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ISM 647 Final Project:
Cognitive Computing & Artificial Intelligence Industry, Tools, and Technology Assessment

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Contents

Executive Summary

In this report, we briefly explain cognitive technology and artificial intelligence methodologies and their roles in business and government, then we dive into our specific industry of focus – the **Media and Entertainment Industry**. While this industry consists of film, print, radio, television, video games, and music, we will take a look at topics particularly relating to *digital* media and entertainment. Most of the advances in this industry have been in streaming platforms for music and television, as well as breakthroughs in Hollywood film production and gaming. We will discuss these developments and how the use of artificial intelligence and cognitive technologies continues to be a driving factor in company competitiveness and sustainability. This is an industry where offering broad, generalized services is no longer the standard – with both services and advertising. With music and television streaming services, like Netflix and Spotify, we discuss how these industry leaders use personalized content and recommendations to serve both their customers and their advertisers. In the past, advertisers would pay to have their ads randomly played between breaks of a show's episode; but now, ads are tailored to specific viewers based on factors like age, if you are a parent, gender, etc. based on specific shows that are geared to certain demographics. Not only can companies see an increase of sales and website traffic due to this customization, users can come across products and services that otherwise they may not have heard about that would benefit their lifestyle; plus, streaming services are able to increase the advertising fee due to this customization, boosting advertising revenue. It is a win-win for all involved.

We also interview a small movie director, who has noticed and benefited from this technology first hand. We will discuss his experience with these technological advances in this field. As great as these technologies are, this industry also faces just as many challenges as they do opportunities. We will discuss these in this report, as well as short-term and long-term impacts of these technologies on the industry, such as privacy concerns and unemployment.

Introduction

In the media and entertainment industry, there are plenty of companies offering enticing options to meet customer's entertainment demands. However, the income growth rate has slowed from 2016 – 2017, encouraging many companies to turn to artificial intelligence and cognitive technologies to increase business (Vault, 2018). This newer approach to focus more resources on cognitive technology developments over the last couple of years has forced companies to dive into their processes and develop systems that make them stand out and impress their customer base, which result in customers not only choosing certain platforms for their entertainment choices, but also seeking recommendations from these companies, such as streaming services for both music and television. In this report, we will take an in depth, vertical look at this industry and the successful growth and advancements made to increase sustainability and improve customer retention.

Cognitive Technology & Artificial Intelligence

What are cognitive technologies and processes?

One of the best ways to understand cognition is to discuss how it relates to intelligence. Cognition is a mental process needed to carry out any task, that may or may not necessarily require intelligence. It involves the different methods of how you remember, focus, pay attention, and learn, rather than actual acquired knowledge. Cognition is the process of the mind in charge of thinking, knowing, and creating knowledge; and intelligence is the ability to understand what you have reasoned, perceived, or learned. Without cognition abilities, one cannot have intelligence, which is why cognition is referred to "the engine of intelligence".

Cognitive Computing takes this "engine" and applies it to emerging technologies to carry out traditionally human tasks using the biological processing of information in the nervous system as inspiration. Therefore, applying this information to the field of artificial intelligence, cognitive technologies are programs that are able to perform tasks that only humans used to be able to do. Examples

of cognitive technologies include computer vision, natural language processing, speech recognition, and various machine learning techniques, with the largest and most profound area of research being Deep Learning Artificial Neural Networks.

ANNs use deep cognitive processes to develop simple concepts in the beginning and build on those to form more abstract ones. A Deep Learning based ANN trains itself using, for example, feature selection, to reach a particular output based on the knowledge it currently contains.

What is Artificial Intelligence?

Artificial intelligence has various definitions and meanings that constantly change and evolve over time as AI improves and opens new realms of research. On a broad level, artificial intelligence is the theory and development of computer systems able to perform tasks that normally require human intelligence. It has two purposes – one is to augment human thinking, making them stronger; the second is to understand how humans think.

The groundbreaking idea of studying AI is to test new programs based on not only what tasks they can accomplish, but *how* they accomplish these tasks – this is a major difference between Artificial Intelligence machines and Conventional Computing machines. AI machines and software are designed to only need the problem, not the steps necessary to solve it.

It uses various machine learning techniques like clustering, pattern matching, and many others to learn how to solve the problem on its own, learning each time and improving with each successful outcome. Conventional computing machines can only solve the problem if you give it the logical steps to reach the desired outcome – it does exactly what it is programed to do; it does not learn.

Roles and Methodologies Driving Cognitive Technologies & Artificial Intelligence in Business & Government

Both cognitive technologies and artificial intelligence play a major role in the government sector and in various fields of business. Cognitive technologies offer the possibility of an otherwise highly unusual accomplishment of increasing speed, enhancing quality, and reducing costs simultaneously.

Automation

There are two ways automation can be applied using cognitive technologies – by augmenting employees and specialists or replacing them entirely. One way to start breaking down the automation process is to separate individual activities and tasks from jobs and see how susceptible they are to automation. This can determine the number of labor hours that can be freed up or eliminated in each job or position within an organization. By automating manual tasks such as factory or farm machinery used to complete repetitive tasks quickly with greater accuracy, and routine clerical tasks such as data entry and note logging, this can free up time employees and specialists can use to focus on specific areas of work where AI cannot compare to human interaction or abilities – this leads us to more advanced programs and systems that support the automation of intelligence. For example, in the medical field, AI and cognitive technologies like machine learning, computer vision, and machine translation can be utilized to organize and log doctors' notes, diagnostic findings, and lab work for patients, and even form algorithms to detect diseases like cancer from recorded scans.

By decreasing the amount of paperwork and assisting in diagnostic abilities, this frees up time the doctor can use to provide quality medical care by increasing time spent comforting and discussing care with patients face-to-face, allows them to see more patients, and can drastically reduce errors. Another example would be an automated voice that provides basic customer service support and answers to tier-1 level questions. In a banking call center for example, most calls received are questions that fall under this category; like changing an online banking password, checking your account balance, and operation information of nearby branches.

Automation can deliver at a level almost impossible for human agents to keep up with; the voice essentially answers immediately as soon as the caller connects to the number. According to IBM, by 2020, 85% of all customer interactions will be handled without a human agent. AI, chatbots and automated, self-service technologies free up call center employees from these tier-1 support questions so they can focus on more complex requests and responsibilities. In government, the Department of Homeland Security uses a virtual assistant known as EMMA to assist with answering questions; the

machine responds to supervised learning in the form of customer feedback, which tells EMMA which answers are helpful, improving her understanding of the data being used.

Knowledge Management Technologies

Another major role AI and cognitive technologies play in business and government is through the development of Knowledge Management Technologies, specifically through Expert Systems and Decision Support Systems. Knowledge Engineering systems convert implicit knowledge to explicit knowledge, which enables knowledge to be moved from the individual level to multiple organizational levels.

Through these systems, knowledge is able to be extracted and preserved so other individuals, or the next person who fulfills a particular role, can build on that knowledge, making it an asset that is constantly improving and available to everyone in the organization. These systems are sophisticated rule-based systems using IF-THEN functions to collectively come to a conclusion an expert usually would only be able to achieve.

These machines use cognitive processes, such as problem solving, strategic planning, and decision making to find, select, organize, disseminate, and transfer important information and expertise necessary for particular tasks or activities. An Expert System makes accurate recommendations for situations, as if an expert were using their expertise to make these recommendations themselves. For example, recommending a personalized budget based off data gathered about your spending habits, saving goals, amount of acquired debt, etc. A Decision-Based system may include an embedded expert system, but these systems support and augment the knowledge, allowing it to be processed in a way that makes sense to the user and their own decision-making process.

For example, a system can help you make a decision on how much money to save for retirement. Using the information, you can present scenarios that apply to your particular goals, for example if you want to retire early, or if you want to save more than the average amount; the expert system can augment your decision-making skills on how much you need to save.

There are currently several areas of government were expert systems are being researched and implemented, for example, personnel assessment in hiring due to the large amount of government employees, legal advice expert to assist with outside contracts and vendors, and intelligent automated auditing software that can assist in detecting fraud, especially when dealing with outside vendors that do not work for the government.

Future Roles for Business and Government

When looking at the ways business and government have both improved over the past 5-10 years because of breakthroughs in AI and cognitive technologies, it is exciting to think of the possibilities to come. Through the continuing studies of more complex machine learning techniques, such as Deep Learning and ANNs, businesses will be able to better support real-time tracking, better decision-making and increased predictions due to predictive analytics models, and improved resource allocation.

As these systems develop, in the next 5-10 years, they will also be made more available and the ease of use will improve as well. With platforms such as IBM Watson and Microsoft Azure, these programs will continue to improve accessibility and user-friendliness. Developing research will continue to push the boundaries of smarter cars, homes, phones, and programs that assist in business and government operations, resulting in more sophisticated cognitive technologies – a game changer for businesses and government sectors looking to break through the barriers of backlogs and resource constraints.

Media & Entertainment Industry Selection

Rationale behind Selection of Media and Entertainment Industry

In this report we are going to discuss current scenarios and how Cognitive Computing and Artificial Intelligence is transforming “Media and Entertainment Industry”. Artificial Intelligence has made extraordinary progress in the banking, automobile & healthcare industries as compared to media and entertainment industry. A PwC report predicts the total revenue in the media and entertainment industry

will reach $2.2 trillion in the next 3 years. The industry's growth rate has, however, slowed by 0.2% in 2017, prompting many companies to turn to artificial intelligence and cognitive technologies to increase business. Thus, we chose to study the future scope of cognitive computing and artificial intelligence in the media and entertainment industry. In the Media and Entertainment industry, artificial intelligence helps companies meet the increasing consumer demand for personal recommendations and personalized entertainment experiences.

Overview of Media and Entertainment Industry

The media and entertainment industry consist of film, print, radio, television, video games and music. These segments include movies, TV shows, radio shows, news, music, newspapers, magazines, and books. The top 10 media and entertainment companies are The Walt Disney Company, 21st Century Fox, Direct Group Holdings, Time Warner Inc., NBC Universal, National Amusements Inc., CBS Corporation, Viacom Inc., News Corporation, and TEGNA Inc. The U.S. media and entertainment industry contributes more than $632 billion to the economy and represents a third of the global industry. Media and entertainment companies have had to figure out ways to adapt to these technological developments while still attracting consumers and staying solvent. Television networks offer previews and reruns of TV shows on their Web sites. Readers can sample small portions of eBooks through Amazon and other booksellers before buying. Newspapers such as the New York Times allows readers to read a certain number of articles online before requiring them to subscribe.

The film industry is mainly composed of large, multinational corporations, major studios, and independent studios. Many of the top-name film companies are part of larger media conglomerates that also include television, cable, newspaper, and magazine organizations. Within the film industry subsectors: film production, film exhibition, and film post-production. The top movie companies include 21st Century Fox, Comcast Corporation, The Walt Disney Company, and Viacom Inc. Digital technologies have revolutionized the music industry by creating high quality, low-cost recording technologies and digital distribution, along with the explosion of devices to download or stream music.

In terms of commerce, the media and entertainment industry contribute significantly to the U.S. economy. The film and television industry alone contribute more than $41 billion each year to the economy and provide nearly 2 million people with employment.

Below graph shows Value of Media and Entertainment market in the US from 2011 to 2020 (in billion US dollars)

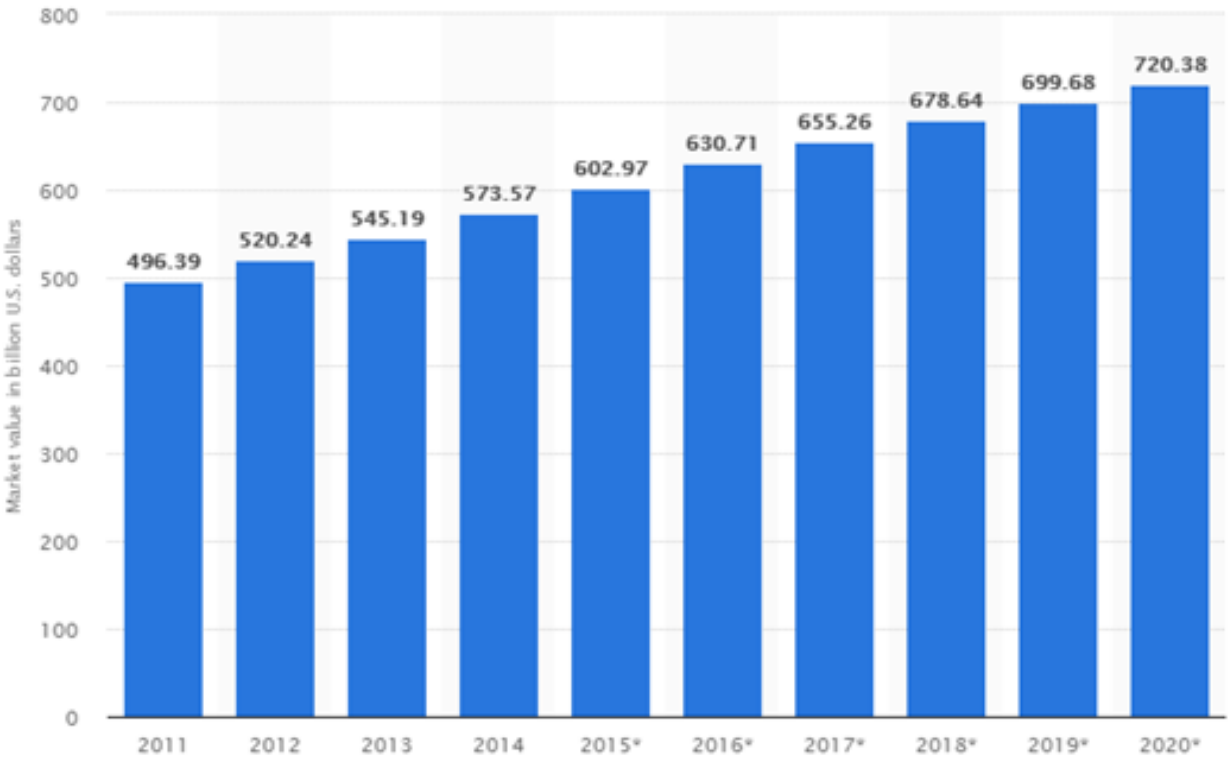

Figure 1Value of Media and Entertainment market in US

Media & Entertainment Industry Uniqueness

Below are the types of activities in Media and Entertainment industry that can be accomplished using AI and Cognitive Computing technology effectively (Robitzski, 2018).

Film Trailers

AI is automating Hollywood. AI will do more of the mundane tasks so humans don't have to do. AI algorithms can animate movie and rendered by the deep learning algorithm. IBM Watson creates first AI-made film trailer of film Morgan. IBM researchers fed Watson more than 100 horror film trailers cut into separate moments and scenes. It performed a series of visual, sound and composition analyses on each scene to get an idea of how to create the dynamics of a trailer. Watson then processed 90 minutes of Morgan to find the right moments to include in the trailer.

Once the supercomputer finished processing Morgan, it isolated 10 scenes – a total of six minutes of video. Although a human editor was still needed to patch the scenes together to tell a coherent story, the AI shortened the process down to only 24 hours when it typically takes around 10 to 30 days to complete a trailer. Thus, AI technology is used for creating film trailers.

AI written screenplay

AI is also used to write screenplay. Recently, the robot wrote a script for a science fiction movie named *Sunspring* (Kortschak, 2019). The script and movie were the product of director Oscar Sharp and Ross Goodwin, a New York University AI researcher. A recurrent neural network, which named itself Benjamin, was fed the scripts of dozens of science fiction movies including such classics as Highlander Endgame, Ghostbusters, Interstellar and The Fifth Element. From there it was asked to create a screenplay, including actor directions, using a set of prompts required by the Sci-Fi London film festival's 48-hour challenge. The resulting screenplay and pop song were then given to the cast, including Thomas Middleditch from, Elisabeth Gray and to interpret and make into a film. The actors were randomly assigned to the parts and set to it.

The result is a weirdly entertaining, strangely moving dark sci-fi story of love and despair. The sentences make sense in isolation, although the dialogue doesn't really when taken together – but if you were half watching while doing something else you would definitely get the feeling that something just happened.

Project Ticket sales and box office performance i.e. script and trailer analysis

Movie data analytics can be unbelievably powerful and can make an educated prediction of production box office sales. Analytics gives businesses the quantitative data necessary to make better, more informed decisions and improve the services they provide to their audience. Machine learning and artificial intelligence are becoming more and more common in many industries, including the Entertainment Industry. One of the most prolific examples of AI and film data analytics is at Netflix, which uses data analytics so thoroughly that they can offer "33 million different versions of Netflix" to their customers, as told to Kissmetrics (Guzman, 2018).

Artificial intelligence may soon move beyond even the performance and editing sides of the filmmaking process it may soon weigh in on whether or not a film is made in the first place. A Belgian AI company called Scriptbook developed an algorithm that the company claims can predict whether or not a film will be commercially successful just by analyzing the screenplay, according to Variety. Normally, script coverage is handled by a production house or agency's hierarchy of executive assistants and interns, the latter which don't need to be paid under California law. The company Scriptbook asserts that it would have recommended that Sony Pictures not make 22 of its biggest box office flops over the past three years, which would have saved the production company millions of dollars.

Recommendation engine

In movie and television industry recommendation engines are accurate with low latency time. Most popular recommendation systems are Content-based filtering, Memory-based filtering, Model-based filtering, Deep Learning/Neural Network filtering. Netflix recommendation system is one of the best recommendation systems. The basic data this recommendation system gathers is user interaction with service, other members with similar tastes and preferences and information about the titles, genres, categories, actors etc. In order to improve recommendation system Netflix took feedback from its user and re-train their algorithm with those feedback signals to increase the accuracy of their prediction.

AI & Cognitive Systems Use in Media and Entertainment

Today the media and entertainment industry are benefiting tremendously from the use of AI and Machine Learning technologies. Through cognitive technologies the industry is changing the changing and gaining advantages in the way it markets its content, the way it develops it content (as in AI Games) and even personalizes content. Below we present these use cases among others. Research

Marketing and Advertising

Through Deep learning algorithms system can think like humans but process through large quantities of data like Machines. Content Creators are leveraging neural networks to understand what audiences like the most. Marketers then leverage these deep learning capabilities to do analytics and understand user engagement. For example, they can use these analytics to understand which content are users not viewing and are only getting click throughs versus which ones are actually getting traffic and keeping the viewers on. This ultimately drive sales of the product and revenue. (Butler, 2019)

Social Media Marketing

A sub Category (also referred to as Social Marketing) that is using AI in media and entertainment industry is Social Media Marketing. Companies are now able to reach more customers by utilizing social media platforms such as Facebook, Instagram etc. They are able to find clients by reaching out to people with similar traits, interests and demographics. Or audiences with same age, interests (or have 'Liked' the same items of Facebook). They can also track successful their marketing campaigns are looking at the data of how often they are being clicked on.

Personalization & Content Discovery

By following and tracking user activity media and entertainment companies are able to personalize users experiences by provided them the content they typically want to see as evident by their searches or activity. From a user's perspective we are subject too much content online and being able to personalize

what I see or discover the content that I want, and only want, to see can make the difference from one platform to another and on which one to revisit in future. According to Media company Ceres from an industry perspective understanding and personalizing and making it easier to find content is key as some content created ends up with no viewers due to difficulties in discovery. AI helps address this. Companies such as Facebook, Netflix and Spotify and leaders in content discovery.

Recommenders are systems are help tremendously in helping users filter through massive content online. Through Collaborative filtering and Content Based filtering systems such as Netflix or Amazon can recommend what users can watch based on likes, ratings and matched patterns. The machine learning nature of Recommender systems helps even as new content gets added to the vast catalog of content that users already have to go through. For example, by matching a new movie's Genre together with an existing Genre list can allow a user to identify such new content.

On an interesting note, the Advanced Software Development Team (ASD) report that Netflix is working on having different movie endings. They give an example of the movie Titanic and how it would be awesome to have a happy ending where Jack actually survives. This would be good and even better example we could come up with here is imagining being able to personalize the ending of the Gladiator movie and having Maximus survive. Now that would be a happy ending seeing him in our own personal ending become Emperor. Wouldn't that be a good ending!

Natural Language Processing & Speech Recognition

In the media and entertainment industry there are areas that have been captured that are already benefiting from cognitive technologies such as Natural Language processing. Voice search assistants that convert speech to text are becoming more widely used. There is still a work in progress due to challenges for example with access, background noises etc. However, they are gaining ground.

According to Forbes, Natural Language Processing though Chatbots is on the rise. Chatbots provide answers by ‘reading and analyzing ‘the text or question presented. Talent acquisition is also leveraging Natural Language to process through resumes and job description matches. (Zhang, 2018)

Natural language processing can also lead to improvements in Closed Captioning, subtitling or translation areas. Speech to text translation is improving and leading to translations of other languages. Subtitling is usually done manually but AI is helping automate this through Speech-to-Text tools from companies like Google or Amazon. AI is reducing costs here by over 50%. (Sridhar, 2019)

Content Creation and management

This industry is also leverage AI even in how they create their content. In the case of promos for movies AI helps identify which parts of the movie or show are exciting to use in the promo. Through AI and Machine learning sports highlights are being created close to Realtime. Some sports reels are built on extensively trained models with many hours of content used. In some Realtime scenarios a combination of Natural language process and content management can be used to certain countries or regions where certain content needs to be censored visually or curse words need to be censored by bleep overs.

AI and gaming

The gaming industry uses Machine Learning to create these smart players that can play like humans. For example, the advanced algorithm called Monte Carlo Search Tree (MCST) was used in the first computer Deep Blue that defeated a human chess champion in 1977. The computer looked at many different options it could take and the possible outcomes before it made the moves. This is something that the human mind is at a disadvantage when trying to process that much data. In video games AI is used which allows users to interact with the game and in some cases developers of the game don’t give the full AI capabilities as to not disappoint the player or make the game too difficult. (Lou, n.d.)

Actual Use of Cognitive Technologies in Organizations

Netflix Recommender system

Netflix's senior Data scientist Mohammed Sabah mentioned in 2014 that "75 percent of users select movies based on the company's recommendations, and Netflix wants to make that number even higher." (Gavira, n.d.)

Below are the basics of Netflix's recommender system. Recommendations are based on the following as documented on their Help menu on their website:

- Viewing History and rating of titles
- Other users with similar tastes and preferences
- Details of movies such as Genre, actors, year

Netflix has gone beyond just the regular recommendations to users but even personalizing it more to different viewing behavior based on device, location, day and other variables.

Netflix is therefore gaining tremendously with these recommendations on the market. The benefits are obviously added users (and revenue), personalized content, customer satisfaction, among others. According to the Maruti Techlabs, Netflix estimated its recommender system to be worth $1billion a year. Netflix has also started implementing automation on a small scale within its application to increase user viewing time. When an episode of a show ends, Netflix will automatically start the next episode of that show, or if the show has ended, or if you've finished a movie, it will automatically start a recommended show or movie based on the one you just watched.

Spotify Recommender system

Spotify is another well-known system that uses a recommender system for its users. It uses 3 main services

- content based recommendation using decision trees and neural networks
- Knowledge based recommendation based on demands, preferences and predictions
- Collaborative Filtering – based on user recommendations and similar interests

The benefits of a recommender system like Spotify is great customer satisfaction, Customer retention and engagement and company growth. Spotify also has algorithms to recommend smaller, less mainstream music and artists that relate to your music tastes, so you can come across bands you may have otherwise never heard about. This benefits smaller bands and artists who are trying to branch out and grow their careers, as well as point users in the direction of uncovered gems of music.

Voice Recognition Systems - Amazon Alexa, Google Home and others

Voice activation or recognition is increasingly being used in various organizations, mobile phones and home assistants. In our homes today and integrated with our home entertainment system's network are applications like Amazon Alexa or Amazon fire. We simply provide voice commands and it will comply. For example, with Alexa we can ask it to launch Netflix and play a particular movie or we can ask it to navigate up and down in Netflix or other supported platforms like Hulu, HBO etc. Alexa will also read news headlines as well, for people who are rushing to get ready for work in the morning but still want to keep up with the media and events. Amazon Fire works the same way; you select the voice command button on the remote and you can open apps on your TV, search for shows, and other various tasks.

These programs are built based on natural language processing by recording your commands and breaking down your words into individual sounds. Every command is sent to Amazon's servers to fire back a response via Alexa, and also to be analyzed for better future efficiency. Because users are constantly feeding the machine new "data" every day, they are on a path of continuous improvement.

Hollywood Film Trailer Production

As discussed, earlier AI is automating film production in Hollywood. Using IBM Watson AI created a movie trailer for the film 'Morgan'. But feeding Watson with multiple samples of horror film trailers cut

into scenes, Watson performed analysis through Computer vision and was able to create a trailer for the movie.

Industry Interview: William Hunter – Film Assistant

As we have been studying the media and entertainment industry, we were able to get in contact with someone in the film making business. William Hunter works as a film assistant at a local studio that focuses on business and corporate training videos. He enjoys making short films as a hobby and works with a group of friends that enter films into different festivals and contests around NC, one of the most popular being the 48 Hour Film Project he participates in every year.

We asked him a few brief questions to gain a better understanding of how artificial intelligence plays a role in both his job of a film assistant and his short-filmmaking hobby.

1. **Are you currently implementing AI in your filmmaking process? If yes, please explain briefly the areas of implementation.**

My company has worked with a couple of different kinds of software over the three years I've worked here; mainly Final Cut Pro. We recently started using a program called Adobe Sensei often to edit, develop and distribute our content. I've been working here for about 3 years now, and we have changed and improved the way we store files, edit and distribute projects to clients. I feel like it makes things faster, especially editing, but it's not necessarily easier. We all had to take a class on how to use the basics, and I'm sure there are elements we have not yet implemented with this program. As the studio owner says, in order to remain cutting edge, we must advance and grow with the industry, which is very fast paced.

As far as my own filmmaking, there are options out there that would be awesome to use, but since this is my hobby, due to my money and resources, I have limited access to certain AI tools

and software. I mainly work with Final Cut Pro with editing my films, and Apple recently came out with an extension late last year that has worked wonders in saving editing time. So, AI is being implemented, but on a smaller scale, some of the most accessible options are extensions or upgrades to software already owned.

2. How is AI to useful to you in implementing in your filmmaking?

I touched on this a little in the last question, but for me personally, the first thing that comes to mind is the time saved editing. There is a lot of time and work that goes into editing videos and having these upgrades fine tune the process of transcribing, video noise reduction, and being able to sync multiple cameras to simultaneously record different Angles and frames has made me only become more passionate about filmmaking and the improvements of AI that result in better quality films.

3. **Did you face challenges to implement AI? If yes, please explain the challenges.**

I would say in my viewpoint, the most challenging task regarding my job was the training and getting everyone on board and on the same page. There are people that work here that are reluctant to change, and some even think that AI takes the “art” out of filmmaking and makes it too computer based. As The studio owner continues to implement newer technologies and AI in order for his business to grow and to give companies the quality, they are looking for in the timeframe they give us, he also has to struggle with getting everyone on our teams trained on the software and also change some people’s viewpoints on these technologies.

Newer people coming on board tend to receive training a little better and easier because it’s all they know, and they are usually excited about it. But it seems to me like the older generation in

our office is a little reluctant to change. So, keeping the environment positive during these changes can be challenging with these types of attitudes.

4. **How long did it take to get the results from the implementation?**

We saw results pretty quickly, but it was definitely a growing process. Everything didn't get better overnight, but once people started to understand the new processes and the studio owner kept up training programs and classes and support, the system itself really started to improve business and impress clients.

5. What is the overall impact of using AI in film making process? In terms of investment, resources, etc.

With me just being a film assistant, I have no clue how much it cost the studio owner, but I am aware of how expensive it can be. A couple of the members of upper management questioned if the investment would be worth it, and I remember a couple of years ago when we first started implementing more expensive software it was a point of contention with some of the members invested in our studio, just from hearing some of the conversations being had in the office. I believe it's paying off and worth the investment, as we are retaining clients, able to make videos with certain effects that are in high demand and top-of-the-line when it comes to quality. Another point to consider, is that the more you use the software, with each project, video, document, etc. made, the cost of investment allocated to each project goes down. We use the software and AI technology on a daily basis, enough to where I think we will for sure gain a return on investment.

Another resource is time - the initial time spent on training staff on software systems is time taken away from work being done for clients, so this slowed down workflow for a little while until we were educated on the systems.

For my personal hobby of short film making, the impact is mostly only good, since I don't spend a lot of money. The overall impact for me saves time and allows me to still make higher quality videos as the technology improves and remains accessible without the large monetary investment.

Challenges in implementing AI in media & entertainment industry

1. Integration of heterogeneous data sources from silos into a unified and homogeneous model as well as making this model available to recommender algorithms.
2. Obtaining and mapping data is difficult.
3. It is difficult to model creativity and originality using AI.

According to Gartner, the rise of data transformation arrived as a result of businesses realizing the "strategic importance of using data to achieve mission-critical priorities" through "more innovative data-driven insights and decisions, achieved by using analytics."

The unique aspects to consider while when considering applying cognitive and artificial intelligence applications to the industry are:

Data: The important aspect to consider is what data to use to train the machines and how to protect the ML models from being used by the competitors and other companies

Speed: Graphical Processing Units have the most impact among the array of technological innovations that have made artificial intelligence possible. GPUs accelerated the applications.

Privacy: AI is fueled on large volumes of data. The more information that's fed into the solution, the more it learns, and the more it refines the algorithms it uses to do its job. As such, its propensity is to learn everything and anything it can about the data sets it is given. That continual consumption of real-

time information has raised some privacy concerns around how that data is disseminated and used. The challenge is striking a balance between facilitating the continual data consumption AI requires to make intelligent decisions and the fundamental privacy rights of the subjects of that data.

Opportunities for AI in Media and Entertainment Industry

A number of disruptive technologies and business models are now causing increased competition from many non-linear service providers. Over-the-Top media services (ranging from broad interest players like Netflix and Hulu) are competing to win a share of advertising and subscription. This has resulted in greater competition for good content and has pushed up the content acquisition costs for M&E companies (Madathil, 2019). The emergence of social media companies like YouTube, Facebook, and Twitch allows consumers in contributing in content creation and distribution via digital platforms.

These platforms can track clicks on their advertising, making it easier to track advertising influence through the purchase funnel, something traditional Media & Entertainment companies have historically found challenging. The Media & Entertainment companies need to equip themselves with the right technologies for better resource allocation, intelligent content delivery, viewing experience optimization, and viewership trend analytics and predictions.

Current Major challenges

The major challenge facing Data Scientists in Media and Entertainment are that the data scientists have a challenge first understanding the business problems in the industry, and then often it is a challenge to obtain and access the right data sets for their work.

· It is also a challenge to establish the infrastructure and communication between the divisions so that projects don’t always need to start from scratch.

· Data science teams need to identify a question and then work to answer it. This happens when the investigation results are only the output. That is, when data science teams generate insights without associated actions.

· A lot of organizations in the industry are struggling to allow their data science teams to have control over the implementation of insights.

· Media and Entertainment companies contain a huge amount of data in their own data warehouse ranging the content itself, such as audio, images, videos, and captions, to customer data, such as viewing behavior, monetization of data.

· In the past, entertainment companies needed to go through various dashboards and tools to manually analyze trends and forecast the future outcomes. These processes require a large number of personnel hours and effort.

· Access to core AI applications (image recognition, translation, NLP, text-to-speech, and speech-to-text. If an M&E company wanted to implement AI techniques 4 years ago, it would have had to build an in-house team of software engineers, Information Technology (IT) specialists, and data scientists to develop these technologies internally

· One of the major challenges is associated with cost. Developing custom ML models would have previously been resource-intensive. It often requires detailed knowledge of the data science.

· Handling performance issues with flexible and cost-effective solutions is also one of the challenges. Given the previous lack of alternatives, companies were faced with on-premises server implementations of AI models. These companies ended up purchasing specialist hardware, most likely expensive Graphics Processing Units (GPUs) for AI model training and development.

Future challenges

1. Evolving Business model: With powering the invention and rapid expansion of new business models, disruption is sweeping through the media and entertainment industry, leading to uncertainty about the durability of well-established ecosystems. Consumers are expecting media and entertainment providers of all types to deliver choice, convenience and value, all wrapped inside personalized, customized experiences that are available on demand and with limited advertising and strong data protection.

2. Need to adapt for new realities: With ongoing declines in subscribers, it is putting pressure on topline performance in the industry. On the other hand, costs are escalating in the critical areas of content and talent.

3. Customer's needs constantly changing: Consumers were passive, waiting for content that was made available at a time dictated by others. But now, digital communication has created a new option that is more atomized and dynamic. Consumers have steadily rising expectations around how products and services should be delivered. Just a few years ago, consumers were delighted to be able to stream a movie or TV show on multiple devices. Now, a consumer expects personalized experiences across their daily life, from mobility and financial services to communications and entertainment.

Implications of Applying Cognitive & AI Systems to Industry

Short-term impacts

Emotion

Artificial Intelligence (A.I.) algorithms analyze the subscribers viewing behavior, which forms the basis for investment opportunities as well as feeding their recommendation system data. In fact, more than 80% of the TV shows users watch on Netflix are discovered through the recommendation system. IBM recently used A.I. to produce a movie trailer for the film Morgan based on machine learning and big data.

The machine was able to create the trailer in 24 hours when it typically takes a human between 10–30 days, posing a potential risk for job displacements in the post-production industry. Human-machine interaction has made great strides, and the interpretation of emotional reactions is what can lead to machines interacting in a more natural way with their users and thus to true machine intelligence.

Privacy

Privacy violations are one of the potential risks using AI and are vast, which has called for the establishment of industry standards from early on. However, this prompts the question of who is in charge of establishing and enforcing these laws, which has caused wide-spread industry debate. emotions will

become yet another data set that can be exploited by advertisers, politicians and hackers, through the privatization of consciousness and an individual's most private emotions.

Long term impacts

Unemployment

There are high chances of decrease in employment, if the industry is completely adapting Artificial Intelligence. Artificial intelligence represents Indirect challenge to individual creativity of employees, and even working on it, because it makes them rely on it to accomplish the tasks of work without thinking about alternatives in person which in turn will lead to heavy mental restlessness.

Disruption

AI current trends in advertising focus on real-time product placement on the basis of the popularity of the content streamed. In the future, AI will make it possible to deliver precision-targeted advertising and product placement according to the content that people watch. Advertisements will be curated for specific people, and you might see your favorite actors endorsing the products you like and follow. In the times to come, advertisers will use AI to target each viewer with inline ads and product placements that can be tracked for analyzing the return on their advertising investments.

Trends & forces shaping entertainment Industry through Cognitive & AI Systems

As industries like the media and entertainment industry analyze consumer behavior, they can use this data to make changes to the way they do business. Below are some of the forces that are revamping entertainment industry and are greatly influenced by AI and Cognitive systems

Data Driven world

With the world becoming more data driven we are capturing more and more data than we can process. There is a huge need to be able to process through the data quickly and find what we need. People do not want information overload. People want to get the data they want in a timely fashion and with accuracy.

Video Streaming and Digital Music

Consumers no longer want to play DVDs or CDs. They want to be able to subscribe to services such as Netflix or Spotify and stream their favorite shows or listen to their favorite albums online.

Artists now leverage platforms such as YouTube to release their content and gain popularity and viewers without having to sign on to large production companies or Labels

AI and Cognitive systems assist with production. Recommender systems assist users in finding content in the huge catalogs that content providers have

Technology advancements

As technology advances companies have been able to use AI to make leverage these advancements. For example, Netflix caches content close to where it will be viewed. This leads to reduced bandwidth and costs. All thanks to analysis and machine learning.

Adoption of AI and Cognitive systems is already having a huge impact for the Media and Entertainment industry. With advances to these technologies we could see recommender systems even allow users to make their own storylines. Bots are also on the rise as the industry is using Bots to handle some of the cognitive tasks. We will see more and more on personalization trend as machine learning will be used to gather and analyze data.

AI systems will also be able to predict user issues before they occur. Customizable deep learning and Machine learning tools will allow users to find what needs to be upgraded on needs maintenance on a system.

Conclusion

In conclusion, studying the digital media and entertainment industry and its advancements in cognitive technologies and artificial intelligence have been very insightful. When learning about these concepts in

class and seeing how they are applied and discovered through a particular industry, it results in a better understanding of how these ideas and systems are used in the workforce. In the media and entertainment industry, we have found that use of these technologies directly correlates with a company's success in the market and ability to serve customer needs. As many developments that have been made in this industry over the last few years, as algorithms use customer data to improve and fine-tune results over the next few years, in some ways the sky is the limit with how much these systems can improve and expand. It will be interesting to see these progressions over time and the breakthroughs that surface as education of these technologies continue and more investments are made in this industry.

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