

# ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING USE IN INDIAN ANIMATION AND VFX INDUSTRY

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*Abstract:* The aim of the research work is to analyse the visual effects and animation techniques used in recent Indian cinema industry. This research aimed to compare the development of visual effects and its impacts on film themes. A case study is conducted to analyse the elements of film contents and changing technological advancements in Indian films. The details such as visual effects, animations, advancements, viewers' opinions and themes are analysed to study the developments and the recent trends in Indian cinema. The Indian film industry (namely Bollywood, Kollywood and Tollywood) is one of the largest film industries in the world. There is a vast development found in the Indian film industry in between the year 2010 to 2019. This research work analysed the mega budget animated and visual effects incorporated movies. In this research, Kollywood films such as Enthiran, Kochadaiyaan, Baahubali, and Robot 2.0 were taken for the study to analyze the development of visual effects and animation in Indian cinema. The selected Indian films reflected the advancements of visual effects and animation in films. Also, this research work found the changing themes, viewer's opinion and film maker's views in the aspects of creating visual effects and animation in the cinema. The visual effects and animation techniques provide more scope for the film director to visualize on all the possible ways. Also, it engages the film viewers in the story in an effective way.

*Keywords*—Visual effects and animation, Recent trends, Impact study, Indian cinema, Opinion study, Viewer's engagement

## I. INTRODUCTION

. Animation is the technique of giving life to art, drawings and paintings. It is a motion graphics technique applied to the pictures and computer-generated images. Animation is classified into many types. They are termed as traditional animation, 2D animation, 3D animation, stop motion animation, and motion graphics animation. Animation includes titling, modelling characters, properties, and settings, texturing, and rigging. A visual effect is the technique of combining special effects and real things. It helps to create the illusion of reality in the movies and animated works. Animation and visual

effects develops the communication effectiveness by attracting the attention and inducing the visual perception of the viewers.

***Importance of this research:***

The growth of new multimedia and ICT technology significantly impacts the film industry worldwide. The advanced technology related to computer graphics and animation gives many more opportunities to the directors and the technicians in the film making process. It reflects in the Indian film industry and it's making methods. The Indian mega budget and "blockbuster" movies have technologically effective, efficient and added many special effects. This type of mega budget Indian movies develops the reach ability to international film viewers and markets to the Indian films.

Technological advances in contemporary Indian cinema are huge. Animation and Visual Effects in particular has grown tremendously. This growth is huge on a global scale brought more coverage in the creative entertainment industry. Animation and visual effects have been a great reason for Indian cinema to grow into a huge market. However, studies on this have not come up much. Such studies are becoming increasingly necessary in Indian cinema, because this industry is worth billions of crores. Thus, the study is done to analyze the importance and necessity of animation and visual effects in the Indian cinema.

II. REVIEW OF LITERATURE

According to McClean, computer generated imagery developed the motion picture technology for the film's dust removal process. Later it developed the other processes such as negative cleaning, wireframe removal, boom microphone removal, and, creating digital set. These applications were called as compositing technology (McClean, 2007). The researcher named Mak, found out the distractions due to the ineffective CGI works. He stated the failure of story narration due to the inappropriate use of CGI portions (Mak, 2003). Lefebvre and Furstenu found out the relationships between the emotional aspects of the film and narrative structure of the film. They found out the importance of sync between the CGI works and the actor's performance. Also, they stressed the importance of emotional expressions in the CGI sets and environments (Lefebvre and Furstenu, 2002). Bazin studied about the connections between the reality and film realism. He explained about the importance of closeness between the reality and film realism. He stated the importance of perceptions related to computer generated imagery and reality (Bazin, 1967).

Ebert, discussed about the difference between the reality and narrative reality of the film. He mentioned about the non-requirements of realistic CGI works and film's narrative realism (Ebert, Roger, 2001). Bordwell discussed about the advantages of computer-generated imagery in film making. He mentioned about the inclusion of Tom Hanks in the old film footage related to the US president, John f. Kennedy (Bordwell, David, 2006). According to the IMDB data, the film Kochadaiyan released in 2015 had many flaws related to facial expression, texturing and emotional synchronisation. It distracted the film viewers between the reality and film realism (Kovacs, 2008). Kovacs found out the importance of computer-generated imagery in between the two different events. He pointed out the connections between the two events in a scene based on the application of CGI (Kovacs, 2007). Morris pointed out the importance of CG works in the film 'Inkheart'. He studied about the cause and effects relationship through the shadow of CG works in the movie (Morris, Wesley, 2020). He mentioned about the spectacular application of CGI works in continuity editing

### III. RESEARCH METHODOLOGY

Case study is adopted for this research method, to analyse the Indian films in various technical perspective spotlighting the animation and visual effects to obtain the research questions. Indian Films with more visual & animation effects with more budget, and different themes are taken into this case study. This case study has conducted with the mega budget movies such as Enthiran, Kochadaiyan, Bahubali and Robot 2.0. The variables such as Story and themes, budget, animation and visual effects, international revenue are taken into considerations to study the advancements and its impacts.

#### ***A) Opinion study:***

A well-constructed questionnaire was used to gather the opinion among the new generation directors. The convenient sampling method was used as a tool to gather the relevant primary data. The simple random sampling method was used to gather and to find the qualitative results.

1. The questionnaire contained five parts with the intention to collect the data relevant to themes, story, budget, visual effects and animation, and market.
2. The variables such as themes, story lines, format of making, visual effects and animation, market segments were analysed to find out the recent developments in Indian cinema.
3. Five points Likert scale was used to study the data. It contained the details in the form of strongly agree, agree, neutral, disagree and strongly disagree. Total 30 young generation film directors were selected to find out the satisfaction level and CGI usage.

**b) Questionnaire**

Kindly measure the following statements. Do you use and perceive any visual effects and animation related technological advancement in the recent Indian film industry?

TABLE I

Assigning	Strongly disagree-0, disagree-1, neutral-2, agree-3, Strongly agree-4					
S.No	Statements	Values				
		0	1	2	3	4
1.	The advancement is huge					
2.	It was fun and entertain					
3.	It helped to visualise the story					
4.	The vfx & animation helped me to create & develop					
5.	It reduces the difficulties in the set and other properties of needed.					

Table 1 shows the questionnaire to study the perception

The Spearman's correlation coefficient was used to study the relationships between the CGI usage and satisfaction level (Rees, 2000).

The statistical formula is

$$R = 1 - \frac{6 \sum D^2}{N^3 - N}$$

Here R refers to the correlation coefficient

D refers to the deviation level among the opinion

N refers to the number of tested samples.

The value of 'D' is 0.63

It shows the significant relationship between CGI and satisfaction.

The opinion and acceptance level got the points from 0, 1, 2, 3, 4. The acceptance level related to strongly agree had 4 point scale in the Likert scaling method. But strongly disagree assigned to 0 points.

The opinion questionnaire were set with the following variables (Rees, 2000)

- Number of visual effects shots
- Satisfaction
- Story telling usage
- Entertainment
- Budget

The young director's opinions are summarized below

1. The technical and visual effects are more effective.
2. The revenue and market segment gives more opportunity
3. It increases production cost and also it develops market avenues.
4. It helps to convey the story in an effective way.
5. It gives satisfaction to the young viewers.

***Case Study 1:***

**Enthiran:** It had the highest budget in Indian film making history in 2010. At that time its production investment cost was 35 million dollars. Its visual effects and animation works were done in the Stan Winston studio (USA). The Hollywood animation films like Avatar and Jurassic park's animatronics works were carried out in the Stan Winston studio. Total 160 crores were invested by the Sun TV groups to develop the special effects sequences like climax fight between the humanoid and human army, and other rescue like sequences. It had 1500 graphical shots. Its story pinned around the battle between the human and machine. The artificial intelligence of the humanoid was established by the love and emotional sequences. It contained the 'Masala' elements like, love, fight, and comedy. It was a multilingual movie. The duration of the movie was 3 hours and 5 minutes. It had 2000 visual effects shots (IMDb, 2020).

***Case study 2:***

**Kochadaiyan:** It was one the highest budget motion capture movie in Indian cinema released in 2014. At that time its production investment was 21 million dollars. It was the first Indian motion capture technology used film. Its animation technology was developed in the Hollywood studio named Centroid (USA). It had the revenge story. The historic film made with the storyline with kings and kingdoms and had ordinary revenge theme. It had the mixed elements like love, fight, and comedy in a historical background. The time duration of the movie was 120 minutes. It was shorter than the ordinary Indian cinema. It was an attempt. Also it was a multilingual film made with many Indian languages (IMDb, 2020).

***Case study 3:***

**Bahubali:** It was the highest budget movie in south Indian cinema released in 2015. At that time its production investment were 181 crores rupees. It collected more than 650 Crores in the international market. It was the highest earned movie in the Indian film history. Its animation technology was developed in the Prasad studio Chennai and Hyderabad. Also the south Korean animation production house 'Tau films'. It had more than 15,000 visual sketches for its storyboard. It had the revenge story.

This film made with the storyline with kings and kingdoms and had the revenge theme. It had the mixed elements like love, fight, and plots in a historical background. The time duration of the movie was 2 hours and 39 minutes movie. It was longer than the ordinary Indian cinema. It was a very successful box office hit movie (IMDb, 2020).

***Case study 4:***

**Robot 2.0:** It was the highest budget movie in Indian cinema released in 2018. At that time its production investment were 570 crores rupees. It collected more than 800 Crores in the international market. It was the highest invested movie in the Indian film history. Its animation technology was developed in the Legacy effects studio, Prime focus and double negative studio. It had more than 2150 visual effects shots. It had the science fiction story. This film made with the storyline with globalised theme. It had the mixed elements like love, fight, and plots in a scientific fictional story background. The time duration of the movie was 2 hours and 30 minutes movie (IMDb, 2020). It was the ordinary length Indian cinema. It was a successful movie.

All these movies were analyzed technically to find out the impact created in the movie through animation and visual effects. The increasing number of animation and visual effect shots showed the future trend of this industry. This research showed the growth of animation and visual effects in the film field. Furthermore, it showed the development of the international market of the Indian cinemas.

#### IV. FINDINGS AND DISCUSSIONS

Young and new generation directors gave favourable opinion related to the newly developed technology related to visual effects and animation. They favoured the application of visual effects and animation technology in the film making process. They gave satisfaction and favourable opinion related to recent digital technology advancement. They accepted the effectiveness of CGI shots to reach the younger generation. They used the CGI portions to enhance their market. They used the computer generated imagery technology to capture the attention of young people and made their cinema a success. Also, they favoured the concepts of new and advanced On-The-Top (OTT) platforms. This type of technical advancements gave the confidence to try new stories and narrative forms. Also, the CGI technology developed the creativity without any restrictions in fantasy films. This digital creative works minimised the gap between the Hollywood and Indian cinema. The visual effects and animation portions gave confidence to invest very high budget movies in Indian context.

## V. CONCLUSIONS

This research work clearly shows the advantages of visual effects and animations in the Indian film industry. It shows the positive impact of new digital technology in the film quality and content. Also it shows the change of themes and stories in Indian film industry. This CGI advancement reduces the gap between the developed nations and developing nations in film making methods. Many of the new generation film directors have very favourable opinion regarding the application of visual effects and special effects in film production. Even though it increases the cost of the production, it gives flexibility in the creative phase. The young directors' views and case study results shows the changing nature of Indian film markets. This research shows the differences in the new CGI technology development in making. It shows the confidence among the production houses to invest huge budgets for the Indian films. The films like Bahubali gives promising future for the content-oriented film's international marketing opportunity. This case study related to the movie 'Kochadaiyan' clearly shows the new advancements in motion capture technology in the Indian scenario. Even though it gives more opportunities, still there is lack found in the texturing and reality in visual effects and animation portions. The film Robot 2.0 has a globalised theme i.e., Smart phones and its impacts. This type of new themes develops the possibilities to reach the global film market. This research concludes that there are many changes found in the current Indian cinema industry because of the advancement in visual effects and animation technology.

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