A Study on Artificial Intelligence Based Business Models of Media Firms

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Abstract

The aim of this study is to develop Artificial Intelligence (AI) based business models of media firms. We define AI and discuss 'AI activity model'. The practices of the efficiency model are home equipment-based personalization and media content recommendation. The practices of the expert model are media content commissioning, content rights negotiation, copyright infringement, and promotion. The practices of the effectiveness model are photo & video auto-tagging and auto subtitling & simultaneous translation. The practices of the innovation model are content script creation and metadata management. The related use cases from 2012 to 2017 are introduced along the four activity models of AI. In conclusion, we propose for media companies to fully utilize the AI for transforming from traditional to successful digital media firms.

Keywords: Media firm, media content, media marketing, artificial intelligence, business model

1. Introduction

Internet business is evolving toward connected platforms consisting of both hardware and software and the spotlight is shifting from mobile applications to a connected platform. Meanwhile, artificial intelligence (AI) technology should accelerate Internet firms' efforts to improve the quality of existing services and develop new products and services [1]. Recent acquisitions by Google, Apple and Amazon already showed interest in AI technologies such as robotics, expert systems, computer vision, and speech, gesture and facial recognition. They are creating new research labs devoted to innovating with these technologies, and the number of AI vendors has increased dramatically. Microsoft's recent connected home strategy is less developed than those of rivals Amazon and Google, but it is working on a feature that will run on Windows 10 PCs and laptops, turning them into a home hub, with Cortana taking a central role [2].

In IBC (International Broadcasting Convention) 2017, there was a heated debate about the broadcasting industry and AI. Benefits of AI include lower costs for services, better quality and consistency of services, improved education and medical treatment, and better, faster, more informed business decisions. The greater value comes from understanding the multitude of related technologies and integrating those technologies into full solutions of various industries. The media business is changing. From the creative process to content

delivery and audience engagement, AI has a big effect on the media industry. A future can be imagined, where computer-generated movie characters blend in seamlessly with their human counterparts. Therefore, the purpose of this study is to develop AI based business activities in whole value chain of the media industry. For it, it defines the AI and discuss activity model initiated by a global research company, Accenture. With this backdrop, it organizes the research questions and investigate those four types and each use case of activity model for developing the AI based media businesses.

2. Theoretical background

2.1. The concept of artificial intelligence (AI)

AI is the simulation of human intelligence processes by machines, especially computer systems. Based on intelligence, humans can infer, decide, and act in given circumstances. ML is the science of getting computers to learn without being explicitly programmed and its types are supervised, deep, and reinforcement learning. Supervised learning has a specific preset outcome determined by a human before the machine begins to learn, but the algorithm doesn't receive clear determination on input data. In reinforcement learning, a machine's actions and the rewards they produce affect the subsequent data it receives and continues to complete the task in a way that maximizes rewards. Deep learning is algorithms inspired by brain structure, called artificial neural networks. AI reaches human levels in speech and visual recognition [3]. Machine learning (ML) is means of AI. It means, ML is one approach to AI research, wherein the machine is taught how to learn, rather than being programmed with knowledge. It is given raw data and a desired outcome, then left to figure out the best way to use the former to achieve the latter.

AI is information system to sense, comprehend, act, and learn [4]. First stage is sensing, i.e. a border-control kiosk can use facial recognition to sense characteristics of travelers. Integrated with other technologies such as multispectral image analysis, extensive information databases and matching algorithms, an integrated solution can improve security by identifying people on unauthorized entry lists or others posing a risk. Video analytics is another sensing, i.e. it can automate observation and incident detection by video surveillance cameras. Other applications can help companies improve physical security at their premises, or they can help retailers count visitors or recognize customers as they enter a store, so marketer can provide personalized services. The second stage of AI is comprehending. AI systems comprehend through technologies like natural language processing, inference engines and expert systems. These have a wide range of applications across multiple industries. For example, a medical diagnostic system can help doctors identify diseases and suggest treatments. The third stage is acting. AI system acts independently and can act within a process, through technologies such as inference engines and expert systems, or it can direct action in the physical world. The last stage is learning. A distinctive feature of all types of true AI solutions is their ability, through ML, to adapt their capabilities based on experience, rather than to have all the rules hard-coded. Computers can process complex questions and give answers, but applications are not easy for process and any change should be required programmatic modifications. AI system is self-learning and more like bright student.

2.2. Activity model of AI

Companies think about types of work automated by AI solutions. Figure 1 provides the guidance [4]. AI solutions can be considered based on two criteria: The complexity of the work that is being done and the complexity of the data and information being worked with. On the one hand, the work can be routine, predictable and rule-based, i.e. clerical work and claims processing or credit decisions. At the other end of the activity is ad hoc and unpredictable and requires the application of human judgment, i.e. the work of research scientists or architects, financial advisors and consultants. In terms of data complexity, data is sometimes quite

structured, stable and low volume, i.e. budget data or sales data. At the other end of that spectrum, data can be unstructured, volatile and high-volume, social media, multimedia data, sensor data and so on.

The framework resulting from the work and data complexity posits four types of activity model. Activities that are closer to the bottom left of the matrix are more likely to involve cognitive work automation, while those closer to the upper-right part of the matrix are more likely to use AI to augment human capabilities. It is important to note that many jobs will have characteristics that span the different models.
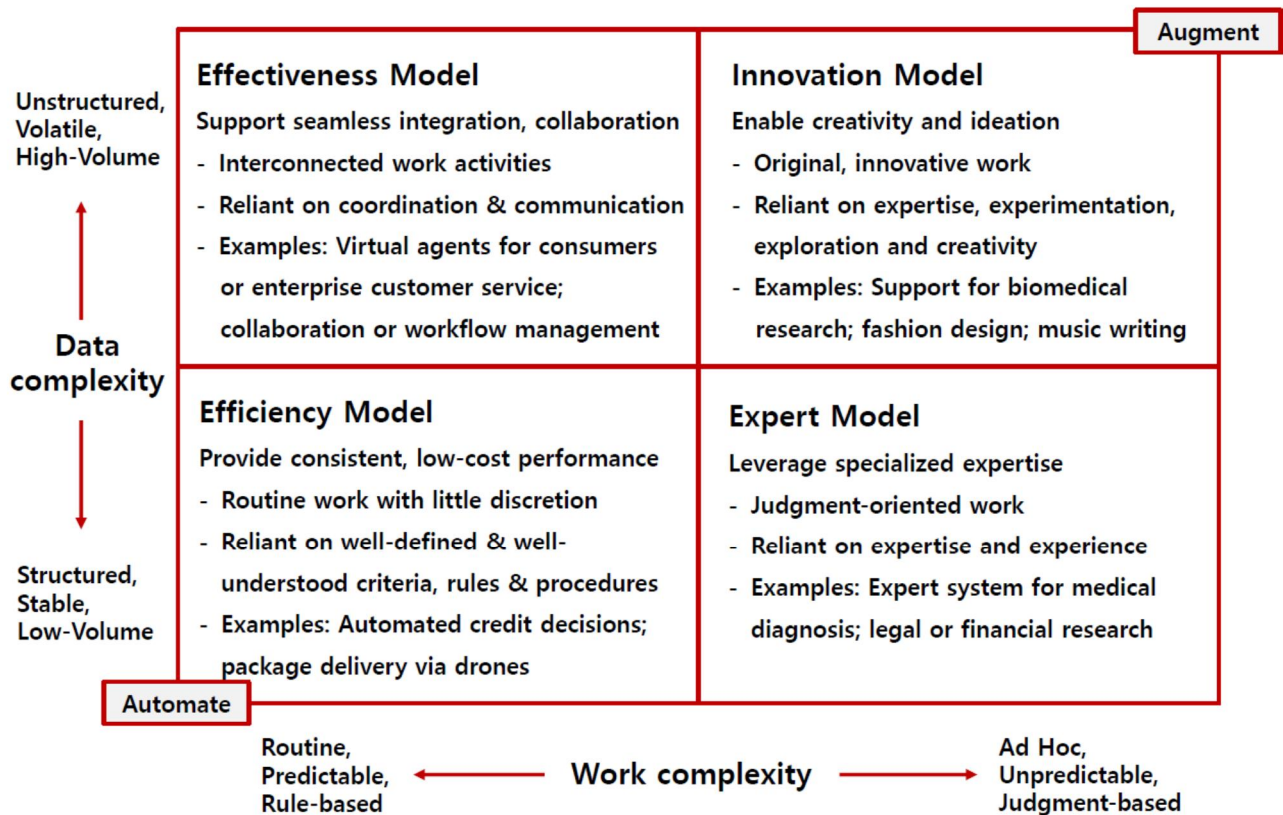
Augment

Effectiveness Model

Support seamless integration, collaboration

- Interconnected work activities
- Reliant on coordination & communication
- Examples: Virtual agents for consumers or enterprise customer service; collaboration or workflow management

Innovation Model

Enable creativity and ideation

- Original, innovative work
- Reliant on expertise, experimentation, exploration and creativity
- Examples: Support for biomedical research; fashion design; music writing

Unstructured, Volatile, High-Volume

Data complexity

Efficiency Model

Provide consistent, low-cost performance

- Routine work with little discretion
- Reliant on well-defined & well-understood criteria, rules & procedures
- Examples: Automated credit decisions; package delivery via drones

Expert Model

Leverage specialized expertise

- Judgment-oriented work
- Reliant on expertise and experience
- Examples: Expert system for medical diagnosis; legal or financial research

Structured, Stable, Low-Volume

Automate

Routine, Predictable, Rule-based ← **Work complexity** → Ad Hoc, Unpredictable, Judgment-based

Figure 1. Tasks and solutions of the AI activity model

The efficiency model characterizes routine activities based on well-defined rules, procedures and criteria and its goal is to provide consistent, low-cost performance, in which technology senses, comprehends and acts, while the role of humans is to monitor the accuracy of the solution as well as to determine how the rules need to evolve as business conditions change. ML improves such rules. An example of the efficiency model can be seen in automated decision-making capabilities that can be embedded into the normal flow of work.

n the expert model, work involves judgment. It is reliant on individual expertise and experience. Decision making is taken by humans, while technology's role is to augment human sensing and decision making, enabling analysis and offering advice and implementation support. The expert systems search vast data stores and make recommendations based on the knowledge. An important distinction among those solutions is whether the system functions as a primarily autonomous system or not. The medical diagnostic system is an example of an advisory system augmenting human judgment. Medical doctors want to interpret the results of the expert system's analysis and present a personalized diagnosis to the patient. In other case like car configurator, a personal relationship is less important. Thus, the expert system interacts directly with a user in natural language without the need for a human intermediary exercising interpretation and judgment.

The goal of the effectiveness model is to improve the ability of workers to produce a desired result. They

require more deep knowledge of their industry, company and business processes. Their success involves a wide range of interconnected activities like administration, managing, sales and so on. In these works, technology acts as a personal assistant on behalf of humans at their direction. Workers use the cognitive tools to assist in scheduling, communicating, monitoring and executing activities. AI helps them be better at what they do. Virtual agents are examples.

Recently, consumers are using virtual agents like Siri and Google Now as an application on their smartphones. Virtual agents receive requests in a textual or verbal form, process them using technologies such as natural language processing or speech recognition, search their knowledge repositories or the Internet, formulate hypotheses and then give the answers back to the consumers, again in text or speech. At the corporate level, virtual agents are handling many of the routine questions of customer service center. Only when questions are not resolvable from an automated knowledge base, a user would be referred to a live agent.

Lastly, in the innovation model, AI solutions enhance human's creativity with AI activities. Humans make decisions and act, while technology helps identify alternatives and optimize recommendations. An example is an intelligent software program from 'Platinum Blue Music Intelligence.' It analyzes a song and provides recommendations to increase the likelihood that the song will be a hit. Billed as a tool to assist artists and producers, Platinum Blue's technology uses spectral sound-wave analysis to offer advice.

3. Research design

3.1 Research question

AI's interest in the media industry increases because of fierce competition between traditional pay TV and new disruptive over the top (OTT) TV & video. In this situation where the existing broadcasting service is struggling with the offensive of the Internet service, traditional media firms are interested in the AI and this is because the production of broadcasting content based on the content usage data of the customer is indispensably required. Internet broadcasters too, were able to provide broadcast curation services and so on. Through adopting AI technology, media firms can improve the quality of existing and new platform services. Higher quality services lead to an increase in customer's service usage and growth in revenue, resulting from greater satisfaction for advertisers, as well as a reduction in processing time and costs. As a core area of cognitive science, various subfields of AI, encompassing ML, voice recognition, translation, and multimedia recognition technologies, are applied to a wide array of existing services, namely search and news services.

Media firms see the potential in AI investment, which enables them to create business models to recognize media and behavior from millions of examples, to analyze and process volumes of media that simply cannot be handled via traditional methods, to generate insights, to present new features to consumers to keep them on a site or bring them back for more, to use AI tools to support internal business decision-making. Therefore, this study will search promising AI based business models. To do this, this study firstly formulates four research questions related to the above AI activity model in Figure 1. The questions are as follows:

Question 1. What kinds of media business model are feasible in the efficiency model of AI activity?
Question 2. What kinds of media business model are feasible in the expert model of AI activity?
Question 3. What kinds of media business model are feasible in the effectiveness model of AI activity?
Question 4. What kinds of media business model are feasible in the innovation model of AI activity?

3.2 Methodology

The main work of this study is to find business practices of media firms' AI business activities. There are some field meetings for obtaining domestic media company data of domestic Internet firms such as NHN,

Kakao, telecommunication companies such as KT, broadcasting companies like SBS, MBC and AI vendors like Samsung Electronics.

However, this study covers global companies like Internet, telecommunication and media content companies even if the interview is based on talks with Korean media and AI vendor firms' experts. Therefore, the analysis is along with extensive tracking of the media industry technology and financial data released by secondary sources such as global research companies like Accenture and OVUM analysis reports & trackers and domestic site such as fnguide.com during 2012~2017, because the year 2012 is considered the initial year of big data and AI in global viewpoint. In addition, the information released by newspaper and press release was thoroughly examined and academic journals, periodicals, and financial report from stock market were investigated.

4. Results and discussion

4.1 Practices of media business in the efficiency model

The Efficiency model is related to the routine work, simple and low-cost performance and there are two kinds of efficiency model in media business. First practice is AI home assistants [5]. It is home entertainment equipment personalization and includes network and hardware. Many telecom companies' activities in home space are still limited, but a few are embracing the potential of AI assistants. As of 2017, only a few telecom operators have relied on partners such as Amazon to start their AI-enabled smart home journeys. In most cases, they are conducting pay TV business together. They have a fear to lose control over the user experience and ultimately the customer relationship, if AI speakers like Amazon's Alexa became the main TV user interface. So, more telecom firms are gradually willing to launch home AI capabilities, but in infant stage usually through partnerships only with consumer electronic vendors. As of 2017, AI starts to have a huge role to play in improving the quality of the customer experience and the quality of service. Telecom firms' strategies to monetize data are dependent on high levels of programmable intelligence and automation to handle the exponential increase in traffic and the onboarding of new devices and subscribers, along with the processing and actioning of personalized customer care responses [6]. In Europe, Vodafone leverages core telecommunication strength with network checker, and uses chatbot to alleviate customer demand and launched TOBi, its IBM 'Watson'-powered AI chatbot to reduce call center demand [7].

Internet companies' AI assistants such as Google Now and Amazon Echo offer telecom operators a chance to jump into the smart home space if they are ready to develop those. Amazon expands its cooperation with a variety of telecom and hardware partners and increase its service offerings. In June 2015, Amazon released the 'Alexa Skills Kit (ASK),' a collection of APIs and tools prompting third-party developers to build new functions into 'Amazon Echo.' The number of functions available on Amazon Echo topped 3,000 in 2016. In addition to the 'ASK,' Amazon released a toolkit, 'Alexa Voice Service (AVS),' which allows hardware makers to integrate Alexa into their internet-connected devices. It means, Alexa AI software, which has firstly been confined to Amazon products, appears in many appliances and devices, including application services [8]. Through the synergy of such meta operating system (OS) like Alexa AI, music streaming services such as Pandora, iHeartRadio also evolve into an online music streaming platform. In 2016, Google opens Google Assistant API through Google Cloud Machine Learning and launches Google Home, a voice-controlled AI appliance based on Google Assistant to compete with Amazon Echo.

As of 2017, because many telecom firms' activity in the smart home space is quite limited, a few embrace the potential of AI assistants. For example, KT's 'GiGAGenie,' SKT's 'Nugu,' Comcast's 'Xfinity Home,' and DT (Deutsche Telekom)'s 'Qivicon' offer smart home propositions with AI capabilities. Some telecom firms rely on partners like Amazon Echo for AI-enabled journeys [5]. Other telecom operators still focus on

designing virtual assistants navigating the operators' multiple products and services and on offering compatibility with third-party solutions as an add-on to combine their existing communications and media propositions with home automation and security.

Netflix develops 'Dynamic Optimizer' encoding, an AI system for network quality control evaluating each scene of video with cooperation with University of Southern California and University of Nantes, France in 2017. This determines the quality of images [9]. OTT viewer's network is adjusted by analyzing image data. It provides a clearer image quality in low quality network, for example in a 100kbps. It is estimated to provide about twice as much image quality compared to the other operators. It means, distribution environment of AI streaming broadcasting service can be improved with the AI [10].

Second practice is service personalization of TV STB media companies including OTT, which use a trained AI to help media consumers through the clutter and channel models of the ever-growing catalog of commercial media. Most recommendation has not been AI-based yet, instead of it, using simple content curation, pattern matching, or requiring so much consumer input as to render the effort pointless. Thanks to the AI technology, media companies want consumers to have a better experience. The AI based content curations have been developed mostly by OTTs rather than traditional pay TV operators.

As OTT provider, first attempt has been tried by Microsoft (MS)'s Xbox One, originally game console box. MS found out, when it initially can position the console as a simple aggregator of media sources. The representative OTT, Netflix has used its extensive data on consumer behavior to offer recommendations and as a bonus cover up the new, high profile film and TV shows in its catalog. Netflix's advantage compared to home TV STB based personalization is that the complex training of the AI can happen in the cloud. Netflix as pioneer expressed its interest in AI-based content curation in the late 2000s. From 2007 to 2009, it devised algorithms for AI that can recommend content precisely and held "Netflix Prize," a competition that shows Netflix's interest in AI content curation [11].

As linear broadcasting companies with channel programming, US based ZoneTV uses AI for channel curation. It is possible to view channels suitable for TV viewer's personal taste. By analyzing viewer behavior, ZoneTV has partnerships with pay TV operators like Comcast, AT&T, DirecTV, etc. [9]. ZoneTV utilizes AI technology for TV channel programming. Its Dynamic Channels provides 14 individual linear TV channels for a highly personalized viewing environment as 2017. Its 'My Zone' imports the content from all channels in Dynamic Channel and applies advanced metadata to determine various topics, emotions, and interests of viewers. Thus, viewers can create their own lineup of programs and enjoy more personalized services through manual tuning [12]. The AI can be also applied to advertising curation as well. For instance, IRIS.TV's 'Campaign Manager' can serve ads to users based on their individual behaviors [13].

4.2 Practices of media business in the expert model

The expert model requires human judgement-oriented work and there are four kinds of expert model based on the human experience: Media content commissioning, rights negotiation, copyright infringements, and marketing. Firstly, content commissioning is an important part of the pre-production and it starts with the idea of writer and commissioning editors identify media products to publish, ensure authors deliver typescripts to specification and on time, research their field on order to learn about trends in the market. For this, the experts usually attend media fairs, conduct Internet research, and draw up surveys to identify demand. However, media industry experiences that the increase in volume of scripted and reality shows soon lead to a crash. Much of this increase is from new players like Amazon and Netflix investing heavily in original programming and improvements in output from channels such as Showtime and HBO. TV shows are high-risk, high-return undertakings. Dozens of series make it through only one season, and some are canceled after only a few

episodes. A deep-learning algorithm can help content commissioners pick TV shows that will be hits by analyzing a wealth of historic data from thin data perspective and qualitative anthropological study from thick data perspective as well. The success is difficult to predict. However, compelling evidence that firms like Netflix are already using some AI decision-making tools and both Stranger Things and BoJack Horseman have benefited from this rigorous process [13].

Netflix aggregates consumer data for content curation, which are combined with its extensive content meta-tagging enables it to be smarter at rights negotiation too. Its series 'House of Cards' was greenlit via data analysis. Such efforts have switched from traditional data mining to AI-driven insights, along with using its recommendation engine to reduce consumer churn. Newcomers have little media of their own and even less experience of negotiating the rights to other commercial media and ML technology is needed. For example, device manufacturer, Chinese Huawei offers OTT services to telecom companies globally, with a particularly strong client base in emerging markets. Huawei's OTT platform gathers data at the TV STB regarding what consumers are watching, what they are skipping, and how they use the user interface (UI), regardless of whose content or application is being used. Its AI analysis enables telecom companies to judge the value of new content for their audience [13].

With massive volumes of video content being uploaded, advertisers, well-known brands, and media owners are concerned about the copyright infringements. Their content can be at risk of being abused [14]. YouTube runs the AI based 'Content ID' from 2012, which is 98% automated and redistributes over \$2bn in advertising revenue to legitimate media content owners. YouTubers who choose to monetize videos can't earn money off them if disputing a copyright claim. A visual content filtering company, Kuznech also uses deep learning to search images and video for copyright violations and adult content, enabling brands to monitor misuse and escalate take-down notices. It is an innovative approach based on logotype detection, text recognition and scene classification by algorithm of 'convolutional neural networks (CNN).' It tracks illegal distribution of video content: It analyzes the uploaded videos and assigns to each file a special set of descriptors to store them in the database. Newly added video file is being assigned with new hashes. Algorithms compare descriptors of the input video with hashes of other videos in the database, reveal matching videos and determines duplicates.

As with the optimization of advertising based on user behavior analytics, higher level of marketing campaigns can be created by using AI to determine what will resonate with potential audiences. This is the mirror image of consumer personalization. The users' preferences can be fed into promotion pieces. For instance, Sony Pictures uses AI chatbot in a purely promotional way, unleashing "Resident Evil" Red Queen on social media to promote the latest installment of that film series. The trailer for horror movie, "Morgan" created by IBM Watson in 2016 is an example for promotion [15]. It was trained with successful existing trailers. The trailer is incoherent, but it shows how this type of short form material can be assembled from full-length video by an AI in the future. The trailer of this movie is a collection of the industry's attention. To this end, Watson taught about promotion films of 100 horror movies. Image of videos and table of actors and screen switching effect and speed, background music, etc. have been into the data, and combines the elements. The combined videos have been released and got people's ratings and improved Watson's capabilities. "Morgan" trailer has been completed in this way and it is hard to distinguish from the real person. It is estimated that it implemented the fear feeling properly. Even if the movie teams don't have a production team, AI can provide attractive visual content to viewers [9].

Further up the marketing, new firms like Persado and Emersys offer AI-based B2B solutions to their clients to optimize messaging and targeting [13]. Persado's AI-powered marketing software is designed to help media companies create personalized marketing campaigns for individual customers based on their past engagements.

4.3 Practices of media business in the effectiveness model

The effectiveness model can support the collaboration among diverse entities of content providers, telecom operators, device manufacturers and solution providers. It requires interconnected work activities. There are two kinds: Photo & video auto-tagging and auto subtitling, alternative text & simultaneous translation. For the former, Facebook sees ca. 300 million photo uploads per day, while YouTube sees about 300 hours of video uploaded every minute. If a tiny percentage of this content would be properly tagged with information such as metadata, the virtual agents can develop more sophisticated curation for media consumers. For instance, this can make searches, e.g. "show me pictures of Obama from last year" easier for consumers. Several solutions are possible for the firms that aim to tag landmarks, people, and locations in photos.

Facebook has done this for some time with photos, as has Amazon with its 'PrimePhotos' which is packaged as Amazon cloud computing, AWS [16], called 'Rekognition.' It offers solutions, some of which are comparable in terms of functional details, quality, performance, and costs. With 'Rekognition,' AWS offers a tool for analyzing static images and getting data about them out of those image files. With this video version, developers automatically get information about the objects in a video, the scenes they are set in and the activities that are happening in them. The service includes support for person detection and recognition. It can track people through a video and filter out potentially inappropriate content. Recognizing objects and people in videos is harder than doing the same thing in images. 'Rekognition' can automatically generate metadata from video files. There are other auto tagging solutions like 'GoogleVision' and 'CaptionBot' of MS. YouTube applies for number of patents in the area, and there are a bunch of startups like Clarifai.

For the auto subtitling, alternative text & simultaneous translation, the sheer volume of new photos and videos created by consumers and commercial operations can leave the visually and aurally impaired out. For traditional broadcasters, accessibility has been handled by manually adding subtitles or using onscreen sign language, processes that are not feasible for a much wider range of video.

However, some companies take the next step to add subtitling and thematic descriptions to content. For example, Facebook's 'Automatic Alternative Text' enables visually impaired users to have images described to them. Google's 'DeepMind' is a collaborative study with Oxford University, using over 5,000 hours of TV program footage. It's transcribing capacity also was 46.8% accurate, higher than the experts in the field, 12.4% [17]. Google's 'DeepMind' can lip-read with a much higher accuracy than human lip-readers, though its success rate is still lower than audio voice transcription, which is also done with an AI. YouTube has over one billion auto-captioned videos, and its accuracy rate is increasing by leaps and bounds. Once an AI gets good at speech-to-text or even recognition of text in-video and picture, simultaneous translation is the next step. Microsoft's 'MS Translator' is used in Skype and Bing. But capturing nuance and emphasis in natural speech is a challenge even for recent AIs [10].

4.4 Practices of media business in the innovation model

The innovation model enables creativity and ideation. Thus, it is the area of content creation in media business. If an AI can pick winning program concepts, it can write that content too. This model has several sectors like script writing, analytics, editing in production and metadata management in distribution.

In case of the script writing, a trained AI can generate original music. For example, Google's 'Magenta' can write short piano pieces. Sony's 'Flow Machines' can generate pop songs. DeepBach can generate Bach's pieces. SCSL (Sony Computer Science Laboratory) is not only popular music composition, but also AI itself utilizing virtual bands, playlists, etc. Its 'Flow Machines' has over 13,000 popular songs learn the music score and made Beatles-style new music score, "Daddy's CarWrote" in 2017 [18]. Alex Da Kid has released "Not Easy" of a heartbreak theme with a music authoring tool from IBM's 'WatsonBeat' and the song have entered

on the top of the various ranking charts. 'WatsonBeat' has provided drafts of music score and text by learning articles of the New York Times, the film synopsis, the Supreme Court judgment and the pattern of popular music [19].

The most promising example of the script writing is short film "SunSpring," starring Silicon Valley's Thomas Middleditch, which was written by an AI. The approach is to use an AI to spot popular themes, tropes, and trends to inform and give direction to a human writer [13]. In 2016, the filmmaker, Oscar Sharp and the AI researcher, Ross Goodwin jointly developed the script writer AI, 'Benjamin.' It has produced a script that has been evaluated to show a certain level of perfection [17]. 'Benjamin' has worked on "Star Trek," "2001: A Space Odyssey," "X-File," and so on. Through these jobs, 'Benjamin' has completed 9 minutes short science fiction (SF) movie, "Sun spring," and the filmmaker, Oscar Sharp made real movie based on this script. After "Sun spring," 'Benjamin' also made a short SF movie script called "It's No Game" and this is better scenario than the former "Sun spring" [20].

The example of the analytics of future script scenario is HBO's "Game of Thrones." A fan of the drama and software engineer, Zack Thoutt made the AI to learn five book titles of published "Game of Thrones" and the AI predicted the following story and learned the story style of George R. Martin, the author of "Game of Thrones" after reading a total of 5,376 pages of those books. The story written by the AI is not perfect in terms of the grammar and there are some limitations that the character remains dead and does not realize that this is dead [9].

For analyzing attractive script story, an AI predicts whether script can lead to mass appeal or not. It is easier to proceed with marketing from the pre-production stage. In 2017, Disney Research released an AI [14]. It used North American social media platform, 'Quora,' which functions as a response platform. The learning process of this AI based platform, 'Quora' is as follows: Firstly, there are randomly selected 21 questions that could be answered in a story format and then 55,000 responses from the questions have been extracted. Out of those 55,000 answers, 30,000 answers containing the nature of the story is selected through the active learning technology. Out of 30,000 answers, again the answers that is composed of less than 50 words or has less than 50 responses have been excluded and only 28,000 answers which is composed of 369 words on average have been collected for analytics. The analysis has been done in the aspect like harmony between paragraphs and whole context, and the pattern was learned. Disney Research expects that it is not possible enough to analyze the story, but the ability to predict the quality of a story is affecting the creation and understanding of the story [21].

Last business practice is metadata creation and management. As broadcasting media content is digitized, metadata can describe characteristics of specific content data additionally. To maximize the usability of broadcasting media content, the creation of metadata is indispensable. It is needed to quickly search for scene. In the past, the method of inputting it was utilized after directly viewing the image by the person. As the AI appears based on the ML, the accuracy of the metadata is expected to increase dramatically. For instance, IBM's 'Watson' won a major tennis tournament "US Open" and edited its highlights and automatically get metadata at the same time. It is expected that AI can dramatically increase the availability of video content. This means that the creation of metadata is also influencing the classification and management of metadata.

This study shows the results as table 1. The results give references to traditional media firms that have few ideas about utilizing the AI technology. The application of the AI to digital media is still in its infancy with exception of application service-based recommendations like Netflix's offering. It is a good time to take a step forward along with the AI activity model framework. It is recommended for media companies to collect data, to have dynamic partnership with AI platforms being made available for specific tasks, and to create their AI platform for media users, because the boundaries between solution and media owners are blurring. Even if the

results are subject to limitations to analyze a few companies based on the limited reports and press releases, this study offers a basis providing a framework of AI activity model. Further study is suggested to compare more media companies in competition along the four detailed types of the AI activity model.

Table 1. Key summary of the result and use cases

4 models	Key tasks of AI activities	Media platforms' use cases
Efficiency model	Routine work with little discretion. Highly reliant on well-defined and well-understood Criteria, rules and procedures	**Home equipment-based personalization** - 3rd party speaker assistants: Amazon's Echo, Google's Google Now - PayTV's own speaker assistant of home services: Kt's GiGaGenie, SKT's Nugu, Comcast's Xfinity Home, DT's Qivicon - Personalization of streaming network quality: Netflix's Dynamic optimizer **Application-based recommendation** - Microsoft's Xbox1 (Game console-based OTT) - OTT video content curation of Netflix's Cinematch - TV channel curation of ZoneTV's AI, Dynamic Channel - TV advertising curation of IRIS.TV's 'Campaign Manager'
Expert model	Judgment-oriented work. Highly reliant on expertise and experience	**Content commissioning** - Netflix's decision-making tool based on Cinematch - IBM Watson's decision-making based on the trailer completed by AI **Rights negotiation** - Huawei's OTT content right negotiation with TV platforms **Copyright infringement** - YouTube's Content ID **Promotion and marketing** - Sony Pictures' AI chatbot for promoting 'Resident Evil' - IBM Watson's movie trailer of 'Morgan' - Startup firms, Persado and Emersys offering AI-based B2B solutions
Effectiveness model	Wide range of interconnected work activities. Highly reliant on coordination and communication	**Photo & video autotagging** - Amazon's Rekognition - Google's Google Vision - Microsoft's CaptionBot - startup firm's Clarifai **Auto subtitling and simultaneous translation** - Facebook's Automatic Alternative Text - Google's Deep mind - Microsoft's MS Translator
Innovation model	Original, innovative work. Highly reliant on deep expertise,	**Script writing, analytics, editing in production** - Google's art creation AI, Magenta

experimentation,	- Sony's music creation AI, Flow Machines
Exploration and creativity	- DeepBach's Bach-style music script creation
	- SCSL (Sony Computer Science Laboratory)'s Flow Composer
	- Alex Da Kid's 'Not Easy' using IBM's Watson Beat
	- Benjamin's script creation of 'Sun spring'
	- Script analytics of HBO's 'Game of the Thrones'
	- Disney's collaboration with 3rd party AI, Quora for story analytics
	metadata creation & management in distribution
	- IBM's Watson's sports metadata creation

5. Conclusion

Media firms can decide possible strategic options among the results for taking advantage of AI. Two factors are needed to make most of the result options work. The first is obviously to seek huge data set as much as possible for ML purposes. Neural networks need vast amounts of data to be trained and learned. Having too little data means either that the question being investigated must be narrowed until it is meaningless or that wrong answers are far more likely. Therefore, media companies for B2C business need their own user data and huge amounts of social and search data such as Facebook, Google, and Amazon. The second is to search monetization method by applying the AI. Unless a media company can generate more revenue, reduce cost, increase number of the consumer, or enter new markets, the AI insight has no meaning. Especially, traditional media companies such as telecom service providers are in the best position to take advantage of the AI technology and it is assumed that they can develop their training data based on their network and cloud computing, or they can acquire it via some partnerships with 3rd party solution providers like Amazon and Microsoft. If they have already a good brand recognition, enough audiences, and convenient delivery mechanisms, that can make AI insights work for them.

Acknowledgement

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