Impact Assessment of Digital Intermediate Technology on Indian Visual Effects Industry

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Abstract

This paper explores the rising horizons of Digital Intermediate technology which is taking the Indian film industry by storm. The effects laden films of today rely heavily on post production effects that taken the reel to the wow factor. The dice that was rolled out by western counterparts almost five decades ago where it has reacheda maturity level; is coming of sort as a bright child in form of Indian Visual Effect industry. In this research paper the scope, context, data analysis of DI technology is examined in depth with a prediction for the future.

Keywords

Digital Intermediate, Visual Effect, Deblocking, Resizing, Deinterlacing, Denoising, Deflicking, Film colorization (tinting), Color grading, Film look, Super-resolution imaging, Uncompressed, Pixel art scaling, Telecine (3:2 pulldown), Inverse telecine.

Introduction

Digital intermediate (typically abbreviated to **DI**) is a motion picture finishing process which classically involves digitizing a motion picture and manipulating the color and other image characteristics. This majorily replaces or augments the photochemical timinthe traditional time consuming process.In fact thdifferent from the telecine process in which film is scanned and color manipulated in early stages to facilitate editing. Contemporary speaking the lines between telecine and DI are getting blurredbased on the fact that often

both the processes are using the same hardware by colorists belonging to same background. The major difference lies in the fact that these two processes are typically a part of the overall color manipulation process in a movie at different points in time. Typically speaking a digital intermediate is also customarily done at higher resolution and with greater color fidelity in comparison to telecine transfers.

Process: Telecine technology has been electronically capturing film images nearly as old as broadcast television.Significant improvements in quality of Film scanners and recorders were witnessed in 1970s, late 1980s and early 1990s. In 1992, released *Super Mario Bros.*Visual Effects broke through several "techno-barriers" in creating a digital studio. In 1993Pleasantville, became the first VFx film to scan, process, and record the majority part of a feature length, live-action, Hollywood film digitally. This motion picture also has to its credit to digitally scan a large number of special effects plates (nearly700) at 2K resolution. The first Hollywood film to involve a DI process from beginning to end was O Brother, Where Art Thou. *Chicken Run* released that same year in 2000 in Europe became the first film to to involve creative options which allowee the film makers toincorporatehigh-quality scannino and color adjustments to produce movies for digital cinema.

Majority of the 50% of Hollywood films underwent through a digital intermediate process in 2005 which increased to 70% by fall of 2007.

The Indian Scenario:

Indian Visual Effects (VFX) space is witnessing certain projects that are pushing boundaries of moviemaking. Domestic filmmakers have also begun using VFX increasingly, looking to unearth IPs of bigger scales.In 2016, VFX redefined storytelling on the big screen with the following releases:

1. Sultan
2. Fan
3. Shivaay
4. Mohenjo Daro
5. M.S. Dhoni: The Untold Story

The DI industry in India has witnessed a huge growth over the years, spearheaded by the fact that Hollywood studios are looking for cost effective options by tapping into a massive

pool of DI professionals in India to work on their global projects. The DI and post-production industry witnessed a growth of around 20 per cent in 2016, and a 23 per cent growth in the DI industry in 2017.

International projects contribute to biggest share of DI revenue accounting a whooping 73 per cent of the industry revenue. Domestic projects arealso expectinga grow spurt at a because of increasing budgets being apportioned for DI in domestic films. Classic example is Bahubali 1 and 2 franchises.

The DI revenue from domestic pretweenojects has CAGR projections of more than 31 per cent between 2016 and 2021. The demand not only is expected come from Bollywood, but also from regional cinemaas down in southern part of India producers are pouring more investments in DI.

The Indian DI industry witnessed a huge leap of faith in in the last few years. *Shivaay*, had 4,500 DI shots which crossed the Rs 848 million revenue barrier. In the next movie *Fan*, the lead actor was de-aged and shrunk in size for the complete duration of about 120 minutes' frame by frame. *Sultan* featured more than 2,200 DI shots and earned a whooping Rs 3,000 million on the domestic box office collection,

The roaring success of*Baahubali* has brought DI to the forefront and the production values measured best with their westerrrn counterparts. Out of a total budget of Rs 550 million the producers of the film hired 25 studios to do the DI work and in this process spent a close to Rs 100 million.

Anotherglaring example is *Kaashmora*, released in 2016. The DI team worked on the film footage mostly comprising set extension for more than 70 minutes. The film extensively uses 3D face scan technology, shooting fight scenes with doubles and merging the actor's face onto their bodies. Similarly, Gautamiputra Satakarnihad more than 40 minutes of DI work which was released in 2017.

Tools of the Trade:

Most of the project based studio thatwere established earlier relied heavilyon Discreet Logic's (now Autodesk). They basically dominanted the high resolution market known for high performance digital compositing systems. Some major softwares used are mentioned in the table below.

• Flame	• Massive	• Smoke
• Inferno systems	• Mudbox / Zbrush	• Nuke
• Lustre	• Avid	• Renderman

The Digital Intermediate (DI) process is revolutionizing filmmaking, both artistically and financially.The DI workflow brings in both speed and versatility, while maintaining the highest resolution standards for an enhanced visual experience. The various DI processes/services generally offered to clients are:

- Scanning at 4k

- Hd & SD to film

- Colour calibration
- Dustbusting
- HD & SD video deliverables
- Digital cinema
- Realtime playback and review
- Conform
- Film recording
- Calibration & film stock
- Data to film

Workflow of DI:

Right from Creating High Quality Film Scans, a database is created as an XML sheet. Later it is conformed to a video file format only to be color corrected 2K/4K resolution. Then quick time coversion is done with output in form of an EDL. The below mentioned workflow vector clearly illustrates the same. This is highlighted specifically for a MAC based system.
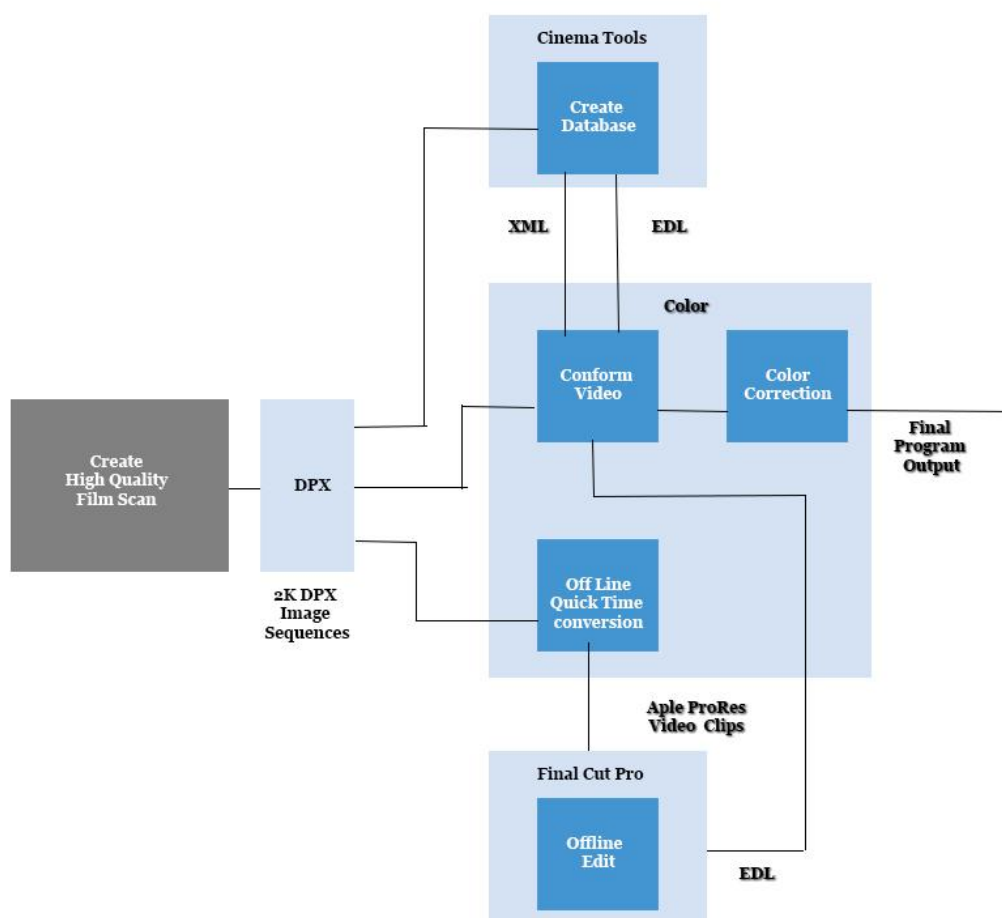
Examples:

Nowdays most of the producers and directors are working with DI technology and even strorylines are being written keeping this is mind. Below is a list of some of the movies which are DI heavy.

Jalpari	Kashchey	Quiet Day	Paigham

A few DI laden Hollywood movies which had a global audience.

Pirates of the Carribean: Dead Man tell no tales	King Arthur : Legend of the Sword	Ghost in the Shell	Beauty & the Beast

Data& Figures:

If we look beyond the film business the channels broadcasting content are not left far behind in the race., Star Plus, Zee TV, Sony, &TV, Life OK and SAB have launched more shows that have a intrisinic demand for proficient use of DI for better quality viewing experience. In earlier 2015, few shows that successfully deployed this technology were "Chakravartin Ashoka Samrat", "Maharakshak Devi"which had 250 VFX shots,chroma shots, 3D modeling, 2D animation and matte paintings to mention a few. Other shows like "Siya Ke Ram", "Naagin"on Colors channel and recently launched show "Janbaaz Sindbad".

A far as quality outsourcing work done by Indian studios is concerned 2015 sawPrime Focus World's doing a Chinese action adventure film "Chronicles of the Ghostly Tribe". Moving Picture Company (MPC) delivered out of its facility in Bengaluru.most of the major visual effects & DI work on X-Men Apocalypse

Considering the incentives provided by the government, the trend of Hollywood outsourcing VFX/ DI projects to low-cost ones has been significantly on the rise.

As a result the DI/VFX artists in developed countries such as Canada are offering grants, labour tax credits to domestic companies engaged in VFX work to help them retain artists talent base as well as in their expansion efforts.

The movie making value chain has undergone a metamorphosis and it is indeed encouraging to see that mainstream Indian filmmakers plan their production schedules to accommodate the VFX component of the film.

Currently the VFX industry is estimated to be of Rs 43.5 billion and will get a significant increase by 2020 and is estimated to grow up to Rs 87.1 billion. While the industry will get a boost after the release of a few big films, the television space is also not to be underestimated. It is expected that digital will drive growth, and innovation will be the key which will be driven by creative expression.

VFX & Post Production: Rendering Success : Current Data

Segements	2011	2012	2013	2014	2015	CAGR % 2011-15	Growh in 2015
VFX	6.2	7.7	9.3	11.3	14.4	23.5%	27.4%
Post Production	13.5	15.5	17.7	20.4	22.8	14.0%	11.8%

Source: KPMG inIndia | Analysis & Discussions

Projected Growth of VFX & Post Production sector for the period 2016-20

Overall Industry (INR Billion)	2016P	2017P	2018P	2019P	2020P	CAGR (2015-20)
Animation & VFX	58.3	67.1	78.1	91.3	108.0	16.1%

Source: KPMG in India | Analysis 2016

The scope of the Digital Intertermediate technology is far more beyond the data and facts presented in the research paper.As the cost of ownership is going down lot of small studios are starting up all over the country. The day will be not far when excessively coptetive price bidding for effects would trickle down not only for films but also for TV and Advertising. The timelines will be tighter and production values will be very high and lot of VFX schools will alos come up to cater to

theevergrowing demand for a qualifying workforce with industry level skills. Conent will rule.

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