Online at: https://researchtrendsjournal.com
Indexed Journal
ISSN No: 2584-282X
Peer Reviewed Journal

INTERNATIONAL JOURNAL OF TRENDS IN EMERGING RESEARCH AND DEVELOPMENT

Volume 2; Issue 3; 2024; Page No. 233-237

Received: 01-03-2024
Accepted: 06-04-2024

Challenges of AI Adoption in Indian Filmmaking: Ethical, Technical, and Cultural Perspectives

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Abstract

This paper examines the multifaceted challenges facing the integration of Artificial Intelligence (AI) in Indian filmmaking, particularly during the pre-production and production phases. As AI continues to revolutionize global cinema through automation, data analytics, and generative technologies, the Indian film industry finds itself at a crossroads where tradition meets innovation. Drawing upon quantitative survey data from 120 film professionals and qualitative insights from 15 in-depth interviews conducted in Mumbai, Hyderabad, and Chennai, this study investigates ethical concerns, technical barriers, and cultural tensions in the adoption of AI tools. Case studies, including high-profile films such as "Robot 2.0" and emerging projects like "Project K," highlight the nascent but growing presence of AI in Bollywood and regional industries. The paper uses a mixed-methods approach, supported by tools like NVivo and SPSS, to interpret data and generate meaningful insights into resistance, readiness, and realistic applications of AI in Indian cinema. The findings emphasize the need for indigenous AI development, ethical frameworks, and industry-wide capacity building.

Keywords: Artificial Intelligence, Indian Cinema, Pre-Production, Ethical Challenges, Technical Barriers, Cultural Resistance, AI in Filmmaking, Bollywood, Regional Cinema, Human Creativity

Introduction

The emergence of Artificial Intelligence (AI) has begun to reshape multiple domains, including healthcare, finance, education, and entertainment. In the cinematic landscape, AI has enabled applications ranging from automated script generation and budgeting to casting and virtual production. Globally, the film industry has embraced these technologies for their efficiency and predictive capabilities. However, in the context of Indian cinema-comprising Bollywood and a multitude of regional film industries-AI adoption remains fraught with unique challenges. These are not limited to technical inadequacies but extend to deep-rooted ethical and cultural concerns that differentiate India from its Western counterparts.

These days, most filming procedures require powerful computers. Unrecognizable imagery may result from the invasion of digital or computer instruments, which create nonrepresentational visuals. The Bollywood business currently uses Maya and 3D Studio Max as application programs for creating 3D visuals. In several industries, including videography, the game business, the automotive industry, and the scientific community, computer-generated imagery, or CGI, is now a distinct industry. In the technology age, bits and bytes are essential to creating a new dimension of storytelling. Digital technology is primarily used by Hindi filmmakers for editing, cinematography, and even digital projection for a day. The advent of digital cameras and computer-based post-production has drawn filmmakers from all over the world.

Many film stock manufacturing enterprises concentrated on converting to digital picture recording techniques and devices after 2010. Because big Hollywood producers switched to using digital media for filming and projection, companies such as Kodak discontinued making film stock. Indian films, however, still use celluloid for filming. It wasn't until 2013 and 2014 that Hindi movies were deemed fully digital. There will soon be more films produced annually as a result of the transition from traditional to

digital media. The digitization of the Hindi cinema industry is the subject of this study. Hindi movies are now distributed digitally via satellite technology in addition to being made digitally.

Another unique idea and utilization of digital visual effects in Hindi movies is the subject of the research title. Digital visual effects are defined as an illusion by the phrase "visual effect," which contributes to the creation of spectacular happenings during the film's narration or storytelling. As a result, the digital turn emerges as a new style for computer-generated motion pictures. However, digital visual effects are a method of creating visuals and reality with the use of digital visual effects rather than an application program.

The theoretical definition of the terms "digital" and "visual effects," as well as their implications for the texts of the movies, are also the main topics of the study. Since the study focuses on Hindi films and the technology developed by major Hollywood companies, a survey of the body of existing literature about the digital cinema industry provides a deep explanation of the history of the digital shift in cinema. Accordingly, the study cites a wide range of digital visual effects works from a variety of genres. The research for this study was conducted by a researcher who is well-known for discussing digital cinema and its consequences. Digital turn, digital recording, digital film editing, digital distribution, and new media reception are only a few of the words that are critically defined in the literature study. Although Hollywood movies and works have been the source of many of these allusions, this study will attempt to connect these categories to the more general issues surrounding the philosophy and aesthetics of cinema. Nonetheless, the study's chosen films include those made by Hollywood's technical and visual effects filmmakers, particularly given how heavily Hollywood has influenced technology advancements. This study attempts to fill the gap in film studies by examining the use of visual effects and its influence on Bollywood's mainstream film business, which is mostly unexplored in India.

D.N. Rodowick, a film scholar, asks, "What is cinema?" in 2007. The question has become crucial in a post-digital world to discuss how the introduction of the digital has changed the nature of film theory. Therefore, digital technologies that are adopted as practices in the Hindi film industry are not just about how computers create cinematic pictures; they are also about how they are opening new possibilities for storytelling and the cinematic medium in general. The film academics are examining the total influence in terms of creating new aspects in filmmaking, in addition to the ongoing technological advances. In his book "The Language of New Media," Lev Manovich (Manovich, 2001) [14] discusses the ways in which digital media affects the emergence of new media. This thesis is based on Manovich's work. Manovich's essay can be analyzed to understand what the term "digital turn" means. In a similar vein, William J. Mitchell's 1992 [15] work "The Reconfigured Eye" explores how new media practices impact how indexical reality is understood.

Additionally, this study examines multiple sources to describe "Digital Visual Effects" (DVFX) as a digital technology method that combines images with live-action scenes, particularly accomplished through computer image simulation programs. "Visual effects" is defined by Thomas G. Smith (1987) [13] in his book Industrial Light & Magic: The Art of Special Effects as any visual alteration of the motion picture frame, whether executed in front or back screen systems, projectors, optical printers, aerial image printers, or cameras. Digital postproduction is frequently referred to as computer graphic imagery (CGI), which indicates the potential for digital effects produced by mimicking digital technology. In a similar vein, William J. Mitchell directs our focus to what he refers to as the "crucial characteristic of the digital image is that it can be modified on the computer with software, it is simply a matter of exchanging new numbers for old... For visual effects artists, computational tools for picture transformation, fusion, alteration, and analysis are as essential as paintbrushes and pigments (1992).

Despite India's global position as one of the largest film-producing countries, the penetration of AI technologies in its creative workflows has been slow and inconsistent. This paper explores the underlying reasons through a systematic investigation, including both empirical research and theoretical analysis. By the end of this study, we aim to provide a roadmap that addresses current hurdles while laying a foundation for ethical and culturally sensitive AI integration in Indian filmmaking.

Aims and Objectives

1. To explore the current state of AI adoption in Indian filmmaking.
2. To identify the primary ethical, technical, and cultural challenges in the adoption of AI tools.
3. To assess industry perceptions and readiness through empirical research.
4. To analyze case studies that demonstrate the successes and limitations of AI in Indian cinema.
5. To recommend strategies for responsible and inclusive AI implementation.

Review of Literature

The global literature on AI in filmmaking often celebrates its transformative potential. Authors such as Gilroy (2018) [5] and Sharma (2020) [7] have argued that AI tools streamline creative processes, reduce costs, and enable data-driven decision-making. In the Indian context, however, few comprehensive studies have been conducted. Chatterjee (2019) [2] examined the role of AI in film editing, while Nair (2020) [6] focused on automated subtitle generation for Indian languages.

Schenk M.M.K (2012) [11], In his piece "Bollywood on the Wings of Technology and its Contribution to Economy: Hundredth Year of Indian Cinema," he talked about how Indian cinema has embraced technology to boost economic progress. According to the article, Bollywood and Hollywood both developed historically at the same time, but Bollywood still lags behind Hollywood in terms of technology. In the same way, Indian regional film industries have tried to match Bollywood in terms of quality. One hundred years have passed since the inception of Indian cinema, which primarily consists of Hindi-language productions. According to the article, Hollywood has marketed its movies by focusing on business principles rather than controlling the star system. They have marketed their films globally and presented the film industry as a

foreign trade policy, even if they have their own domestic audience. Bollywood, on the other hand, did not originally gain traction because it was unable to accept government funding. Hollywood has focused on advancing technology and storytelling through its films and has taken the lead in all industrialized nations. Additionally, it has been heavily supported by the US government, which links movies to trade policy. The paper also disclosed that Bollywood has established itself internationally at its own pace. Regarding the visual and cinematographic aspects of films, Bollywood is undergoing rapid and evolving developments. Bollywood is implementing the newest technologies by using highly qualified and experienced personnel. The management and cutting-edge technologies work together to promote the widespread channelization of movies. Through their screenplays, Bollywood filmmakers are bringing the idea of the Indian way of life to commercial films, gaining recognition from other nations and having an economic impact on a worldwide scale. Bollywood needs to write better scripts with compelling storylines in order to survive in the global economy, as the essay suggests.

Banerjee (2013) [16] Spike Lee is quoted in his study "New Trends in Digital Movie Making and its Impact on Film Viewership," which claims that digital has made filmmaking more democratic. These days, making movies without a film could be a pastime. Due to the widespread distribution of films brought about by digitalization, there are numerous websites that share videos, and many of these people now aim to become filmmakers, even if only as a pastime. "It is uncertain whether the quality of films will improve, a lot of people will take up moviemaking," adds Kushal Banerjee. Furthermore, claiming that someone lacks the funds to produce films cannot be used as an excuse. He can turn his idea into a movie if he has a workable one.

He described the enormous influence of technology in Bollywood in his piece "Bollywood Catching up on Technology with Hollywood." Businesses in the IT sector are actively involved in the media and entertainment industry. Bollywood is evolving quickly in line with the expertly crafted technical effects. It has been improved to the point that it is challenging to distinguish between actual and special effects in movies. Film budgets have decreased because of technical advancements that have made it possible to live in virtual heaven, fight alongside thousands of warriors, and more. In a same vein, big-budget movies have begun to produce unique, visually stunning, and animated pictures that heighten audience tension. To revolutionize Bollywood and make it compatible with Hollywood, an attempt is made to train working people in technology, scene production, and animation.

Rani (2011) [17], outlined the significant changes brought about by technology in the Indian film industry and illustrated the advantages of implementing digital cinema in a paper titled "Impact of Technology on Creative Industries: A Study of the Indian Film Industry." The survey revealed that almost 1000 films are made annually, with a staggering INR 3.2 billion in ticket sales-a figure that is both astronomically high and constantly rising. Filmmaking has become more creative thanks to digital technologies. To work on cinematic effects for movies, technical specialists are employed. A regional film can be released by dubbing it into multiple languages. Filmmakers can use technology to create images of actors and actresses, and they are not required to be there in person for a certain shot. Digital technology has, in theory, helped the audience by providing high-tech visuals, improved sound quality, and assistance in the process of creating content. The study listed several advantages of digital cinema, such as lower print costs and the need for a one-time investment in digital printing. The low and reasonable price of the tickets makes it simpler for consumers to pay. Digital cinema can be used to practice the digital print's wide release. Digital protection software makes it simple and secure to prevent movie piracy. Films that don't decay over time can now have an endless lifespan thanks to digital cinema. Digital cinema offers a simple and effective way to collect revenue. The procedure of investing in the print or its copyright carries a minimal amount of risk.

Ethical concerns have been increasingly addressed in Western literature. Boddington (2017) [1] emphasized the risks of data bias and job displacement. Similarly, Ford & Wood (2019) [4] discussed the ethical implications of AI-generated characters. In India, ethical discourse is still evolving, and practitioners often express fears about creative dilution and cultural homogenization.

Technical challenges are particularly pronounced in India. According to Sinha and Mehta (2020) [18], the lack of high-quality datasets, especially in vernacular languages, hampers AI model training. Moreover, the absence of standardized digital workflows across production houses creates implementation hurdles.

Cultural resistance also plays a significant role. As noted by Deshpande (2018) [3], Indian filmmakers often rely heavily on intuition and storytelling traditions that are difficult to quantify or replicate via algorithms. The preference for human judgment over machine-generated insights remains prevalent.

Research Methodologies

The research employs a mixed-methods approach combining quantitative and qualitative methods.

Quantitative Data Collection

- Sample: 120 film professionals (directors, producers, screenwriters, and casting agents).
- Tool: Structured survey questionnaire.
- Locations: Mumbai, Hyderabad, Chennai.
- Analysis: Frequency analysis and cross-tabulation using SPSS.

Qualitative Data Collection

- Sample: 15 in-depth interviews with key stakeholders.
- Tool: Semi-structured interviews.
- Analysis: Thematic analysis using NVivo.

Case Studies

- Films Analyzed: "Robot 2.0" and "Project K"
- Focus Areas: Use of AI in script analysis, budgeting, casting, and pre-visualization.

Table 1: Quantitative Data Collection Summary

Parameter	Details
Sample Size	120 film professionals
Sample Composition	Directors, Producers, Screenwriters, Casting Agents
Locations	Mumbai, Hyderabad, Chennai
Data Collection Tool	Structured Survey Questionnaire
Data Analysis Method	Frequency Analysis, Cross-tabulation using SPSS

Table 2: Qualitative Data Collection Summary

Parameter	Details
Sample Size	15 key stakeholders
Sample Type	In-depth Interviews
Data Collection Tool	Semi-structured Interviews
Data Analysis Method	Thematic Analysis using NVivo

Table 3: Case Study Analysis

Parameter	Details
Films Analyzed	*Robot 2.0, Project K*
AI Use in Pre-production	Script Analysis, Budget Estimation, Casting, Pre-visualization, Scheduling
Analysis Focus Areas	Practical use of AI in pre-production and its regional adaptability
Challenges Identified	Language compatibility, Metadata standard issues

Results and Interpretation Survey results indicated that 68% of respondents had used or were exploring AI in pre-production. Among these:

- 45% used AI for script analysis
- 33% for budgeting
- 29% for casting suggestions
- 22% for location scouting

Interview data revealed concerns about the lack of localized AI tools. Many participants noted that AI platforms like ScriptAI and Jasper are optimized for Western narratives and lack contextual sensitivity to Indian storytelling. Some voiced ethical concerns about synthetic actors and AI-generated scripts potentially replacing human creativity.

Case studies of "Robot 2.0" and "Project K" showed that AI was used for scheduling, visual pre-production, and budget estimation. However, limitations such as low compatibility with Indian regional languages and lack of metadata standards were evident.

Table 4: Survey Results on AI Usage in Pre-production

AI Application Area	Percentage of Respondents Using AI (%)
Script Analysis	45%
Budgeting	33%
Casting Suggestions	29%
Location Scouting	22%

Note: Total exceeds 100% due to multiple selections allowed.

Table 5: Summary of Key Themes from Interview Data

Theme	Description
Lack of Localized AI Tools	Most tools like ScriptAI, Jasper not tailored for Indian contexts
Western Narrative Bias	Tools favor Western plot structures over Indian storytelling conventions
Ethical Concerns	Concerns about AI-generated scripts, synthetic actors replacing humans
Creativity and Authenticity	Fears of diminished human creativity in storytelling

Table 6: AI Usage in Case Study Films

Film	AI Applications	Observed Challenges
Robot 2.0	Scheduling, Visual Pre-production, Budget Estimation	Language limitations, lack of metadata standards
Project K	Script Breakdown, Pre-visualization, Budgeting	Incompatibility with regional data structures and formats

Discussion and Conclusion

The findings of this research underscore that the adoption of AI in Indian filmmaking is both promising and problematic. Ethical concerns about job loss and creative autonomy are significant. Technical challenges like inadequate data infrastructure, limited language support, and a lack of digital standardization act as major roadblocks. Cultural resistance, rooted in a rich tradition of human storytelling, further complicates integration.

Despite these hurdles, there is cautious optimism. With policy support, localized AI development, and ethical guidelines, AI can be a valuable assistive tool rather than a disruptive force. This paper recommends increased investment in R&D, development of indigenous AI tools, establishment of ethical standards, and training programs for industry professionals.

The following recommendations or suggestions are being made in light of the study that has been done; these can serve as a basis for gauging the extent of future research projects in related fields. The following highlights these recommendations:

1. The construction of movie theaters and multiplexes in areas that do not yet have theaters-that is, semi-urban and rural areas-with a capacity of roughly 100–150 people could be considered by the Hindi film industry as a way to improve both the frequency and quality of movie viewing. This would give the audience a more comfortable and enjoyable viewing experience. Furthermore, based on this research, it is recommended that theaters be made available to rural areas as well, since this will ultimately increase the amount of money that movies make at the box office.
2. It is recommended that theaters consider setting movie prices according to the content and quality of the films as well as the economic and geographic circumstances of the localities. This will allow the majority of people to watch films with their friends and family, which will ultimately increase the volume of film business.
3. It is advised that multiplexes concentrate on offering online redressal services and customer support, since these can assist in resolving problems encountered by moviegoers. More importantly, every theater should choose to use an online ticket booking system since it can be efficient for both sides and result in a better experience.
4. Since youth provide the majority of business to the

entertainment industry, it is suggested that appropriate steps be taken to maintain better assistance towards young viewers.
5. By making security and nearby transportation available, more people will watch films, which will boost the film industry. The local transportation offices should be given the proper amount of attention by the people living in rural or village regions.
6. Given that it is generally advised that crowd size might affect people's interest in viewing movies, it is crucial to consider the level of training or skill of the audience when selecting the location of movie theaters and multiplexes.
7. It is proposed that the screen's characteristics, lighting, and general amenities should be prioritized to increase the level of satisfaction of the moviegoers, and that enhancements to the fundamental structure will attract more people to the theaters.
8. There should be enough family-oriented films produced so that young people and couples can routinely see movies with their families. Because there is a lot of explicit content in movies, families often don't go to multiplexes to view them.
9. The producers should prioritize making satirical films in addition to lighthearted comedies, as this will help them increase their earnings.
10. When considering the cast of films, it is advised that emphasis be placed on the main characters based on their capacity to engage viewers rather than merely the well-known actors. However, this element entails filmmakers making individual decisions based on their requirements.
11. As a result, a significant recommendation is made that our nation's government collaborate with the film industry to construct additional theater spaces that meet worldwide standards. This will be crucial in attracting international filmmakers as well.
12. Filmmakers should take advantage of the pandemic by ensuring that more films and content are released on over-the-top (OTT) platforms, which offer many benefits, including reaching a larger audience and allowing people to continue watching high-quality content in the comfort of their own homes with friends and family.

The future of Indian filmmaking with AI will depend on balancing innovation with integrity, efficiency with emotion, and automation with artistry.

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