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The future of film-making: Data-driven movie-making techniques

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Abstract

Since the term 'big data' came to the scene, it has left almost no industry unaffected. Even the art world has taken advantage of the benefits of big data. One of the latest art forms, cinema, eventually started using analytics to predict their audience and their tastes through data mining. In addition to online platforms like Netflix, Amazon Prime and many more, which act on a different basis, the industry itself evolved to a new phase that uses AI in pre-production, production, post-production and distribution phases. This paper researches software, such as Cinelytic, ScriptBook and LargoAI, and their working strategies to understand the role of directors and producers in the age of the digital era in film-making. The research aims to find answers to the capabilities of data-driven movie-making techniques and, accordingly, it makes a number of predictions about the role of human beings in the production of an artwork and analyses the role of the software. The research also investigates the pros and cons of using big data in the film-making industry.

Keywords: Artificial intelligence, cinema, data mining, film-making.

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1. Introduction

Cinema is a young and ever-evolving art form. Since its invention, the cinema has been greatly nourished from technological improvements. Machine and man have worked together to create visual stories. Throughout history, whenever the machine changed, the role of man has adapted itself accordingly. As computers infiltrated almost every household, and have turned into an irrevocable medium for everyone, today there is almost no space that does not benefit from digital technology. The cinema can also be considered as one of these spaces. Today, cinema is called digital cinema because it uses digital technologies from scriptwriting to distribution. However, with artificial intelligence technology, there is a new pathway for films to follow. Digital technology is no longer an auxiliary for film crews, but it is now one of the key figures for decision-making. This paper studies three types of software, Cinelytic, ScriptBook and LargoAI, that use data mining technology to create financially and aesthetically more successful films.

2. The methodology

This paper aims to discover how technology has affected the film industry from the point of view of the film-making process. The new cinema technique, called data-driven movie-making and its effects on the creative process, will be the main subjects of the paper. The methodology that will be used is content analysis. Three different types of software, Cinelytic, ScriptBook and LargoAI, which are being used today and continue to be developed, will be studied. The features of the software and their focal points will be examined. The study also compares software that uses AI in the film-making industry, to understand in which phases of the film-making process that AI is most effective.

3. The film-making process and Big Data

Until digital technology came into being, the film-making process was extremely difficult and expensive. Starting with cameras, almost all necessary equipment for film-making, such as lights, rolls, tripods and dollies, and suchlike were heavy and difficult to use. Moreover, the results they gave were not as satisfactory as they are today. However, with the help of HD digital cameras and powerful, portable lights, it is possible to shoot at night and see what a man's eye cannot see (Bordwell, Thompson & Smith, 2016, p. 5).

Cinema was always cautious about integrating new technologies, fearing loss of its financial status (Parkinson, 2002, p. 253). However, once it sees the financial advantages of using technology, the cinema adapts itself wholly. Today, cinema has been using digital technologies in production for almost over two decades. In addition, the technology also functions to match the right audience with the right content. Online platforms such as Netflix, Amazon Prime and similar ones use data mining to introduce different content for their audiences. They do not only curate a selection according to their individual subscribers' tastes, but they also use that data to produce new content. Bernard Marr in his book '*Big Data in Practice*' says that the algorithm of these online platforms analyses user behaviour and, in this way, they both present a more personalised film selection to the audience and collect data for their next films and series. For example, pausing the film, repeating a chapter or a scene and evaluating or giving stars to the content give clues about the individual and allow the algorithm to understand what kind of visuals can be more appealing. Additionally, Marr (2016, pp. 20–22) expresses that with the tagging method that Netflix asks its audience to use, they have more than 80,000 micro-genres for films and series.

The relationship between cinema and technology is not only limited to certain applications for production and data mining to identify a better audience. Within a world where everything is automated, two film-makers, Tommy Pallotta and Femke Wolting, ask an important question for the history of cinema. They wonder if it is possible to build a smart robot with artificial intelligence, which can direct a film and create a documentary about this attempt. In the documentary film

'More Human Than Human' (2018), Pallotta and Wolting together with Hanson Robotics, build a robotic, called CameraBot, which has artificial intelligence and a camera. They taught the machine how to shoot a film, and they expect it to be able to direct an interview with Pallotta and Wolting. The overall process of creating the robot and teaching the techniques are rather fast and the CameraBot is rather primitive, since the main idea is to test the early stages of a robot camera. At the end of their experiment, they express that the interview conducted by the CameraBot was more like an interrogation rather than an interview, and there was no connection between the questions. Another director, Richard Linklater, also considers the camera movements of CameraBot as sudden and freaky. Although the results of the experiment seem unsatisfactory, the CameraBot is just a simple experiment led by an extremely crucial question and it highlights up the way that cinema will take.

Another aspect of film-making in the technological era is data-driven movie-making which is the subject of this research. Since the film industry is a multi-billion dollar business, using big data most profitably seems reasonable. One of the founders of Cinelytic, Tobias Queisser, explains that although the film industry started using super high-tech machines in film production, in pre-production the business has remained as it was 20 years ago (CBS News, 2019). However, AI can help to enhance this side of film-making. In addition to several platforms that work on the predictive analytics of films from budget to cast selection and genre and so on, 20th Century Fox also uses AI to research a machine learning and predicting just by analysing a trailer (Vincent, 2018). Their machine can label several features that appear in the trailer and analyse their frequency of use to predict the success of the film. However, working on the pre-production phase and generating predictions about the financial success of a film is a more complex process. Several companies are working on artificial intelligence technology to be used in the movie industry, but in this paper, Cinelytic, ScriptBook, and LargoAI will be the three main focus points, since these are the most popular and advanced among others.

4. Data-driven movie-making software

4.1. Cinelytic

Los Angeles-based Cinelytic was founded in 2013 by Tobias Queisser, Dev Sen and Christian Monti. The platform serves five main spots. The first spot is project management. Cinelytic has a cloud-based project management system. They use the existing data of the film industry to come up with certain predictions about the risks for a future project (Kay, 2019). The integrated model of the project management allows more than one user to access the data as a film producer and also enables them to have a whole view of the project. However, the main feature of Cinelytic is their ability to give predictions regarding casting, which they call talent analytics. This feature provides information about actors' and actresses' popularity and suitability for the project by giving information about their Box Office talent scores, reviews, age, their social media interactions, and total budgets. The system also sorts the actors and actresses according to their popularity by countries. For example, in 2019 Cinelytic's top three actresses for the USA were Scarlett Johansson, Jennifer Lawrence and Emma Watson, while the top three actresses for China were Michelle Rodriguez, Celina Jade and Scarlett Johansson (Kay, 2019). Therefore, the feature sums up the effects that an actor or actress can bring to the success of the film.

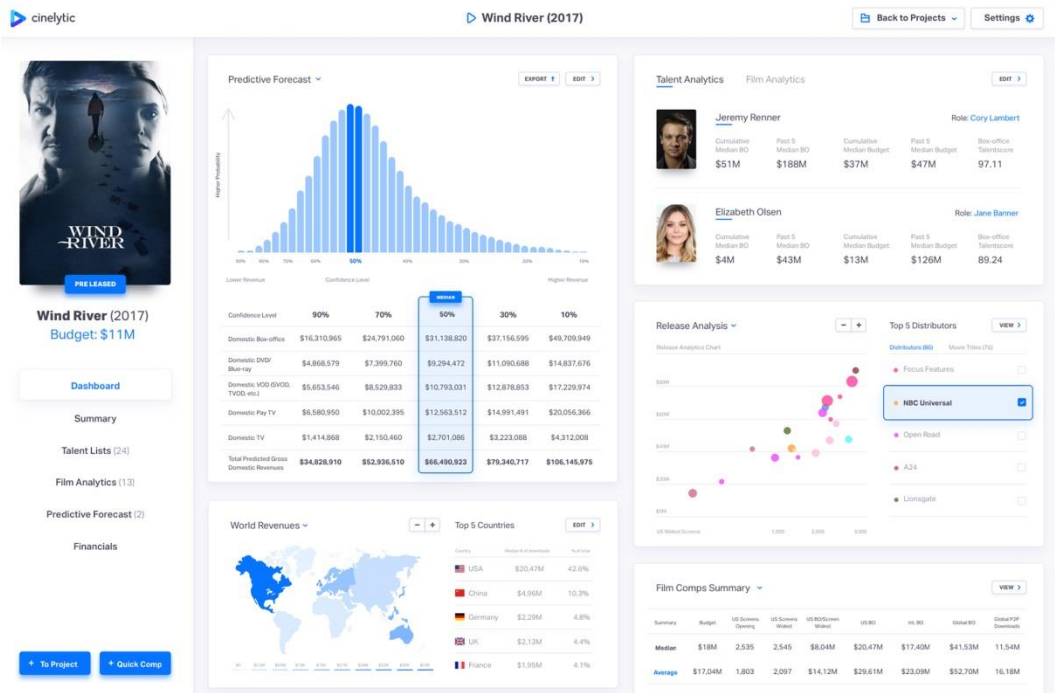

Figure 1. Cinelytic analysis of wind river (2017)

Another feature of Cinelytic is film analytics. This feature compares the distributors and revenues according to the scenarios of the movies and their success. This also gives an idea about the production companies' genre selection. Film analytics allows users to understand which types of films are more appreciated by an audience and also the reliability of the production and distribution companies, as well as their revenue success both country-based and worldwide. The fourth feature of Cinelytic is predictive forecasting. This feature enables producers to fully understand which platform is more suitable for the project. It gives data of domestic box office predictions as well as DVD/Blu-Ray sales statistics; pay TVs like Netflix, Amazon Prime, and suchlike, and domestic TV screening success. The last feature of Cinelytic is financial modelling. This helps producers to understand the return of investment (ROI) of a film after its production and distribution. It gives country-based sales assumptions and the lowest and highest rates of box office returns. Although Cinelytic uses AI for different features, the most popular is its ability to give data about the talent choice. Talent analytics is also the most well-known feature of cinelytic. This focuses on the effect of casting on the film.

4.2. ScriptBook

The other platform is called ScriptBook, which was founded in 2015 by Nadira Azermai and is based in Belgium. As can be understood by its name, the company focuses mainly on film scripts. The founder of ScriptBook, Nadira Azermai indicates that they analysed Sony Pictures movies from 2015 to 2017 and they identified 22 films out of 32 that the company has failed (Caranicas, 2018). The system of ScriptBook is quite easy. They allow producers or directors to upload a PDF version of their scripts and, within minutes, they get a detailed report about the films from their character analysis to target audience and box office predictions. The system has worked on 6500 existing scripts and determines predictions by comparing its knowledge from that data (Caranicas, 2018).

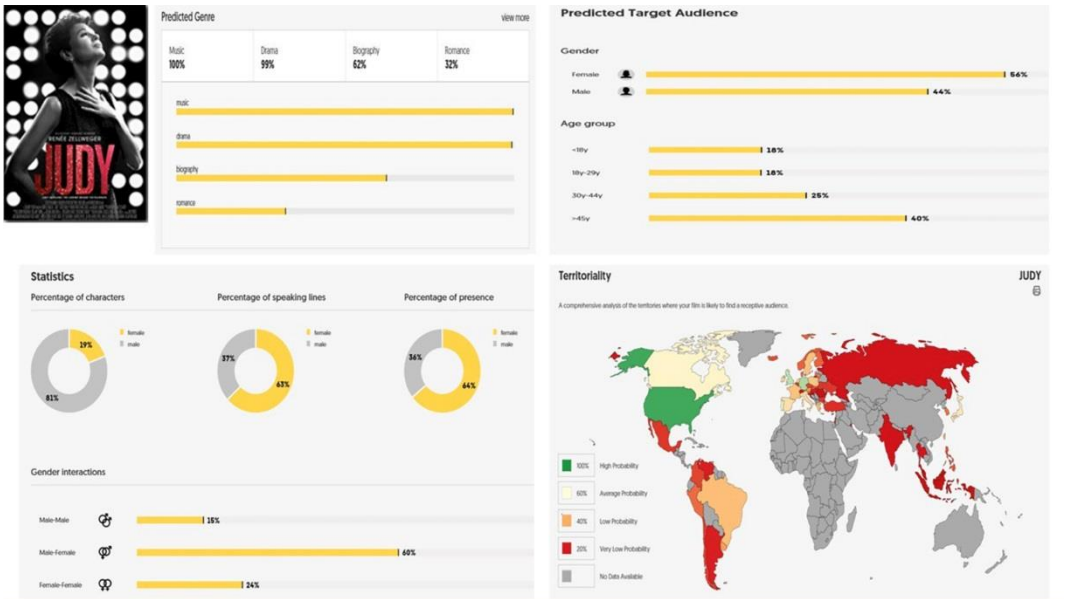

Figure 2. ScriptBook analysis of Judy (2019)

ScriptBook mainly focuses on three different spots while providing a digital portfolio for users to follow their film success by means of statistics. The first feature of the ScriptBook is the story analysis or what is called script DNA. The platform believes that the core of each film is its script and this is why they choose the scenario of the movie as their focal point. Story analysis gives many different evaluation aspects for users. The AI gives the percentages of the suitable genre of the script and the scene analysis. The platform also ranks the scenes according to the emotions that they portray. It studies the dialogues and the wording to understand the general aura of the script. Another feature within the Script DNA is its ability to analyse character structure. The platform gives likeability scores of the protagonist and the side characters and also their percentage of presence and speaking lines within the film. ScriptBook also compares scenes by dialogues between the characters and measures gender interaction, which provides data about gender equality. As the platform also allocates scores to the script, it seems to be sensitive regarding gender equality. The second feature of the ScriptBook is critical viability or audience demographics. By analysing existing movies and their scripts the platform provides data concerning the demographical characteristics of the target audience. The demographics provide information regarding gender and age, and it is also possible to map audiences by their nationalities. The platform also positions the film according to its script, as to whether it is a blockbuster or an arthouse movie. The last feature of ScriptBook is market positioning or financial forecast. The platform estimates the production budget of a film and also predicts possible box office success, both internationally and by country (ScriptBook DeepStory, 2019). As can be seen from its structure, ScriptBook places importance on script and character analysis. The founder, Azermai, also adds that they want to improve ScriptBook by adding a feature that can create the perfect script written only by AI (Seth, 2019). Character analysis also seems one of the strongest aspects of this particular platform.

4.3. LargoAI

The last platform that is a subject of this research is LargoAI. LargoAI is the newest of all the others. Established in 2018 by Sami Arpa in Lausanne, LargoAI has analysed more than 30,000 movies and can predict the financial success of a movie up to an accuracy of 82%. For example, LargoAI estimated a movie gross of $201 million for the film ‘Venom’ and the actual gross was $213 million (Arpa, 2019). Another example of LargoAI’s predictive ability is the Italian film ‘Domani e Un Altro Giorno’ (2019), in which the platform predicted between €1.6 million and €3.9 million box office gross within 4 months

of the film's release. The true box office gross of the film was €1.7 million. LargoAI has three spots that are focused on. The first is content analysis, which can be referred to as the pre-production stage. The platform can analyse a script and detect its genre. After doing so, it can give an enhanced report about possible audience reaction. Moreover, it can also provide data regarding country-based audience reaction (Davies, 2019). This aspect is the leading feature and has spread on other stages as well.

Figure 3. LargoAI interface for movie analysis (2019)

LargoAI analyses genre-based audience feedback and gives clues to improve a film's success at an early stage. The second feature is actionable Insights or the production phase. After analysing a script and providing data and suggestions regarding further action, the platform identifies the most suitable actors and actresses. In addition to casting suggestions, LargoAI also advises on which parts of the film should be modified to achieve the director's goal or the commercial viability of the project. The last feature of the LargoAI is market planning. After analysing geographical reaction and audience preferences, LargoAI reports highlights and risks for potential revenues. Since it provides audience data on a geographical base, the platform suggests a list of countries that will be most profitable. It also provides data about possible ROI channels for the film. The main focus of LargoAI is to define the target audience according to their geographical location and suggest a pathway for the producer and the director to take steps according to this data. For instance, if a film is to be released in Italy and the comedy genre is in decline there, LargoAI suggests adding drama to the script (Chiarini, 2019). Moreover, if a thriller movie is to be released, LargoAI lists countries where the thriller genre is popular. This feature demonstrates that the LargoAI team believes that geography has a huge impact on the film industry, which cannot be denied.

5. Discussion and conclusion

Three of the platforms have similar features, but their contents are different. While Cinelytics presents five different features for the users, ScriptBook and LargoAI present their service under three different categories. Cinelytic does not divide the film-making process into three, pre-production, production and post-production, rather it seems like focusing only on casting and distribution. ScriptBook's structure can be considered as dual stages. The first is to get data regarding the script

and target audience and the second is the distribution and marketing. On the other hand, LargoAI takes the whole process and divides it into three. In the pre-production, they provide data about the genre and the target audience by analysing the script. In the production phase, it suggests modifications for the scenes according to the target audience's demands. Lastly, in post-production, LargoAI reports possible marketing strategies. LargoAI's methodology seems more comprehensive than others, since it covers all of the phases of film-making.

Another difference between the three is their focus points. The main feature of Cinelytic is its ability to present talent analysis. It focuses on the importance of casting and, since it is so, it can be said that its consideration of the choice of actors and actresses is one of the most important aspects that can affect the box office success at the cinema. Since Cinelytic is an American company and Hollywood created the star cinema system, it can be said that associating the success of a film with star selection is reasonable. On the other hand, the concern with ScriptBook is the scenario of the film. It not only evaluates the script's success, but also encourages script creation with gender equality. The European Cinema was always the one that had precision for philosophy and social concepts, more than Hollywood. Therefore, the concern of ScriptBook suits the ideology of European culture and cinema. Another Europe-based company, LargoAI, puts geography to the forefront. Determining the geographical location where the film will be shown also gives clues about the culture, tradition, and mentality. As a result, LargoAI can be said to have the same concerns as ScriptBook. Moreover, it can be said that LargoAI is a combination of ScriptBook and Cinelytic, since it focuses on the financial success of the film as Cinelytic does and, at the same time, takes into account culture, tradition and mentality by defining the geography for the film, and gives priority to script analysis which can also be seen with ScriptBook.

In three of the cases, there is a crucial question to be asked and yet not fully answered. If everything is being decided by data what will happen to the creative aspect of the cinema? This question can be asked of each platform. However, it seems that data-driven movie-making is a tool for the producer to take wiser action and have better success at the box office. The creative aspect of film-making depends on many different dynamics, such as colour, lighting, sound, music editing and so on. These platforms enable films to reach out to more audiences and have greater financial success. The creativity and aesthetic judgments seem to be left to humans. Additionally, the founder of ScriptBook, Nadira Azermai, explains that AI technology is not here to remove what humans are capable of, but to unify AI with creative skills to work collaboratively with humans (CNN Business, 2017). AI technology is improving every day, not to replace humans, but to make them better humans.

All of the platforms focus either on the star selection of the film or the script to make the film more successful. However, all of these highlight the importance of the production team. A film's success is mainly based on teamwork. A director of photography (DoP) can change the quality of the visuals, or the lighting team can create dramatic effects for the film, or an editor can turn the film into another genre. As the platforms suggest for the actors and actresses, they can also suggest the most suitable and successful DoPs, editors, sound and lighting designers for the film.

It seems as if the history of film-making is also shaped by technology. The effects of digital technology on society, economy and art can be considered as revolutionary. From this point of view, the first era of the cinema, from the late 1880s until the end of the 1990s, can be defined as Cinema 1.0. In this era, the relationship of machines with humans was mostly manual and the workfellow was strict. With the digital media, cinema jumped into another time frame in which the interaction between man and machine is greater; this era can be considered as Cinema 2.0. The third period comes with the use of big data, since it adds another dimension to the equation of the interaction. The data mining technic understands an audience's tastes and allows film-makers to create new content accordingly. This period can be called Cinema 3.0. The last period should be the one where artificial intelligence takes all control of the film-making process and be called Cinema 4.0. Humans will be removed from the production process. The machine and the audience will be the only two dynamics

of the equation of interaction. The machine learning and predicting the success of movies can give an idea, but actually it may be considered as the bridge that will carry Cinema 3.0 to Cinema 4.0.

Cinema is one of the biggest industries in the world. It has adapted itself to the use of technology during each period, and today it is taking steps to catch up with the latest innovations. Although the technology has already invaded the production processes to help man to make everything easier, in the pre-production and planning phase it seems to be just getting there. Cinelytic, ScriptBook and LargoAI are some of the new platforms for the film industry to integrate AI for more successful projects, and there may well be many more platforms like this in the future.

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