an audio version. With **OLI**, Radio France offers bedtimes stories for the connected speaker in the child's bedroom.

Beyond these examples, AI can lead to innovation with respect to storytelling in the advertising, marketing, film and audio sectors, whether as a simple assistant or a content creator.

Artificial intelligence in extended reality

Thanks to technological advances, chatbots are being transformed **into virtual companions** that are actually capable of discussing and debating. **Artificial intelligence and virtual reality** appear to be two different fields of research, but technological development shows that the two domains are increasingly interconnected. Initially restricted to the gaming world, these new technologies are slowly emerging in the realm of **audiovisual creation.** AI will transform storytelling with virtual beings that are capable of advanced interactions with human beings.

With its **"Whispers in the Night"** project, **Fable** studio took the plunge and started to create virtual animated beings using Artificial Intelligence. To create these AI enhanced

computer animations, the same technology than that wich Epic Games or Magic Leap are based on is also used, for immersive storytelling purposes. **Emoshape** uses the "Emotion Processing Unit" (EPU) component to determine users' emotions in real time and enable robots to respond with an emotional state in tune with that of the user. Technology even uses science to optimize interactions and make them as realistic as possible. The **MIT Media Lab** customized a **VR headset** that incorporates a device capable of detecting the user's emotions. This physiological capture module is comprised of electrodes that collect "galvanic skin response" (GSR) data, as well as of photoplethysmography (PPG)-type sensors that collect heart rate data.

Being as it is less apprehensive of humanoid robots than European countries, **China has launched** AI-empowered newscasters through its Xinhua news agency: a male version named Qiu Hao (that speaks Chinese and English) was first introduced on November 9, 2018 and was followed by a female version (Xin Xiamomeng) on February 19, 2019. Powered by artificial intelligence and machine learning, they can independently comment live videos and read texts displayed on a teleprompter.

AI as a tool for indexing, archiving and optimizing searches

Search engines used to run exclusively on text but progresses brought about by AI now enable searches on images, videos and sounds. Combining technologies of image recognition, machine learning, speech-to-text, NLP, face, object and location recognition, AI can **automate the creation of content metadata** to **improve archiving** but also **encourage their discoverability**. Data structuring, like the EBUCore format, is the essential step for the automated processing. Conversions of data formats, transcoding, audio and subtitles extraction or even transfers/copies/purges (FTP, HTTP) are all automatable content management tasks enabling almost live cataloging. Automated indexing also speeds up the work of journalists and eases fact-checking.

The lifetime of a given content is very short, and **without proper metadata it is impossible to retrieve a specific topic** among all that has been produced; hence the importance of optimizing metadata generation. Metadata generation is made faster, cheaper and more accurate thanks to AI, provided that it is trained with enough data.

It is almost impossible for the media to develop fully controlled proprietary solutions. Many turnkey tools exist, often supported through cloud systems, by Microsoft, Google, Amazon, IBM, OpenText, Oracle and so many others.

Newsbridge, very active in the media sector, offers a solution for real-time and automated indexing of rushes, via image recognition. Meanwhile, it contributes to optimizing the

production process of a topic and to sustaining the later reuse of the contents. A live translation feature is also available for interviews.

Editor is an AI-based tool used since 2015 by the NYT in order to simplify the verification and formatting of information. When writing the article, the journalist uses tags to point out the key elements - the machine then learns to identify these elements, to understand the topic of the article and does a real-time search to retrieve information on the subject. The BBC News Lab has launched a similar tagging technology called **Juicer** and another tool called **Summa** that uses language recognition to better index content. **LEANKR** enables precise video indexing with automated tagging, smart thumbnail creation, and a search engine embedded in the video using Natural Language Processing, speech-to-text and OCR.

AI helps to **optimize the accuracy of search results**. Computer vision technologies also make it possible to better process image contents and speed up the production process. Machines can now easily identify individuals or situations in photos, generate legends or feed more complete databases.

Artificial intelligence as a tool for enhanced targeting and personalizing

Recommendation algorithms are not a new thing. As a matter of fact, **Tapestry**, the pioneer in this field, celebrated its 25th anniversary in 2017. AI is also a tool supporting the **adaption of content dissemination strategies in real time**, thanks to recommendation algorithms. AI is used to analyze social networks and identify the most appropriate dissemination time, to analyze audience data, to automate generation of titles/summaries/illustrations with keywords and hashtags, guaranteeing content visibility, personalized newsletters, custom playlists...

AI is able to customize content according to each user's profile: personalized according to **preferences**, user **activity patterns**, and **contextual data** (location, time, weather ...). Focus groups are now replaced by the actual behavior of existing users base.

Textbook cases of personalization are Amazon, Facebook and **Netflix**. The latter fully personalizes its home page. Its **Meson** system coupled with Machine Learning (through the collection of data fostering constant adaptation) even suggests a personalized visual (9 versions) on which the user is most likely to click according to his/her activity pattern and context. The objective is to identify the largest combo of shows that could correspond to segments in order to satisfy users rather than having content corresponding to the greatest number. Algorithms are then serving creativity and diversity, which are chosen over standardization.

AI can automate the curation of content, update thematic playlists on a regular basis, profile users to personalize recommendations. According to a Reuters study, 59% of the

media use artificial intelligence to recommend articles or plan to do so. **Your Weekly Edition** is the NYT's personalized newsletter launched in June 2018. It sends a personalized content selection (via algorithmic & human curation) for one single purpose: to show the user only contents that he/she hasn't seen already. **Amazon Personalize** allows developers with no Machine Learning experience to easily create personalization capabilities. **Freshr** is a Messenger bot for young adults (20-35 years old) that summarizes the latest most important news according to the user's tastes, in only 5 minutes each morning.

Recommendation algorithms are far from perfect. The economist Matthew Gentzkow even speaks of a "**personalization paradox**" to describe their deceptive side. How many times have we been offered content we already purchased, or just content posted by our friends on Facebook? Here as well, AI progress can help strike the right balance between personalization and intelligent content promotion. And it might well be that traditional methods are at times just as effective: RAD, Radio Canada's journalism lab, invites their audience to respond to online surveys for the purpose of offering them content adapted to their expectations.

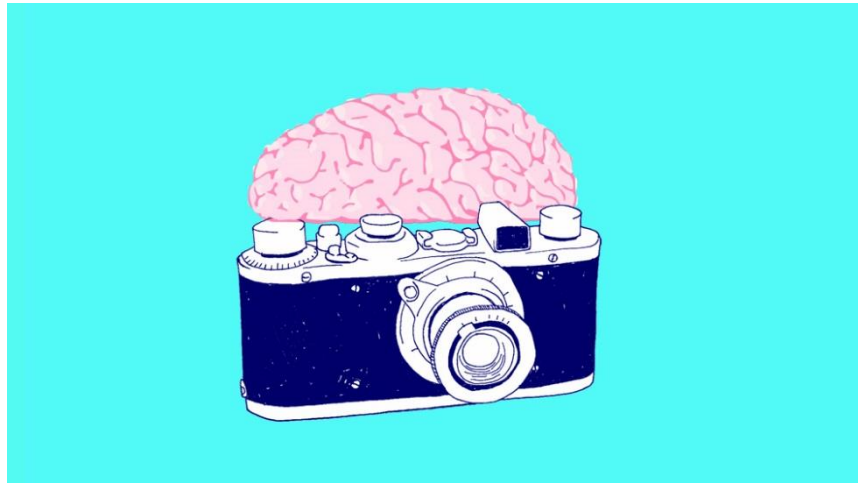## Artificial Intelligence contributing to greater accessibility

On the one hand, **automatic transcription** technologies make journalists' lives easier by optimizing their work time, and at the same time contribute to making **content accessible** to people with disabilities, through the automation of subtitles (speech-to-text), audio synthetizing of text (text-to-speech), contextual recognition of images for real-time audio description or translation.

AI Media TV offers captions and transcriptions for live events and in replay. It just recently launched the **Scribblr.ai** service. **Trint** is a transcription tool funded by Google DNI, which is used to automatically transcribe audio and video flows. It is used by the AP and integrated into Adobe Premiere. **Mediawen** manages the translation of video content in real time using IBM Watson and text-to-speech solutions, in synthetic voice or subtitling. **AFP has developed the Transcriber tool**, which allows its journalists to automate the transcription of interviews.

Artificial Intelligence as a tool for video production and creation

With a growing requirement for the media to **produce short formats adapted to social networks**, many start-ups that offer turnkey solutions have been developed. AI can then be used to automatically generate text from graphic materials, or a video based on texts. AI is also used in the different **technical stages of recording and broadcasting**. It is involved in image post-production and special effects production. The number of solutions comprising AI building blocks has exponentially grown in recent years in the development of video editing and media management.

AI is able, thanks to image recognition, **to analyze video rushes to produce coherent editing**. Most major editing software vendors, such as Adobe, Avid, and Elemental (an affiliate of Amazon) have already added automatic video processing features to save editors time. **Adobe and Stanford,** for example, have developed an AI program that automates some of the video editing work while still giving humans creative control over the final result. The tool can for example suggest different editing options for a dialogue scene. **Gingalab** offers to create automated and personalized videos. The app is able to automatically generate best-scenes according to a predefined editorial line (humor, tension, focus on a character ...), provides simplified editing tools, automatically publishes on social networks and aggregates analytics.

In September 2018, the **BBC** aired a program entirely made from archives: "**Made By Machine: When AI Met The Archive**". The one hour format of assembled archive clips found among the vast archive library of the BCC shows some inconsistencies (a weakness that the AI writers of *Sunspring, It's No Game* and *Zone Out* had already been criticized about).

Even though the Generative Adversarial Networks (GAN) technology helps improve the copying of creations by robots, AI is in no place to replace artists. It remains based solely on **probabilistic and combinatorics systems** that have no symbolic intelligence or emotional capacity.

Artificial intelligence as a tool to monetize and predict success

From advanced audience analysis to detection of the right target, the benefits brought about by machine learning algorithms support marketing professionals in discerning between conjectures and essential tasks. AI, by cross-referencing behavioral data, audience analysis and trend detection is able to **predict the potential commercial success of content** before its release. Advanced analytics are used to discover patterns, correlations and trends that improve decision-making processes. AI is used throughout the marketing process; starting with **customer acquisition** (audience analysis and segmentation, scoring and targeting, visual identification of the context), involved in **the transformation** (personalization and recommendation, creation of contents, optimization of sites and supports, automated campaign management) all the way through **retention** (conversational agents, client program automation, behavioral analytics, attribution calculation and predictions).

AI is now able to collect "**emotional data**" in order to analyze our behavior, not only by our clicks, but also by our emotions. This is the last level of personalization: media that offer content adapted to our current emotional context. Frank Tapiro, from Datakalab, describe this transformation as follows: "*Thirty years long, I created emotions. Now, I use neuroscience and data to measure emotion*". Amazon is even working on a bracelet that will be able to detect our emotions.

Prevision.io is an online platform (SAAS) that automatically creates predictive models from datasets (internal or external, structured or unstructured) and displays the results on dashboards. This automated machine learning platform identifies predictive scenarios regarding audience losses, unsubscribing, and advertising price management. It promotes the transparency of its solution, explaining each result and proposing action recommendations and/or impact assessments. The group **Le Parisien-Les Echos** recently won a Google DNI financing for an anti-churn program. Entitled **High Fidelity,** this project should allow the sharing of data from call centers, newsletters, print mailings and interactions from apps and websites, and predict domino effect in churn to avoid the massive loss of readers. The **NYT**, for its part, sells premium advertising spaces based on the reader's feelings with "**Project Feels**". **Vionlabs** is a Swedish company involved in content indexing based on automated recognition of emotions. It analyzes content and creates graphs representing the different emotional moments. These data will then be able to feed a recommendation engine based on emotions.

AI is used to acquire **a very precise understanding and knowledge of users** and in turn be able to target the best time – and the best way - to invite them to switch to a paid subscription. AI here serves as a **decision support and anti-churn tool.**

AI and the issue of ethics applied to the media sector

In the midst of a **crisis of confidence**, the use of AI and opaque recommendation algorithms involving behavioral analysis may not be an obvious choice for the media. The use of AI requires the establishment of clear rules and transparent documentation for the audience. Big Data used to feed AI is based on massive data collection (including personal). **Ownership** of data and **independence** from third-party sources are key for the development of an independent ecosystem, and could be critical to the long-term survival of businesses, especially those in the media sector.

However, most of the datasets and algorithms available on GAFA clouds appear to be biased or even racist.

How then can the values of the public service (information, education) be integrated into a recommendation algorithm? How should it be ensured that a topical public debate brings together? How can recommendation continue to be performed maintaining social cohesion? What is the degree of recommendation we desire? Where is the right balance between personalization and content discovery?
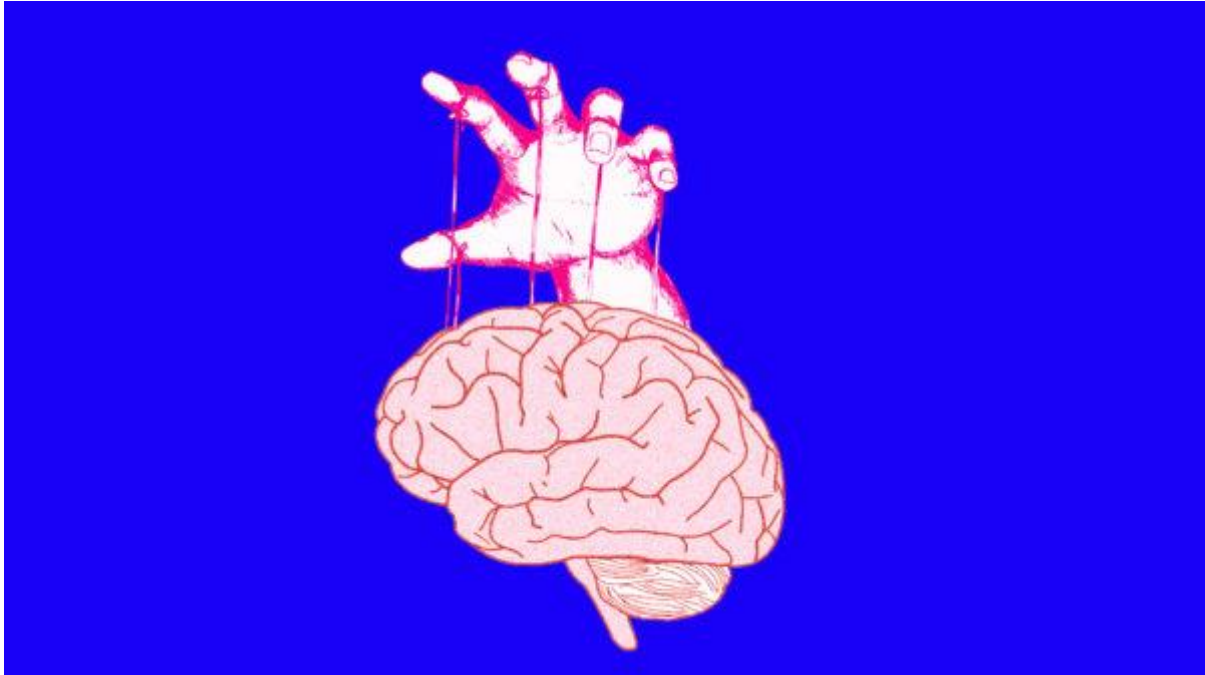
The English government has launched an **observatory of the use of AI in the public service.** The BBC applies its ethical rules to the "Responsible Machine Learning in the Public Interest" program, joined by the EBU. The latter's *Big Data* working group is considering the ethical use of algorithms in public service media so as to avoid bias and to respond to the challenges of this tool not yet fully mastered - inequality in the face of artificial intelligence, neurohacking, technological sovereignty, and above all the need for the complementarity of the brain with artificial intelligence.

The interpretability and **the explicability** of AI are the biggest challenge. The intelligibility of algorithms in general and particularly those of artificial intelligence has become a dominant requirement, as mentioned for example in the French Villani report, and highlighted in Europe with the introduction of GDPR. Being transparent starts with clearly indicating that a content or a recommendation is wholly or partly offered by an algorithm.

On the other hand, the possibilities of AI do make it possible to reach niche audiences for which the media didn't have the means to create content. Algorithms enable the creation of entirely customized playlists on highly targeted topics. And perhaps the media can also give space to emptiness. In that respect, Jonnie Penn, guest author at the **Impact of AI on Media** EBU Workshop in November 2018, calls for "*data deserts*", "*protected areas from data*", to make room for "*healthy differences of opinions*".

Conclusion:

The buzz around AI can trigger **expectations that are too high**: AI is not the miracle remedy and, as described in most cases hereabove, needs to be associated with human inputs, especially for **content creation**. However, it is already operational on the **demand** side in the areas of broadcasting, access to content and monetization. It has great potential for social good to help navigate the mass of content by optimizing search and personalizing recommendation, and to prevent manipulation.

More applications are expected to be developed on top of those already mentioned, such as autonomous cars... But this new technology requires **awareness** to be raised, on the side of the actors involved in the media value chain, but also on the side of the audience, from the youngest to the oldest, so that they can grasp the challenges of AI.

AI is useful for certain tasks, but does not replace humans. The greatest added value of the media is (or should be) the **production of complex content** affecting judgment, interpretation, creativity and communication - areas where humans still surpass algorithms, and will certainly continue to for years to come.

But AI can also help to **ask the right questions**. How can value be created for the user? AI has a very significant impact on society, and the role of the media is to ensure that it is used wisely, especially by public service media.

Use cases are still to be invented, always remaining mindful not to use AI where there is no real need or real added value in its use. Just because the technical ability to integrate it exists doesn't mean it is always relevant, as Jonn Penn notes: "*Machine learning is like salt: you can add it but if you have too much it is unhealthy*".

A mapping of Artificial Intelligence applications in the media sector

The application fields for AI in the media sector are numerous: automation of business processes and customer relationships, social network monitoring and listening, information verification and fake news detection, predictive analysis of success, video creation and post-production, automated conversation per voice assistant, automated drafting, optimization of content dissemination and monetization, emotion tracking and accessibility - all in support of greater interactions with audiences and personalized user experiences. The following panorama does not claim to be exhaustive but offers an illustration of the ways in which AI is used throughout the value chain of information and entertainment media.
(The sector is constantly evolving – and with that, some examples might no longer exist by the time this document is being read).

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Monitoring, social listening, trends identification ⇧

Because of its ability to scan and analyze large amounts of data, AI makes it possible to constantly monitor trends on social networks and to detect weak signals.

Social networks listening, detection of weak signals:

- Associated Press uses **NewsWhip** to detect trends on Twitter, Facebook, Pinterest and LinkedIn. Also adopted by the Huffington Post, Buzzfeed, BBC, The Guardian ...

- QWAM has developed the Ask'n'Read tool, a search engine of "relevant web information" that analyzes more than 2 million sites in 9 languages in real time and sorts the information by theme

- JXPress is a press agency without journalists in Japan that detects events on social networks and produces news reports

- Nunki is based on geolocation and offers listening of social networks and post aggregation by theme/location/time of publication

- **Dataminr** also specializes in the detection of weak signals, and was notably at the origin of the revelation of the killing at the Douglas High School in February 2018 and the attacks in Paris

- **CrowdTangle** is the tool that Facebook offers to detect successful content on social networks, track the spread of content and identify internet users qualified as influencers. Used by Brut, TF1, South China Morning Post ...

- **Banjo** monitors social networks and offers content curation related to everything that happens live in the world, sorting it by theme / location

- **Vocativ** uses data mining to monitor the "invisible web" (that which is not or poorly indexed by search engines) in order to identify weak signals, source unexpected stories and automatically generate new content. It turned to all video in 2017

- **Bloom** is a platform identifying and analyzing trends and opinions on digital networks in order to anticipate marketing and communication strategy decisions

- **News Tracer** is used by Reuters to detect trends and breaking news on Twitter and facilitate content creation. The system designed with Alibaba detects news reports, classifies them, annotates them and arranges them

- **GDELT**, the "Global Database of Events, Language and Tone" is a vast publicly accessible social information warehouse, driven by Google, for large-scale, social-oriented data mining

Big data analytics for public opinion mapping:

- France tv and **Havas Cognitive** with **IBM Watson** and the Eagle AI platform have conducted an experiment concerning the detection of weak signals during the 2017 Presidential election

- The Canadian government uses the **OpenText**'s AI technology for [real-time analysis](#) of public opinion in the media and on social networks on the G7 themes

Support to data processing ⇧

Beyond the detection of trends on social networks, AI is also able to analyze massive volumes of data, in a manner that humans would not be able to. A new type of investigative journalism is thereby emerging, built on a collaboration between humans and machines (computational journalism). Monitoring has the ability to tap into multiple sources of information varying from conventional open sources to new sources such as the data published by Wikileaks, or the data generated by the IoT.

Investigative journalism:

○ **Panama Papers**, the processing of 2.6 terabytes of data from more than 11.5 million leaked confidential documents and pattern tracking through algorithms. Initially sent to the German Süddeutsche Zeitung, data was then shared with media press rooms in more than 80 countries through the Washington-based International Consortium of Investigative Journalists5 (ICIJ). The first articles are published in April 2016, together with 149 documents

○ The objective of **Crime pattern recognition** with the **OCCRP** (Organized Crime and Corruption Reporting Project) is to teach the machine to detect corrupt practices through data analysis

○ **The Atlanta Journal-Constitution** was nominated for the Pulitzer Prize through a year-long AI-based investigation on sexual abuse of doctors that analyzed more than 100,000 documents

○ **BuzzFeed** has trained a machine to assist its journalists in their investigation on spy planes

○ The ICIJ (International Consortium of Investigative Journalists) and the NGO Global Fishing Watch produced the documentary *Looting the Seas* using AI to search huge amounts of data and to create a map to visualize commercial fishing areas around the world

○ **QWAM Text Analytics** processes and analyzes large amounts of unstructured data to derive key elements and indicators. Used by **Le Figaro** for tag generation, semantic enrichment and recommendation of similar content

○ Perfect Memory is a data refining platform capable of automatically aggregating all data sources (internal and external), of all formats (text, image, sound, video) and of all types (structured and unstructured data). This enables the management, indexation and monetization large volumes of multimedia content

Predictive data analytics:

○ FiveThirtyEight (ESPN) uses predictive tools to picture the possible consequences of an electoral redistribution in the USA or to predict the World Cup winning team

○ **Pandascore** specializes in the supply of data, predictive statistics on eSports competitions, mainly for the media but also for online betting companies. This start-

up has developed an Artificial Intelligence based on a Deep Learning network structure which offers real-time analysis of a game's video, counting the kills, collecting the purchased objects or carried weapons, etc. It thus produces live statistics, either raw (without processing), or via an API, or processed (in synthetic data visualization, in rather long analysis reports or in community management sheets for a stocktaking exercise of the competition at a given moment). Used by L'Equipe, Media 365, O'gaming, ESL, PMU ...

Other various uses: content publishing (SEO, contextualization, metadata generation, content creation ...), sales / marketing / business intelligence, e-reputation, HR, analysis of employee / client opinions

Information verification ⇧

Thanks to its advanced analytical capabilities, AI can be an important tool for the automatization, at least in part, of information verification: verifying the authenticity of photos/videos through image recognition and the image similarity process, metadata analytics, real-time comparison of information with databases. Combined with blockchain, AI can also be used to authenticate information.

Fact-checking:

o   **ClaimBuster** performs automated fact-checking thanks to an algorithm that detects keywords and expressions commonly used in factual statements in any speech, and allows real-time identification of the declarations that may be the subject of a verification

o   **Facebook** also uses AI to detect "semantic patterns" that would be typical of fake news

o   A competition has been launched for the development of tools that leverage AI for the benefit of fake news debunking: **the Fake News Challenge** (with First Draft, Full Fact and INRIA as jury)

o   **FactMata** is a platform that uses AI to fight fake news by assigning trust scores to online content, by identifying hate speech / abusive content, propaganda, aggressive clickbait (explicitly excessive headlines titles that only seek to generate clicks)

o   AFP's MediaLab project, **InVID**, is a tool which checks the reliability and accuracy of videos, especially coming from social networks. 2 years in, InVID is now replaced by **We Verify**, in partnership with the EU NGO DisinfoLab, located in Brussels, specialized in the sourcing of false information

o   **Truepic** and **Serelay** rely on blockchain to authenticate images and are used by the Wall Street Journal's info verification team

o   **Neutral News** is able to track manipulated information with the **diplotetect** tool, based on Machine Learning. Created in Dec 2018 by 3 EPITA students, who have just started a collaboration with the Ministry of Foreign Affairs

o   **ADOBE** detects edited images using an algorithm

o   **FabulaAI** is based on an AI technology "which learns social networks". Thanks to Geometric Deep Learning, Fabula aims to separate facts from fakes, in all languages and in a record time. Its API is planned to be made publicly available by the end of 2019

o   **Truly Media** from Deutsche Welle embeds Google Maps, TinEye, WolframAlpha, Google's reverse image search, Yandex, Snopes, Pipl and other tools to verify information on a collaborative platform

- o **DeepNews.ai** is a tool mainly thought for aggregation platforms. It picks the most relevant articles on current topics on the Internet. The algorithm then considers the depth of the subject's handling, the expertise, the analysis' qualities and the means implemented by relying on a convolutional network

- o **Trendolizer** detects trending topics, coinciding in some cases with the appearance of fake news, which spread following the same pattern as breaking news. The **Forbidden Facts** website gathers the analyzed contents

- o **New Knowledge** uses machine learning to detect fake news campaigns on social networks

- o **AI Foundation** detects deepfake images

- o **Cyabra** has developed a solution that identifies fake accounts on social networks, as they are key players in the spreading of fake news campaigns. This technology, based on artificial intelligence, analyzes the data related to the accounts (last names, date of creation of the profiles, activity, etc.) simultaneously with a reading of the latest news, in order to determine the fake profiles. It then offers its clients recommendations on how to (re)act

Génération de Fake news / Deep Fakes:

Manipulation of images is not a new thing, but with technological advances, production of DeepFakes is now within the reach of everyone. Fake videos, which are generated by machines, [multiply on social networks](#). DeepFake is a process based on Deep Learning that falsifies videos by automatically replacing the face / voice of a main character with that of a third party.

Image / sound manipulation:

- ○ **Synthesizing Obama** is an MIT project that uses AI-assisted lip sync to make anyone say anything

- ○ **ThisPersonDoesNotExist** generates images of virtual people through a [Generative Adversarial Network (GAN)](#) AI

Text manipulation:

- ○ **GPT-2** is an AI technology from Elon Musk's **Open AI** research lab that invents a sequel to a text in the journalist's style, adding fake quotes from well-known people or fake facts. Judged too dangerous, [the code has not been made public](#)

Bias:

○ **Yurie,** a conversational AI technology crafted from French copyright free writings (and thus old) regularly held sexist remarks

Predictive analytics of success ⇧

AI, by cross-referencing behavioral data, audience analysis and trend detection is able to predict the potential commercial success of content before its release. Advanced analytics are used to discover patterns, correlations and trends that improve decision-making processes.

General:

- Prevision.io is an online platform (SAAS) that automatically creates predictive models from datasets (internal or external, structured or unstructured) and displays the results on dashboards. This automated Machine Learning platform identifies predictive scenarios, "makes the data speak", to predict audience losses, unsubscribing, advertising price management, etc. It promotes the transparency of its solution, explaining each result and proposing action recommendations and / or impact assessments. SNCF, MAIF, BNB PARIBAS, EDF, Canal +, NRJ ...

Audiovisual creation:

- **ScriptBook** analyzes up to 10,000 scripts per day to provide indications about film genre, age limitation, character analysis, storyline, gender portrayal equality, market positioning, the socio-demographic target, financial forecasts (production budget, box office) and recommendations on the exit strategy

- **20th Century Fox** uses AI to predict movie success from movie trailers with their **Merlin** system

- For **House of Cards**, **Netflix** uses user data to identify the most relevant content to develop (a remake of House of Cards produced by D. Fincher and starring K. Spacey)

Written press:

- [Le Temps has developed its Zombie tool](#), which identifies its best articles thanks to Chartbeat / Google Analytics data, assigns a relevance score according to qualitative indicators (reading time, audience history, involvement and debate on social networks ...) and advises on the best time to republish them and reach new audiences

- **INCA** (Intelligent Newsroom Contextual Analytics) is a platform that the **Times** developed to help journalists understand data related to their articles and thus predict the success of their content ([white paper](#))

- **INJECT** is a project supported by the EU Horizon 2020 Fund and WAN-IFRA. It's an AI technology that browses the existing articles on the topic that the journalist wants to cover and [then offers different approaches](#) via key figures, via drawings, figures, etc., by asking the journalist questions on the subject to help him develop new perspectives, and provides him with "fact cards" that contextualize the subject

Advertising:

- <u>Google Ads</u> was among the first to integrate machine learning into their platforms.

- <u>VidMob</u> offers AI-augmented predictive analytics of content success targeting specific segments, including GenZ and Millenials. The AI technology predicts which audience will be most receptive to a type of design

- **Dentsu Consulting** partnered with **Synomia**, an AI actor, to design a new generation of [AI-assisted competitive intelligence](#) for executive, steering and marketing committees combining advanced strategic analysis and speed

- The AI platform <u>**Albert Intelligence Marketing**</u> uses predictive analytics, Machine Learning, NLP and computer vision for granular audience targeting, tailored user solutions and automatic generation of campaign strategies

Audience analysis ⇧

AI can analyze content audiences and automatically provide insights in real time. Automatic reporting can also send notifications in case an anomaly is detected to shorten response time.

o The majority of audience analytics tools (like **Google Analytics**) integrate layers of Machine Learning in order to provide automated insights

o <u>Outlier AI</u> wants to replace traditional dashboards: rather than having specialists process and analyze audience data to find interesting trends, the tool offers real time data analysis and notifies users when there is an event of interest

o <u>Socialbakers</u> added IA-powered audience segmentation to its platform

o <u>Adobe Sensei</u>, among other things, analyzes audience numbers and helps with the reading of customer behavior using machine learning in **Adobe Experience Cloud**

o **Salesforce** offers <u>Marketing Cloud Einstein</u>, which gives insights per segment

o <u>Médiamétrie</u> has developed **Data Profiling** solutions that can use different methods such as Deep Learning or neural networks for semantic analysis and Machine Learning

Video recording, Post-production and Broadcast ⇧

AI is used in the different technical stages of recording and broadcasting. It is also involved in image post-production and special effects production. The number of solutions comprising AI building blocks has exponentially grown in recent years in the development of video editing and media management.

Video recording:

- The BBC tested out having a programme directed by an AI technology called "Ed" during the Edinburgh festival at the end of 2017: footage recording but also the picking of shots to broadcast, viewing angles, cuts, etc. The Single Operator Mixing Application (SOMA) and Lightweight Live projects, developed by the BBC R&D, enable virtual framing from high-resolution images.

Image enhancement:

- Upscaling 8K allows the addition of "missing pixels" thanks to machine learning. For its 8K TV, Samsung submitted thousands of images to its own AI tool. From 8K sources whose quality was deliberately degraded to SD, the AI tool then learned to upscale the contents back to their original form. This generated 256 algorithmic "curves" in Samsung's chip

Post-production:

- Arraiy generates special effects for film, TV and video games. Using Machine Learning and Computer Vision, it automatically extracts characters through trimming from the back of the image to embed them in other scenes, without using a green or blue background. The neural networks that are used are trained with large volumes of video archives. In March 2018, the Oscar for Best Special Effects was awarded to Arraiy

- Unlike manual special effects, digital special effects have significantly progressed in recent years thanks to computer computing capabilities. AI is here intended to recreate movements, and more recently entire characters (Thanos in "Avengers: Infinity War"), with techniques based on multi-agent systems, which include machine learning

Cropping:

- The ARD uses Pictacrop to automatically crop videos in adapted formats (vertical, square ...). The tool detects faces and chooses a suitable angle for the mobile application "Tagesschau"

- Sony spotlighted its AI-based video analytics system at NAB 2019, which integrates image/object recognition and speech-to-text

- Dartfish 3D is based on SimulCam and Stromotion modules to dynamically adapt drawing objects to ground shapes

Smart cameras:

- Cameras, too, are getting smarter. Currently restricted to surveillance and smartphones cameras, embedded processors, such as **Movidius Myriad 2** which was designed by Intel, support the entire computation required for image recognition algorithms and may soon be found in professional cameras

- **Graava** wanted to create an automatic self-editing camera that would select interesting parts using different sort of data from GPS, heart monitor, proximity, audio and light sensors, accelerator ... The project was abandoned

- **Soloshot** is one of the many robotic cameras that automatically captures moving objects; a technology that relies on image recognition

- **Pixellot** offers a camera and a technology for the automated production of amateur and youth sports competitions. The camera allows 180° capturing, then the image is stitched and an AI solution proceeds to the production detecting the flow of play, the players, the ball, etc.

Video broadcasting:

- The MIT is working on an AI solution to improve the quality of its video streaming. Named **Pensieve**, this Artificial Intelligence solution will be able to select the best algorithms in order to maintain a video stream of good quality, without interruption

- **Netflix** collaborated with the University of Southern California and the University of Nantes to develop its Machine Learning method "**Dynamic Optimizer**" able to compress a video without degrading image quality

Video creation and editing proposals ⇧

Thanks to image recognition, AI is able to analyze video rushes to produce more or less coherent editing. Most major editing software vendors, such as Adobe, Avid, and Elemental (an affiliate of Amazon) have already added automatic video processing features to save editors time.

o _Morgan's Trailer (2016)_ was **created by Watson (IBM)** after analyzing and comparing the movie to 100 horror movies in order to select relevant scenes to incorporate into the trailer. Production time amounted to only 24 hours for a 6-minute trailer

o **Adobe and Stanford** have developed an AI program that automates some of the video editing work while still giving humans creative control over the final result. The tool can for example suggest different editing options for a dialogue scene

o **Gingalab** offers to create automated and personalized videos. The app is able to automatically generate best-scenes according to a predefined editorial line (humor, tension, focus on a character ...), provides simplified editing tools, automatically publishes on social networks and aggregates analytics

o **Bigvu** offers journalists a solution for the editing of their smartphone's videos. This AI tool allows cutting the video shots and placing them in a storyboard

o **GetWiser** uses AI to serialize info into smart video topics: it cuts the video according to topics and provide a suite of custom videos for each user based on their knowledge of a topic, their shopping habits, etc.

o **Synchronized** is a platform for video content enrichment and automatic cutting of highlights (used in the cutting of the _Quotidien_ show)

o **Minute.ly** analyzes video contents, identifies highlights and then replaces video thumbnails with one or more teasers (of a few seconds). This solution combines artificial intelligence (video analysis) and big data (user behavior data analysis) to foster user engagement, content consumption and to increase advertising revenue

o **Wochit** was among the first to automate the creation of short videos. Used by Forbes, USA Today, AOL, Der Spiegel, Time, France tv ...

o The **Triller** app creates videos that synchronize users' recorded images with music from the directory, and wants to compete with **TikTok**

o **Magisto**, acquired by Vimeo, also offers automatic video editing from existing photos and videos according to a prior choice of atmosphere

o **Overcast**, one of the world's leading applications for **podcasting**, offers its users the possibility of converting an excerpt from their favorite show into a short video in order to share it on social networks, by email or by text message.

o On the occasion of Roland Garros, France Télévisions partnered with **Mojjo**, a French start-up, whose technology makes it possible to identify and eliminate time-outs

during a tennis game in order to automatically offer summaries of the highlights. Generation of *à la carte* video summaries of the games in 2/5/10mn on the RG VR app

- o <u>Imagine This!</u>, a project from the Universities of Illinois and Washington, automatically generates FlintStones cartoons from a script using generative networks

For advertising:

In 2018, 10% of Cannes Lions award-winning campaigns contained AI-generated elements.

- o <u>Lexus</u> created an **advertising** spot with the The&Partnership London agency using IBM Watson's AI, which analyzed fifteen years of award-winning advertising, cross-referenced results with a university study to detect the objects and actions generating the greatest emotional impact

- o <u>Luban,</u> the AI tool of Alibaba, creates banner ads 1000 times faster than a human and personalizes them, producing 8000 different designs per second

Automated writing ⇧

Automated generation of texts (NLG for Natural Language Generation) has known such progress nowadays that the fear attached to the robot-journalist figure is, more than ever, on everyone's mind. Yet the applications are numerous and rather beneficial, with the production of articles, reports, summaries to remedy the TL;DR phenomenon, etc. AI makes it possible to cover more topics, and faster, to release human resources so they can focus on themes requiring more creativity, to reduce the number of errors, and to addresses niche/hyperlocal communities.

The Narrative Science start-up, which offers an automated writing solution (it notably provides the Forbes' Daily Market reports), predicted in 2015 that [90% of news would be generated by AI by 2030](#).

Journalism/Generating summaries:

- **Le Figaro** automatically generates summaries of 2018 World Cup games, ["Mondial Stories"](#), displaying a set of 5 moving visual cards in a vertical format showing the game's statistics (ball possession, cards, shot accuracy, most/least efficient players …)

- [**Partnership between the Japanese newspaper Shinano Mainichi Shimbun and Fujitsu**](#) to generate news stories

- **Yahoo** Sports partnered with Automated Insights to generate sports recaps

- [**Yseop**](#) offers financial reporting and other automated report writing

Journalism / Writing articles:

- **AP** has been using Automated Insights since 2016 to write articles on business results and sport. It used to publish 300 articles per quarter, but today 3700 -> released 20% extra time for journalists

- The **Norwegian News Agency** offers soccer games recaps that are written by a robot and published 30 seconds after the end of the game since June 2016

- The **LA Times Quakebot** sends tweets about earthquakes, their location and magnitude, [sometimes mistakenly](#)

- [**Syllabs**](#), a French start-up, offers a writing engine developed by linguists. 1.3 million articles about the 2015 regional elections were written in 24h for Radio France, AFP, Le Monde, Le Parisien, L'Express … Le Monde was one of the first media in France to publish content written by a robot journalist, on the results of the departmental and regional elections in 2015

- [**Labsens**](#) is a customizable content writing bot, operating in a similar fashion to Syllabs, or **TextOmatic**, a German solution

- ○ **The Washington Post** used its Heliograf bot to write 850 articles in 2016 (election, university athletic results)

- ○ **BuzzFeed US** covered the 2016 political conventions using a bot

- ○ **The Press Association** (UK Press Agency) received 800,000 $ from Google DNI in 2017 to develop its **RADAR** tool (Reporters and data and robots) which automatically writes 30,000 localized pieces of content per month (AI using a template that it fills in, and which is then reworked by journalists)

- ○ **Forbes'** CMS, **Bertie**, is writing draft articles that reporters then only need to polish and enrich

- ○ The Guardian Australia publishes news stories written by the robot reporter Mate

- ○ Botnik Voicebox offers help with writing

- ○ Voitto, YLE's bot, generates 100 articles and 250 images each week, and publishes them without human verification, but clearly marked as such

- ○ AX Sematics is an automated content writing tool that is proficient in 110 languages

- ○ Quotebot is a program that automatically generates texts from financial data for the Belgian daily newspaper L'Echo. It was developed with editorial journalists and Syllabs

Artistic creation ⇧

Even though its self-learning capabilities have come a long way - it is now easy to feed neural networks with infinite amounts of information and millions of images accessible anywhere online – AI can only copy the style of other artists. Generative Adversarial Networks (GAN) technology, devised by researcher <u>Ian Goodfelllow</u>, helps improve the copy. Lacking context and perception, and incapable of feeling emotion or showing intention, AI is in no place to create true pieces of art. Only when combined with human creativity does the use of AI for the purposes of artistic creation succeed. A few examples outside the media will inspire use possibilities.

Film:

○ Script writing: *Sunspring* (short film written by the <u>artificial screenwriter Benjamin</u>), *It's No Game* (<u>sci-fi short film with David Hasselhof</u>, parts of which were written by Benjamin), ***Zone Out***, released in 2018, always with <u>the same flaw</u>: AI loses the thread of its own story, as it is unable to maintain narrative continuity

○ ***Progress Bar*** is a movie written and directed by a human being, but the program wrote the dialogues of a character (himself a form of AI)

○ With **"Song of Ice and Data"**, students at the Technical University of Munich have <u>created an algorithm that predicts the death</u> of a **Game of Thrones** character

Literature:

○ <u>A new Harry Potter chapter</u> has been written by AI

○ **Shelley** uses Artificial Intelligence to tell terrifying stories. In order to train the program, its developers fed it with over 140,000 stories published on **r/NoSleep**, a Reddit forum

○ **Frankenstein AI** is an interactive AI-augmented system. Developed by Columbia University's **Digital Storytelling Lab** after the success of Sherlock Holmes & the Internet of Things, it uses AI, IoT, visual algorithms to leverage our relationship with Artificial Intelligence technology. It's a <u>collaborative project</u> with over 2,500 participants from different countries

○ Ray Kurtzweil's <u>poems' generator</u>

○ A computer that writes <u>in Jack Kerouac's style</u>

○ The first machine generated <u>**scientific book**</u>: Publisher Springer Nature used its algorithm called "Beta Writer" to curate its archives' contents, group them by similarity, and arrange them in chapters and sections, adding a table of contents and footnotes

Photo:

- Creatism is the result of Google's research towards the development of a Deep Learning algorithm for artistic content creation. For the first tests, the AI tool was fed with millions of Google Street View photos and then asked to **create photographs of artistic landscapes in the fashion of professional photographers**. Impressively enough, professional photographers themselves acknowledged the quality of the result

Painting:

- Christie's auctioned the first painting created by Artificial Intelligence. The "*Portrait of Edmond Belamy*" was created by the Parisian-based collective Obvious, using GAN (Generative Adversarial Networks), which carry two algos. The "generator" algo creates new images based on 15,000 works that it "knows", painted between the fourteenth and twentieth century. The second, "discriminator", checks whether the submitted images already exist, or whether they have been generated by an algorithm, until it can no longer differentiate a work produced by a human hand from another generated by a machine. Their work's signature is characterized by a mathematical formula showing the collaboration between technology (associated with Artificial Intelligence) and the human artistic process

- Back in 2016 already, Microsoft's *The Next Rembrandt* trained a machine to paint like the Dutch master, to the point of reproducing the thickness of brush strokes using a 3D printer. The quality of the creation was such that it could fool the greatest experts, as the robot's painting provoked comparable emotions than when looking at a work of the artist

- Miguel Chevalier, a French pioneer of digital art since 1978, paints a digital nature painting in *"Extra-Natural"* using algorithms that interact with the public

Music:

- Muzeek is a start-up generating original music tracks from acoustic arrangements that were studio recorded by real musicians. Muzeek is able to offer hundreds of musical variations of a track that adapt themselves to any video by synchronizing the music with the video. MXX also offers a solution that automatically synchronizes sound with image

- With **Google Magenta**, and thanks to Machine Learning, the Neuron Synthetizer algorithm transforms a series of musical notes into a harmony with Bach's signature style, used in a **Google Doodle**

- Amper is an Artificial Intelligence music "creator" program, used among others by the American singer Taryn Southern for the composition of her album *I am AI*, presented at the SXSW 2019. The only settings that need to be determined as wished for are instruments, tempo, style and duration. Similar programmes would be Aiva Technologies, Jukedeck, Melodrive or Melomics Media

- Hexachords produced a music track using AI for the TV documentary *Tunnels of war: the great escape* (*Tunnels de guerre : la grande évasion*) on RMC Découverte

- Popgun.ai is using Deep Learning to learn musical rules from human compositions and to enrich existing pop compositions

- Warner Music has become the first label to sign a record deal with an AI app that composes music. The German app Endel, relying on an algorithm that can create "personalized audio ecosystems to give your mind and your body what they need to fully be immersed in a task" will release 20 albums

- MuseNet also generates songs of all kinds, just like LANDR, a cloud audio mixer automation service

- "Flow Machines" is a Spotify research project that offers artists the ability to compose "composer-like" songs using algorithms. Spotify also created Pacemaker, an AI-based DJ

- AI was used to complete an unfinished composition of Dvořák

- The copyright issue for music-creating AI is increasingly being raised

Drawing:

- Developers from Microsoft and the University of Hong Kong have created artificial intelligence that turns photos into caricatures

Design:

- Chairs have been designed by AI

Podcast:

- An "infinite podcast" has been created with the *Sheldon County* Project that produces fully personalized narratives from the same story base

History:

- The project "Dimensions in Testimony" offers interaction with holocaust victims through holograms based on real testimonies. It is made available through the StoryFile app, created by Heather Smith. This interactive storytelling is based on a combination of NLP, machine learning and volumetric and 360 captures

Extended realities, AR, VR ⇧

AI progress is also benefitting immersive storytelling. Artificial Intelligence and virtual reality appear to be two different fields of research, but technological development shows that the two domains are increasingly connected. Initially restricted to the gaming world, these new technologies are slowly emerging in the realm of audiovisual creation as well. AI will transform storytelling with the introduction of <u>virtual beings capable of advanced interactions with humans</u>.

- <u>Fable</u> studio took the plunge and started to create virtual animated beings using Artificial Intelligence. To create these AI augmented computer animations, the same technology than that which was used by Epic Games or Magic Leap is used, in support of immersive storytelling. Their project *Whispers in the Night* will be presented at the Virtual Beings Conference in San Francisco during the summer of 2019

- Google's <u>Move Mirror</u> experience is based on Artificial Intelligence, specifically machine learning and computer vision, in order to recognize a person's movements. Analyzed in real time, these movements are then compared to others made by other individuals around the world and used to create animated GIFs. This represents a new form of interactivity

- <u>Mica</u>, the humanized version of artificial intelligence by Magic Leap

- <u>Intel True VR Technology</u> can recreate every piece of a scene with 3-dimensional pixels. It was used during the Olympic Games for example, which the spectator could follow with a headset, enjoying a 360 ° perspective from the standpoint of the athlete

- Game players have entirely been animated by AI, as tested for example by <u>OpenAI</u> in the DOTA 2 game

- <u>Emoshape</u> uses the "Emotion Processing Unit" (EPU) component to determine users' emotions in real time and enable robots to respond with an emotional state in tune with that of the user

- <u>PHAROS AR</u> is an AR app that allows to create a "multiplayer augmented music experience" thanks to the Google ARCore technology and Unity, a real-time 3D development platform

Robots newscasters:

In the 1970s, robotics professor Masahiro Mori observed that the more anthropomorphic the features of an android became, the more positive the emotional response became. But once the robot starts to resemble humans too much, yet without being able to hide its artificial nature, that curve is reversed and discomfort, to the point of rejection, prevails as strangeness leads to uneasiness. This did not prevent China and Japan from experimenting with humanoid newscasters.

- **China has launched** AI-powered newscasters with Xinhua: a male version named Qiu Hao (that speaks Chinese and English) was first introduced on November 9, 2018 and was followed by a female version (Xin Xiamomeng) on February 19, 2019. Powered by Artificial Intelligence and Machine Learning, they can independently comment live video and read texts displayed on a prompter

- Erica, the Japanese robot TV newscaster, is equipped with an advanced linguistic intelligence system that allows it to conduct a conversation with a human. Its voice will also serve as voice assistant for autonomous cars

Multi-format content ⇧

With a growing requirement for the media to produce short video formats adapted to social networks, many start-ups that offer turnkey solutions have been developed. AI can then be used to automatically generate a video based on texts and add images available in databases…

- **Wibbitz** automatically generates videos from text. The algorithm selects the most important sentences, extracts keywords to search for photos/videos in databases, adds voiceovers using a text to speech system. Used by LCI among others

- [Telestream offers the Vantage Social solution](), which automatically delivers packaged videos for social platforms (formatting, tagging, captioning, branding)

- **Chaï** uses Artificial Intelligence technologies to develop digital tools that enhance reading experiences and render written content audible. Chaï offers a B2B speech-to-text solution to websites, magazines, publishers, transforming their content at a lower cost in comparison with podcasts

- [Read Speaker]() is a solution comparable to Chaï that speech enable websites and mobile applications

Reuters partnered with **Graphiq** to automatically generate interactive maps from multiple data. Data is accessible via Reuters Open Media Express

Voice assistants, voice ⇧

Natural language processing and speech recognition have made it possible to develop conversational assistants capable of interacting with humans (cf. Google Duplex). Voice control already accounts for 20% of searches (Meeker), and is forecasted to reach 50% by 2020 (ThinkWithGoogle). In January 2019, 66.4 million adults in the US owned a smart speaker, against 47.3 in January 2018. Voice assistants are definitely a new audience portal for the media, while waiting for connected cars.

Smart speakers:

Amazon banked on the media for its launch on the French market, through partnerships with some twenty media (Franceinfo, Paris, LCI, Echos, Binge, L'Equipe, Brut ...) which offered 2-3-minute flashes specifically customized for the speaker. The HuffPost, for example, offers a "Surprising piece of information of the day" flash

Interactive contents for voice assistants:

- ○ The Inspection Chamber by the BBC allows to interact with a narrative through conversation

- ○ StoryFlow offers interactive audio stories targeting children

- ○ The Wayne Investigation is an interactive sound fiction available through connected speakers using Amazon Alexa

- ○ Alexa also adapts Choose Your Own Adventure into an audio version

- ○ OLI are bedtime stories offered by Radio France that allow interaction with the voice of France Inter

Dialogue:

- ○ LLC One works with the software building blocks that make connected objects interact with each other thanks to Artificial Intelligence, notably by voice. Proposal for a demonstration of a virtual voice assistant's capabilities

Voice search:

- ○ Spotify is currently testing voice search ("Play my Discover Weekly playlist", "Play some rap")

- ○ Snips.ai offers a fully embedded voice assistant service for professional builders, whatever the medium used is, and respectful of users' privacy

- ○ Google now automatically transcribes podcasts to improve their indexing. The Google Podcasts application tests the automatic transcription of audio content using a Speech-to-Text technology that it is developing. Appearing in the source

code of Google search pages, these transcripts would make it easier to find content. Remembering the name or release date of the podcast is no longer necessary, a quote is enough

○ [Google's AI](#) is now able to recognize a voice even if it has never heard it

Audio generation:

o **Lyrebird** is a Canadian start-up that creates ultra-realistic artificial voices. Applications: chatbots, audiobooks, hotlines, video games, text to speech. You can also create your own voice avatar

o **Alexa** now has a [professional newscaster voice](#) for the reading of news. The AI-powered voice takes on the intonations and style of a human newscaster after a text-to-speech training of only a few hours

o The **ASTRA** project is able to reconstruct [lost sounds of the past](#)

Speech   Recognition:

o **Vivoka** developed a technology called **Lola**. This new Artificial Intelligence technology based on a speech recognition system aims to meet the needs of its users through the notion of context, by deciphering the natural language and the intentions of the user. The technology can be integrated into all types of media (phone, applications, robots, cars, connected objects...). Vivoka is particularly specialized in the building block of Artificial Intelligence (there are 5 building blocks to a voice assistant: turn on/start the conversation, speech-to-text, NLV (understand users' intention), AI (context, learning...), rendering (text-to-speech)

o The arrival of Google's **BERT**, based on neural networks, marks significant progress in the development of AI: computers are now able to learn languages' contingencies by themselves

Automated conversation, chatbots ⇧

Chatbots originally used question and answer libraries, but advances in Artificial Intelligence increasingly allow them to "analyze" and "understand" messages through natural language processing (NLP) technologies and to have learning capabilities empowered by Machine Learning. Whether for the purposes of information consumption or customer interaction (Gartner Marketing forecasts 85% of human-free interactions by 2020), the automation of dialogue is becoming more sophisticated and personalized. Conversational interaction is a way to provide a close user experience, be it through bots embedded in messaging services to meet the target through affinity channels (1.6 billion users for WhatsApp, 1.3 billion for Facebook Messenger), or bots directly integrated within the websites and apps.

Chatbots:

○ **Quartz** developed its own bot studio to offer personalized conversational narratives

○ **The Guardian** launched its chatbot in 2016, **CNN** and **Wall Street Journal** use Facebook Messenger to publish news, **NBC** offers breaking news via the **Slack** app

○ **Gingalab** offers to design chatbots to push content, which web users can answer to using video

○ **Freshr** is a Messenger bot that summarizes the latest most important news according to the user's tastes, in only 5 minutes each morning. Aspiring to become the main information platform for young adults (20-35 years old), Freshr currently counts 10K users. Targeting the same age group, **Jam** touches on everyday life matters, **hello Marcel** relates to young parents, **Mmmh** is for cooking recipes

○ The **BBC** appended a bot in its stories to respond to comments

○ **Ask.ai** offers a SaaS bot that syncs to any business data and enables users to simply ask their question in French. This solution, based on Artificial Intelligence, allows operational users to easily access the data they need

○ **CallDesk** offers an intelligent robot capable of handling phone calls, alongside call center agents. This robot understands the natural language queries and offers a qualitative experience to their correspondent by providing them with relevant answers. It also automatically identifies and transfers complex tasks to specialized call agents.

○ **Clustaar** specializes in human-machine conversation (interpreting natural language queries and detecting intentions behind keywords) that relies on a deep semantic analysis service to teach chatbots, robots and connected objects to have a complex conversation with a human user. It offers the creation of chatbots, especially around live events (multiplex soccer for example) or of quizzes (with Société Générale for its game "Out of love for rugby" (*"Par amour du rugby"*))

○ **Omnibot** offers solutions to businesses, with a conversational platform (chat or voice) powered by Artificial Intelligence

○ **PlayBots** (bought by Easyrecrue) is a chatbot publisher, offering design and development services. The company also uses customized statistical data to

optimize the tool's performance. This start-up is particularly specialized in chatbots that mix games and storytelling. University of Fribourg (interactions with historical figures/education), Film (Paramount films)

○ **Politibot** is a simple chatbot building platform. The project was birthed with the desire to cover the Spanish elections and developed into a platform that helps with the creation of one's own chatbot, without coding, using natural language processing. A simple interface with analytical capabilities is made available to customers

○ **Recast.ai** (now integrated in SAP AI Tools) is a collaborative platform for the creation of bots whose Artificial Intelligence is trained by users in a collaborative way. This company offers tools enabling a very quick development of a bot and its integration into any support (messaging services, websites, applications ...).

○ **Sently** is a plug & play solution, which allows a structure to quickly engage its community on different conversational interfaces, including Messenger. This company has developed a specialization for the media, via templates and business expertise. It also set up bots for TV shows like LCI, Danse avec les Stars ... Used by TF1, Prisma, CondéNast, LCI, Le Parisien

○ **Smartly.ai** enables the creation of a bot solution which can manage communication via a voice assistant or a messaging application (Skype, Messenger, Slack or text). The solution allows the bot to be associated with human expertise as it attributes certain themes or situations to community managers and customer advisors. The tool lists users who have used the bot and collects certain information (Facebook ID, mobile number, gender, etc.)

○ TalkToTransformer.com provides an accessible version of the Open AI text generator. The user enters a text, and the bot is automatically able to respond. It is also able to complete a text from which only the beginning was typed in.

○ The technology introduced by **Bond Inc.** is a nostalgic version of a chatbot, capable of imitating human writing and producing thousands of handwritten notes

Precise automated indexing / Content management ⇧

With image recognition and Machine Learning, AI can automate the creation of content metadata to improve archiving but also facilitate their discoverability, as searches can then be operated with finer criteria, leading to more accurate results. Data cleansing and structuring, like the EBUCore format, are the essential steps for the automated processing. Conversions of data formats, transcoding, audio and subtitles extraction or even transfers/copies/purges (FTP, HTTP) are all automatable content management tasks in real-time. Automated indexing also speeds up the work of journalists and eases fact-checking.

- QWAM has developed the QES Media Suite tool, a set of software solutions for the searching, aggregating and sharing of textual digital feeds. For the media sector, it provides journalists with a search engine covering all their resources + other sources (partners, news providers, web feeds…)

- Fox Sports has partnered with IBM Watson Media to cover the World Soccer Cup: automated metadata tagging for game footage (highlights of the game, fouls called, crowd cheering…) allowing for quick editing of images so that the "highlights" are made available to viewers in near real time. It also launched The Highlights Machine, an archival portal of matches from 1958 to 2018, which allows fans to customize their own clip edits by filtering videos by year, team, player, game, play-by-play (penalty, goal …) and share on social media.

- Newsbridge is a solution for real-time and automated indexing of rushes, via image recognition (contributes to optimizing the production process of a topic + to sustaining the later reuse of the contents). A live translation feature is also available for interviews

- Aiconix.ai is a Newsbridge competitor for automated rushes indexing and image analysis. They present their speech-to-text solution as being highly performant

- ClarifAI partnered with Vintage Cloud to accelerate the content classification process on video platforms

- New Age Factory uses face recognition and text-mining technologies on video contents to help index them and facilitate searches in video archives

- Valossa is a Finnish image and voice recognition start-up that supports indexing and compliance with standards (nudity, violence). Its AI video and audio analysis solution enables to determine the feelings/emotions within the contents, to contribute to their indexation and then to the personalization of the experiences. It also adds metadata to analyzed scenes that can be used in analytics tools or program guide generators.

- Watchwith, a "deep metadata" company bought by Comcast early 2017, offers a platform that automatically identifies metadata in order to index content (actor appearing in a scene, scene location … contextual data)

- Sonalytic is an audio recognition technology, which was acquired by Spotify in 2017, that identifies sound similarities in order to classify them accurately

- [4M of LIFE magazine photos were sorted by a Google AI solution](#) on the Life Tags platform, using the Image Content-based Annotation algorithm

- Editor is an AI-based tool used since 2015 by the NYT to simplify the verification and formatting of information. When writing the article, the journalist uses tags to point out the key elements - the machine then learns to identify these elements, to understand the topic of the article and does a real-time search to retrieve information on the subject

- The BBC News Lab has launched a similar tagging technology called Juicer and another tool called Summa that uses language recognition to better index content

- [Salient de Lore.ai](#) is a search engine that analyzes multilingual and multimedia content (text, video, photo, audio) to check and process data from different sources. It makes it possible to establish links between documents, to classify them and to use them

- New Age Factory uses face recognition and text-mining technologies in video content to help index and ease searches

- RAI has long been using Computer Vision to automate its indexing in Hyper Media News, connected to a semantic basis, now backed by a building block of Deep Learning

- The BBC's COMMA project (2012-2015) also aimed to create tools for better content indexing and archives accessibility

- Trafalgraph is an indexing engine that automates the real time collection, analysis and synthesis of all the content and information dedicated to professional themes and topical issues, in order to identify trends. It also improves archiving systems and searches

- Google's AI helps the NYT to sort through its photo archives

- LEANKR enables precise video indexing with automated tagging, smart thumbnail creation, and a search engine embedded in the video using Natural Language Processing, speech-to-text and OCR

- RTS uses AI (facial recognition, speech-to-text ...) for the processing of its archives

- The Washington Post has proposed a Knowledge Map to give users an easier access to contextual information and to enhance their reading experience

- IBM Watson has created a smart engine for searching the TED video collection. Watson analyzes concepts, keywords, feelings, languages and taxonomy to create a playlist of short videos that answer the question asked or keyword search; the purpose being to suggest the most relevant content in relation to a search

- AI is now able to [automatically generate metadata itself](#)

- <u>WSC Sports</u> has developed an automated video solution dedicated to sport: the video streams are analyzed automatically, indexed (thanks to recognition of situations, personalities, actions, detection of audio activity, statistics, etc.) then cut to create video content that will be shared on websites or social networks. These contents may be moments such as the game's highlights, a player's moves, goals or three-point shots, etc. The solution integrates dynamic animations through motion design

- Turnkey solutions also exist on the market, such as <u>VSN Explorer MAM</u> that integrates various building blocks such as image and facial recognition, speech-to-text and automatic translation, object and audio effects detection, emotion analysis and contextual information extraction. Nevertheless, these solutions must be adapted to the needs of each media

Optimization of content dissemination ⇧

AI is also a tool supporting the adaption of content dissemination strategies in real time, thanks to the analysis of social networks trends in order to identify the most appropriate dissemination time, to automated generation of titles / summaries / illustrations with keywords and hashtags which guarantee content visibility. AI is here used to analyze audience data, provide precise insights and highlight timeless content at the right time, to the right audience, on the right platform.

- o **Echobox created its assistant Larry**, who monitors trends on social networks, topics viewed by media followers and most successful articles on its website to determine the catchiest headline and the most relevant hashtags. It is an automated solution but not only; it also seeks to optimize publications on social networks (using an AI algorithm) in order to increase media performance on Twitter and Facebook. It is thus possible to delegate content distribution to Echobox's algorithms by activating automation (selection of articles, sharing times, frequency, etc. as determined by the algorithm) or to determine specific rules for semi-automated running. Echobox also allows for A/B testing of post display before final publication on social networks. Used by Le Monde, Le Figaro, Libé, VICE, New Scientist, Franceinfo …

- o **True Anthem** is an integrated content distribution platform for the media. It uses data to identify the right moment to circulate content; the right content to deliver; and the right audiences on social media. Used by Reuters and CBS Interactive

- o **Croma** is an AI-driven content analytics platform that optimizes post publications on social networks. It can also identify trends, compare competing publications, and benchmark through tracking of URL or post links. Similar solutions: **IO Analytics**, **EzyInsights**, StoryCash

- o **Blossom** is a bot developed within Slack by the New York Times in 2015 in order to predict the performance of content on social networks, and to decide what content to post

- o **L'Equipe** uses AI to manage stocks, to forecast the optimal quantity of newspapers to be delivered daily in each point of sale, and thus to minimize the risks of shortage while limiting unsold stocks. The **NITRO** solution was developed with BearingPoint

- o **Muuze** is an active content enhancement service which enables the easy creation of engaging and interactive pieces of information in a range of visual formats. Muuze assists the content creator to generate more comprehensive content with sharper insight that is seen to be new and additive, and also allows that content to be distributed more efficiently with its subsequent usage being tracked and evaluated in real time

- o **OOvvuu** analyzes the content of news and video publishers to facilitate the distribution of video content embedded in articles. Oovvuu offers an Artificial Intelligence platform that enables news publishers and video publishers to connect. It reads and analyzes hundreds of thousands of daily published articles and acquires relevant videos published by the media. These videos are analyzed by IBM Watson

for indexing in order to have them match with articles and embedded into them. This solution provides audiences with relevant videos, and increases content distribution for video publishers. Performances are recorded for the publisher (embedded content) and advertisements provided by its own department. Oovvuu's business model is based on revenue share

- The **Prisma Orion** project aims to accommodate all the publishers' requirements, audience acquisition, monetization into a single tool – allowing Prisma to better associate each webpage, topic and channel with its real income. It will allow publishers to choose content depending on the expected ROI and monetization strategies

- With one-armed bandit tests, **Adobe Target** can identify the most effective variations of a format, and then automatically funnel traffic to the winning experience

Adding value to archives

- [Le Temps has developed its Zombie tool](#), which identifies its best articles thanks to Chartbeat / Google Analytics data, assigns a relevance score according to qualitative indicators (reading time, audience history, engagement on RS ...) and advises on the best time to republish them and reach new audiences

- The **NYT** applies internal tools to know when to publish certain content - with Slack, a bot that predicts what content it would be most relevant to circulate on social media

- **BuzzFeed** has built a Machine Learning model that selects the optimal type of content and publishing channel for "evergreen" content to bring back in focus – content that has been found on social networks - and indicates the best time for their publication

- [The BBC uses IBM Watson](#) to make its archives of more than 250,000 TV shows accessible

- The BBC also aired a program entirely made from archives, "**Made By Machine: When AI Met The Archive**", in September 2018

Advertising / Product placement

- The **Mirriad** start-up works on the smart product placement in programs, and is used by TF1 in "*Demain Nous Appartient*"

- **E-contenta** is a recommendation platform that presents two offers: a personalized native advertising platform and a content recommendation engine. In both cases, this technology is based on the analysis of the user's browsing behavior, to offer him either a pre-existing advertising article corresponding to his/her assumed tastes, or a recommended content

- **JINNI** is a precision solution of contents' mapping (very advanced categorization), with a social dimension as well, involving semantic search, mood navigation and

other intuitive discovery mechanisms. A unique DNA is identified for each content (50 tags per film taking into account various criteria such as mood, tone, era, location, story structure, etc.)

- **Vbrand** offers an Artificial Intelligence platform that tracks brand exposure at sporting events. This video analysis allows customers to optimize their media plan and maximize their sponsorship ROI by measuring the impact on TV broadcast and online

- **Watiz** has developed a visual search engine that relies on image analysis and Artificial Intelligence. Its "**Epick**" solution enables, via an in-video extension (a module in the player), to detect products (clothes in particular) and to offer a catalog of similar articles for purchase thanks to a brand affiliation strategy. The economic model is based on revenue sharing (for sale)

- **Phrasee** uses AI to help brands write more engaging promotional emails and posts for social networks (+ 57% click rate for Domino's Pizza)

- **Quantcast** uses AI to optimize advertising space sale. CNN, Forbes, Vice, Buzzfeed and others use its services

- **Adomik** offers a Machine-Learning based forecasting tool to optimize programmatic advertising

AI to better analyze content bias, especially cultural:

○ **Google's tool** to measure gender equity representation in movies

○ **Ceretai** to measure equity and diversity for broadcasters

Personalization ⇧

AI, by centralizing a wealth of information, is able to customize content according to each user's profile: personalized according to preferences, user activity patterns (i.e.: browsing started on desktop, continued on mobile = the same popups won't be shown two times), and contextual data (location, time, weather ...). Focus groups are now replaced by the actual behavior of existing users base (large audience base = very precise analysis).

Personalization of presented content:

○ **Ownpage** offers personalized newsletters based on data mining and Machine Learning (customers: Le Monde, Marianne, Euronews, Les Echos ...). The tool collects the user's behavioral reading data, analyzes them, crosses them with the text and metadata of content. This enables selecting new content and pushing it forward, especially via newsletters or via APIs and mobile push notifications, with personalized home pages

○ **Your Weekly Edition** is the NYT's personalized newsletter launched in June 2018. It sends a personalized content selection (via algorithmic & human curation) for one single purpose: to show the user only contents that he/she hasn't seen already

○ **Personalized homepage for each user with different titles and visuals** (example of a tool: <u>Optimizely</u>). Examples of media that personalize the HP: The Guardian, BBC News, <u>NYT</u>, <u>WSJ on its mobile app</u>

○ **Netflix** fully personalizes the home page. Its **Meson** system coupled with Machine Learning (through the collection of data fostering constant adaptation) even offers the personalized visual on which the user is most likely to click according to his/her activity pattern and context. The objective is to identify the largest combo of shows that could correspond to segments in order to satisfy users rather than having content corresponding to the greatest number. Creativity and diversity are chosen over standardization

○ **Craft.ai** is a Machine Learning building block that allows services/apps to continuously adapt to users in order to offer them a personalized experience. From business data, user behaviors, external data, etc., Craft.ai's technology learns and adapts content to the user by automatically generating decision trees

○ **Iris.tv** offers personalized videos, programming and broadcasting thanks to Machine Learning. It is used by CBS, Newscorp ...

○ The **BBC** is working on personalization on connected TV

○ **Amazon Personalize** allows developers with no Machine Learning experience to easily create personalization capabilities

○ **Babator** uses Artificial Intelligence to help publishers offer users personalized videos based on their behavior (and therefore without log in). This solution is integrated into

the publisher's player with a simple line of JavaScript code

- ○ <u>BDMReco</u> is a Belgian start-up specializing in multi-object recommendation and personalization with a focus on broadcasting and publishing media, in particular thanks to cooperation with RTBF. BDMReco offers a solution whose added value particularly lies in meta-data enrichment (speech-to-text, image analysis, etc.). Its recommendation works on both video content and articles

- ○ The Dutch <u>BNR Smart Radio</u> app provides a personalized experience for the user. Speech-to-text technologies and NLP algorithms are used to split a radio show by subject and categorize it according to topics. The system assembles the program segments into highly personalized playlists capable of addressing a niche audience

- ○ <u>Cognik</u> is a personalized content recommendation platform for websites, mobile applications, tablets and TV. The solution is based on content analysis, trend analysis (including social networks) and user behavior analysis. The publisher may tailor the criteria of the algorithm (and Cognik offers support in decision-making)

- ○ <u>Contentwise</u> is also working on personalizing the user's activity pattern, especially for PayTV and OTT, using predictive analytics, content matching and user cluster

- ○ CMBenchmark has been awarded Google DNI funding for its <u>Nicheletters platform</u> that allows the sending of single-topic newsletters containing ultra-targeted advertising

Using a unique tool, <u>Jeeng</u> makes it possible to offer users the option of personalized web push notifications and/or personalized newsletters, even personalized websites/home pages. Jeeng analyzes user profiles; their uses but also content (videos, articles, audio / via Watson in particular), in order to offer better targeting, without a need for log-in. The solution can be configured automatically and/or manually, and notifications are monetizable.

Content contextualization:

- ○ Le Temps plans to adapt <u>the temporal/spatial indicators found in articles to each reader</u>

- ○ <u>Google Play Music</u> relies on Machine Learning to offer personalized playlists according to preferences of course, but also to take into account the time of day, location or the weather in order to select songs to an even great degree of fitting

Personalization through interaction:

- ○ Netflix personalized user experience by interacting with the <u>Bandersnatch</u> episode of the *BlackMirror* show, in a "Choose your own adventure" fashion, which had previously already been used for children's programs - *Buddy Thunderstruck* and *Puss in Book: Trapped in an Epic Tale*

- ○ The BBC <u>turns its *Click* program into an interactive experience</u> by allowing viewers to choose how they want to watch and sequence the different parts themselves. It

is also preparing a series of *Future You* magazines on major contemporary global topics integrating interactions possibilities varying according to the public's degree of knowledge of the themes

Personalized advertising:

○ **Dynamic creative optimization (DCO)** automatically modifies advertising in real time according to target audience and broadcasting context

○ **Dynamic advertising insertion (DAI)** automatically adapts the introduction of ads into VOD content (pre/mid/ post-roll), according to demographics or the user's usage history

○ <u>Sizmek</u> and <u>Semcasting</u> provide **contextual advertising** through granular analysis of web page content, which enables to display ads in environments that match the page audience

○ [Axe's advertising campaign "Romeo Reboot" in Brazil (2015)](#) featured four short films based on Shakespeare's work. In these short films, out of eleven scenes, six could vary according to the viewer's profile (100,000 segments resulted from AI permutations!)

○ **Facebook** is able to predict our future actions to advertisers thanks to its AI [FBLearner Flow](#)

○ AI is also used for [**programmatic advertising at RTBF**](#)

○ **Personalization according to emotions: Saatchi, Clear Channel** and **Postercope** have launched [an "intelligent poster campaign](#)". The ad is personalized according to the emotions of the person standing in front of the advertising device

Emotion tracking ⇧

AI is now able to collect "emotional data" in order to analyze our behavior not only based on our clicks, but also based on our emotions. This is the last level of personalization, where media offer content adapted to our current emotional context, based on the six main emotions: joy, sadness, fear, anger, disgust, surprise.

o   <u>Musimap has developed a "humanized algorithm</u>" capable of associating emotions with sounds. It offers B2B solutions to the music industry, classifying music according to its emotional impact, and offering a catalog with emotional and contextual recommendations

o   <u>Watson (IBM) is able to infer the personality of a speaker</u> and the conveyed emotions. This allows an ultra-precise segmentation of users

o   <u>RealEyes</u> has developed an emotional tracking technology via webcam, so as to identify users' emotions and then better target them

o   <u>Q°Emotion</u> is a semantic and emotional analysis solution that automatically classifies client comments posted on websites or social networks, identifies their emotions, personalizes and improves their experience, enhances customer service responsiveness, detects alerts/weak signals, and helps customer services to respond. It is used by Corsair, Crédit Agricole, Chanel, Carrefour

o   <u>Deezer</u> tries to adapt its playlists to the listener's mood

o   <u>Snapchat</u> uses facial recognition to track its users' emotions at events

o   <u>Vionlabs</u> is a Swedish company involved in content indexing based on automated recognition of emotions. It analyzes content, creates graphs representing the different emotional moments, its colors, etc. These data will then be able to feed a recommendation engine based on emotions (and no longer mere highly factual and impersonal metadata, such as title, director, actors, etc.). It can then suggest new content depending on consumption patterns, context, taking into account "discoverability". This solution can also automatically produce trailers

o   With **"<u>Project Feels</u>"**, the **NYT** sells premium advertising spaces based on reader feeling

o   The **MIT Media Lab** customized a **VR headset** that incorporates a device capable of detecting the user's emotions. This physiological capture module is comprised of electrodes that collect "galvanic skin response" (GSR) data as well as of photoplethysmography (PPG)-type sensors that collect heart rate data, with <u>Isobar</u>
o   <u>Datakalab</u> detects eye movement and micro-facial-emotions in real time. Caught by a webcam, these data are analyzed by algorithms. The company has launched a tool for measuring emotions on e-commerce sites with IBM

o   Emotion detection can also happen with text. In 2015 already, <u>Microsoft</u> worked on an emotion detection project in the context of a written text

Content curation / Recommendation ⇧

AI can automate the curation of content, update thematic playlists on a regular basis and profile users to personalize recommendations. According to a Reuters study, 59% of the media use Artificial Intelligence to recommend articles or plan to do so. Textbook cases of personalized recommendation would be Netflix, Spotify, Amazon, the custom Facebook newsfeed...

o   Google News has updated its platform to integrate a layer of AI that combs through all the news content to break them down into simple and short formats (timelines, local news aggregation, stories presented in a developing and evolving sequence)

o   Flint offers users the possibility to train their own AI tool to regain control of their information consumption and counter filter bubbles

o   Knowhere is a US news website that relies on AI to free itself from human bias and offer "unbiased journalism". AI is used to identify current popular topics, browse thousands of sources (verified, ranked according to a trust index, confirmed by several sources) and create a database on the topic. The article is drafted automatically, without human bias, in about 1-15 minutes, then proofread & stylistically improved by 2 editors (helping AI to progress). The AI tool can offer 3 political perspectives (left-wing / right-wing /unbiased)

o   Current Status offers political topics curation on the web thanks to an algorithm that monitors over a hundred publications and classifies content according to both quantitative criteria (length, date of publication) and qualitative (article displayed on news websites homepage, shared by the press on their RSS feed, having been pushed)

o   Upday uses behavioral analysis in addition to socio-demographic data to provide a personalized flow of information collected from 600 media sources. It also offers contextual distribution with adequate encoding to make relevant compression/transmission choices, personalization according to user location ...

o   Nuzzel makes it possible to combine Facebook and Twitter news feeds within the same space, prioritizing the information that they share according to their relevance

o   Flipboard is a social media aggregator that allows users to indicate topics that interest them and then automatically selects content to create a custom magazine

o   Newsadoo is an Austrian initiative that offers information curation via an app, both personalized and open, using Machine Learning and NLP

o   Toutiao "Headlines of the day" is a Chinese news aggregator that relies on AI in order to select articles and videos to be spotlighted for each user; to rewrite articles' headlines so as to improve their indexing and click rate; and even to write articles, especially on sports. Toutiao has raised 3.1 billion dollars since its creation and reports an average of 74 minutes spent on the app per day (+ 50% compared to Facebook, and even + 12% compared to WeChat).

- Within the same company (ByteDance), **TikTok** uses a stronger recommendation algorithm than the one Facebook uses, based on GAN, collaborative filtering, logistic regression, gradient boosting and decision tree

- The **Alertsy** solution by <u>Intelligo</u> is a news monitoring and alert bot running on the Slack messaging platform. Alertsy analyzes a vast sea of data points about content and readers' behavior. It uses machine learning to open and mark news stories - themes, writing styles, rhythm, emotions, etc. - and uses this data to better match news stories with new readers

- <u>Spideo</u> is a recommendation algorithm based on a granular qualification of video content:
  - by mood (30 tags including 7 specific to TV)
  - Integration of TNT content + movie channels
  - Consumer tags and rating
  - Social data
  - User behavior (declaratory or customary)
  - Four recommendation solutions: Envideo, Kinosocial, Kinograph and Kinoprofile.

  It is an interesting solution for "cold starts", and is Used by Infinity on Canal +, Arte

- <u>Taboola</u> has developed a content recommendation solution in native format that is embedded in articles. In so doing, it creates bridges with the content of different platforms of a same brand, offers sponsored content, gives the possibility of integrating all types of elements (videos, subscription to a newsletter, third-party content …). This recommendation adopts a similar format to the timelines of social networks and pursues three objectives: to renew and retain the audience, to engage it and to promote content monetization. Taboola also enables the retrieval of data from the entirety of a visit (where the user comes from), the monitoring of editorial activity (similar to Croma.io, Crowdtangle, EzyInsights, etc.). It used by Bloomberg, BusinessWeek, Time.com, USAToday, NYTimes, BBC …

- <u>Dotaki</u> (formerly ZenWeShare) is a "full data" solution aimed at analyzing visitors' behavior in real time, "segmenting" them and personalizing the recommendation, newsletters content, etc.

- The <u>NYT</u> uses a Machine Learning algorithm for its "<u>Recommended for you</u>" section

- <u>Lobster</u> offers curation of content from social media to communication agencies and companies

- La Croix, Corse Presse and l'Equipe develop <u>content recommendation and curation systems</u> that adapt themselves according to the preferences of their readers

- <u>NPR One</u> aggregates its programme podcasts thanks to AI

- <u>Molotov</u> uses Machine Learning for its recommendations

Comments moderation ⇧

Trolls are a well-known scourge of the web. AI can help prevent them from harming online debate by automating moderation of comments. But falling into the other extreme should be avoided as well: automatic moderation involves the risk of infringement on the freedom of expression. Very clear and transparent standards are needed to explain the reason for deleting a comment, and to really improve the quality of the discussions on the Internet.

- The Perspective tool (developed by Jigsaw, Alphabet Incubator) used at the **NYT** assesses the degree of comments toxicity via keyword recognition. The NYT wants herewith to go from 10% of articles open to comments to 80%. The tool is also used by The Guardian, The Economist

- The Washington Post uses **ModBot** with an algorithm that was trained by the Post's human moderators. The algorithm sorts through the messages, classifies them, and hands the complicated cases to human moderation. A machine learning building block will also allow it to better analyze words in context, so as to reduce the need for human intervention. ModBot was integrated into **Talk**, the comment management system developed by the Coral Project, a collaboration between The Post, The New York Times, and Mozilla

- **Smart Moderation** uses Machine Learning and Natural Language Processing to analyze comments and general context (not just words that would be blacklisted), and then identify spam/hate speech

- Utopia AI Moderator promises better accuracy than human moderators. It can handle large volumes of content, allowing human moderators to focus on managing the moderation policy and on the most delicate cases

Transcription and Accessibility ⇧

On the one hand, automatic transcription technologies make journalists' lives easier by optimizing their work time, and at the same time contribute to making content accessible to people with disabilities. AI can thus improve the accessibility of content to people with disabilities or of foreign language content through the automation of subtitles (speech-to-text), audio synthetizing of text (text-to-speech), contextual recognition of images for audio description or real-time translation.

- **AI Media TV** offers captions and transcriptions for live events and in replay. It just recently launched the **Scribblr.ai** service

Speech-to-text:

- **Ava** subtitles conversations using the participants' smartphone

- [AFP has developed the Transcriber tool](), which allows its journalists to automate the transcription of interviews. This accelerates their work, but also makes transcripts of interviews accessible to the visually impaired (voice format) or to the hearing impaired (text format)

- [Real-time captioning on YouTube Live]() thanks to automatic speech recognition

- **Vocapia** is used by SRT for automatic subtitles creation

- With AI, **Skype** will live-caption conversations

- **Trint** is a transcription tool funded by Google DNI, which is used to automatically transcribe audio and video flows. It is [used by the AP]() and integrated into Adobe Premiere

- CNN offers live [transcription]() of its programs

- **Rosetta**, a Facebook AI tool, is able to read the text included in an image and transcribe it

- [Canny]() is specialized in dubbing video content using an artificial intelligence technology that intervenes in the content to modify the movement of persons' or characters' lips

Audio description:

- France **tv** has developed [its prototype of automatic audio description]() via voice recognition

Translation:

- **Google Translate API** is used by Vice to automatically translate its articles into multiple languages

- [Facebook]()'s multilingual translator uses unsupervised polyglot text-to-speech

- o **Mediawen** manages the translation of video content in real time using IBM Watson and text-to-speech, using synthetic voice or subtitling

- o L'Opinion uses the **DeepL** translator, which manages to detect the subtleties between French and English, in order to translate its entire Wall Street Journal supplement. The name of the German software is the diminutive of deep learning

Sign language:

- o In the **SubTil** project, France tv resynchronizes subtitles produced in real time thanks to AI. Neural networks specially trained to recognize faces and voices make it possible to position the subtitles optimally in the video. The exact synchronization is based on speech-to-text

- o Another part of the project consists of avatars interpreting in sign language based of motion capture (with **Mocaplab**) of deaf interpreters, in order to improve the quality of sign language versions, notably for young audiences, for whom sign language is their first language

- o Microsoft announced a new program called **AI for Accessibility**, endowed with 25 million dollars

Monetization, Customer retention, Subscriber management ⇧

AI is used to acquire a very precise understanding and knowledge of customers and in turn be able to target the best time – and the best way - to invite them to switch to a paid subscription. AI here serves as a decision support and anti-churn tool.

o The Neue Zürcher Zeitung uses AI to set up a personalized dynamic paywall: thanks to Machine Learning, the algorithm determines when the user has reached his/her "hot point" (the best moment to launch his/her paid subscription). Unlike the traditional use of a paywall - after 3 articles, the readers must subscribe or else will see their access to content blocked - the NZZ combines **100 to 150 criteria** (against 60 for the Wall Street Journal) to offer the user the invitation to pay only when he/she is the most available. Once the right moment is identified, **a completely personalized landing page pop ups for the prospect**. The title, the writing, the message, everything is adapted to the reader, according to his/her tastes as calculated by the machine. Result: X5 conversion rate in three years

o The Times and the Sunday Times (UK) raised € 1M from Google DNI to develop the tool Ask James - in collaboration with the Belgian company Twipe. This AI solution is able to offer readers, whether they are subscribers or not, content adapted to their areas of interest and their media consumption, while feeding itself on user data, including the propensity of readers to convert into subscribers and churn rate

o Swedish **MittMedia** boosted its subscriptions thanks to robot-generated content, reporting +1000 subscriptions per year

o The group **Le Parisien-Les Echos** won a Google DNI financing for an anti-churn program. Entitled **High Fidelity**, this project should allow the sharing of data from call centers, newsletters, print mailings and interactions from apps and websites, and predict domino effect in churn to avoid the massive loss of readers

o **The Skimm** uses a bot to help its subscribers to make decisions

o Start-up **Vidora** works with companies like News Corp., Yahoo Japan and Walmart's, customizing their dialogues with customers on the web, through mobile, and through apps, in order to reduce churn

o **The Financial Times** uses gaming technologies to prevent churn and determine the behavioral correlation between media engagement and termination rate

o **The Wall Street Journal** offers a machine-learning automated freemium based on behavioral data

AI in the media – ethical issues ⇧

Long before the GDPR, the public European audiovisual sector raised questions over the use of data and of AI-empowered algorithms. The BBC launched the "Responsible Machine Learning" project so that values applied on air would also be taken into account with the use of AI, and Europe has just published guidelines for an ethical AI.

Responsible Development of Artificial Intelligence: Montreal Declaration
How to teach AI some common sense
A racist bot, a robot expert in lip service… the top 5 of worst AI cases isn't all that glorious
Establishing an AI code of ethics will be harder than people think
In Google's view, AI must be accountable to humans
Practically speaking, how do we confer responsibility to algorithms?
Google's AI confuses love with hate
According to Yuval Harari, Artificial Intelligence benefits dictatorships
The Holberton-Turing Oath on ethics in AI
Information in the face of Artificial Intelligence: promises and dangers
Paris Call, Preserving and accessing software source code
Ethics as AI's development driver in Europe
AI: "ethic-washing", a European invention
AI for journalism, an ethical check-list