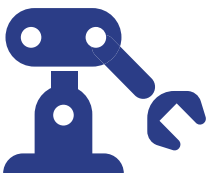
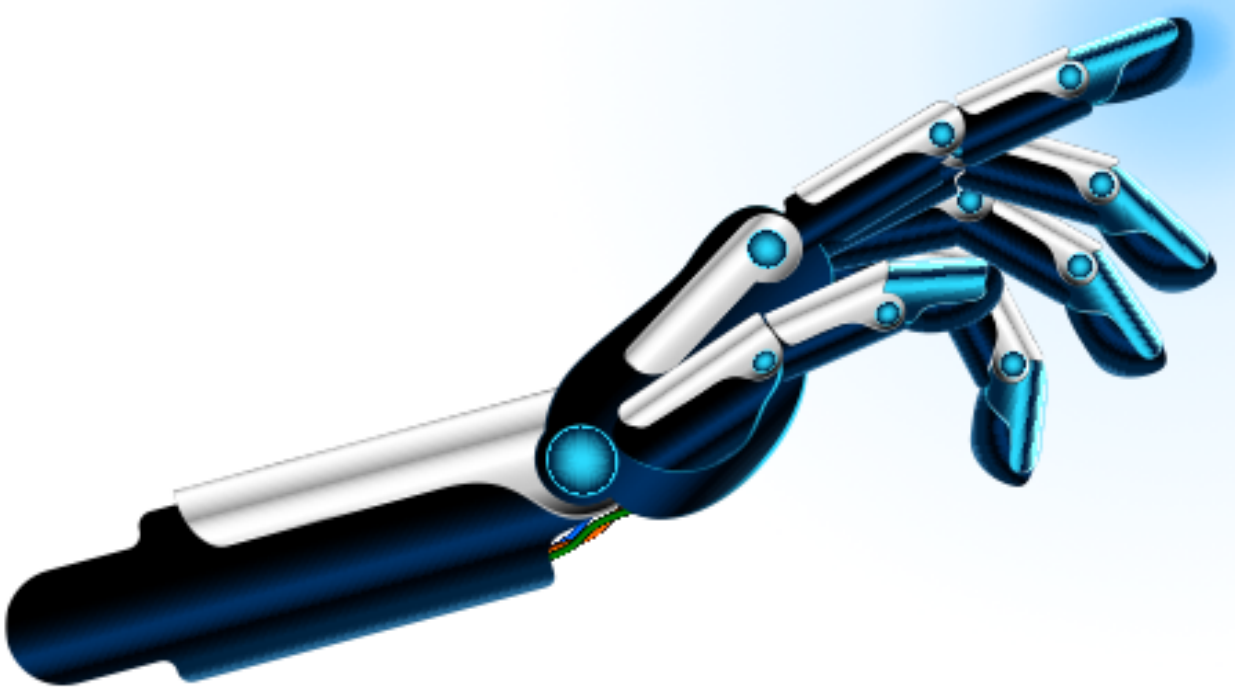
SRUSHTI

THE INCEPTION OF SMART MACHINES IN CREATIVE INDUSTRY





"Hey Siri, what's up?"

"Just responding to three million people calling out 'Hey Siri' at the same time." "Do I look fat?"

"Judging from your voice, I'd say you must be fairly attractive."

Siri - such a smart girl! Perhaps, you don't need any special introduction about her. For those guys who mistake Siri to a girl, we are talking about Apple's voice assistant. It tells you jokes, suggests you restaurants, books, and films, and it has an answer for your every question. Besides Siri, there are so many other voice assistants such as Cortana and Alexa, helping out mankind in their everyday life. Machines talking to men! This was just a fantasy shown in hollywood movies and something man could not believe to be possible. But today, it is just as simple a reality as the sun rises in the east.

A voice assistant on mobile phones is just an example of Artificial Intelligence, shortly called AI, that we carry along with us every day. In the modern world, there are numerous other examples like Driverless cars, smart homes, and robots that have brought a drastic change in the way things work around us and much more innovations are anticipated in the days to come. Just as the genius Stephen Hawking said, intelligence is the ability to adapt the change and the smart machines have mastered the art. However, it requires sustained learning, doesn't it? One question would definitely hold our attention- how do these machines learn and from where? And the question has a simple answer- Machine Learning.

Since our childhood, we learn many new things from our surroundings and in the process, we do several mistakes. Machine learning works with the same principle. It is an approach of Artificial Intelligence with an intention of learning, rather than simply programming. With the aid of deep neural networks, the computer systems study large sets of data and tries to make predictions instead of using computer programs. Suppose a machine mistakes an apple to an orange, it learns from the mistake and the next time, it identifies correctly. Simply put, machine learning enables a machine to mimic the way human beings think and behave.

If we call the 21st century a smart era or a digital era, machine learning has a major part in the reasons for us calling it so.

Be it manufacturing, marketing, or governance - machine learning plays a significant role. Well, there is a conception that creativity is the unique feature of mankind that makes human entities superior on the earth and there are many speculations that machines cannot be the brainies to generate creative content. But slowly, Machine Learning started backing the computer systems to leave their mark in the creative industry too.

MACHINE LEARNING IN CONTENT CREATION

WATSON FOR MORGAN !

20t h Century Fox - a hollywood production house well-known for its path-breaking movies like Avatar and Deadpool. Every now and then, the studio makes experiments with new film technologies, taking the industry to new levels. In the year 2016, Fox produced a sci-fi thriller film Morgan, featuring Anya Taylor-joy in the lead role. The Luke Scott's directorial revolves around the character of Morgan, a bioengineered child who is smarter than human beings and becomes a life threat to its creators themselves. Though the film could not do great at the box-office, its trailer created a page for itself in the history of world cinema. The movie is about a humanoid enabled with Artificial intelligence and the creators wanted to reflect its theme in every inch of its promotion. And that's how the curtains rose for the first ever film trailer created using AI machines.

In 2010, IBM developed a smart computer system Watson, that can answer questions asked in natural language. Named after the first CEO of IBM, Thomas J Watson, the computer system was powered with Natural Language Processing and Machine Learning to answer the questions on Jeopardy, an American TV quiz show. And it was no surprise that Watson won the first prize in a competition against former winners of the show, Ken Jennings and Brad Rutter. On hearing a great deal about Watson, Fox approached IBM and asked if the AI machine could

analyze the AI horror thriller and automatically generate a trailer. Naturally, we human beings are capable of judging the mood of an individual. But, can a machine do that?

After all, the bottomline of Artificial Intelligence is to make machines behave the way humans do, isn't it? So, the scientists at IBM Research Centre took it as a challenge and decided to send Watson to a film school. Watson analyzed the whole movie of Morgan and generated statistical data of where some action takes place throughout the film. The system also studied hundreds of horror film trailers that invoked the emotions of viewers and kept on the edge of their seat. Thus, Watson was able to analyze each and every shot from Morgan whether it carries horror, sadness, or tenderness and arranged the visuals in an order to prepare the trailer. However, it's just a machine that still needs to learn giving a human touch.Filmmaker Zef Cota at IBM Research took the responsibility the creative elements of the trailer and prepared the final trailer. And the output... here have it for yourself:

SOURCE : MORGAN | OFFICIAL TRAILER [HD] | 20TH CENTURY FOX

As a creator, director Luke Scott felt that AI has its real value for films only when it starts to understand and calibrate human emotions for itself. Really, can machines ever be content creators themselves? To

what extent Machine Learning can involve in the creative industry? Well, to a great extent that machines could write scripts and screenplays. And it took not much time to be proven true when Jack Zhang of Greenlight Essentials sought for a crowdfunding on Kickstarter to complete a horror film co-written by an AI machine.

IMPOSSIBLE THINGS MADE POSSIBLE!

Jack Zhang was given a software tool that uses Machine Learning to analyze the response from audience while watching different genres of films. The AI machine helped the creators to learn what kind of plot points audience love the most and this analysis resulted in a creepy horror film, Impossible Things. When asked about the use of Machine Learning in filmmaking, Zhang said that 85 percent of the films fail at the box-office just because of a mismatch between the plot and the taste of the audience. For Impossible Things, the AI system analyzed the interests of women under 25 and suggested the creators that a plot with ghosts, family relations, and piano and bathtub sequences would match the taste of a large number of audience. The intelligent computer system not just stopped its work at giving the demographics, it also involved itself in developing the plot, which turned out to be one of the scariest scripts out there. The story revolves around a mother and daughter who move to an old victorian house and the induced insanity of the mother after the daughter's death.

The film is half-done and the AI system edited a terrific trailer by learning the interests of viewers through machine learning. International Movie Database (IMDb) says that the movie is still under development, for which the Zhang needs $22,843 for releasing it. Further, Zhang wants to reward the supporters with complementaries such as digital copies of the script,

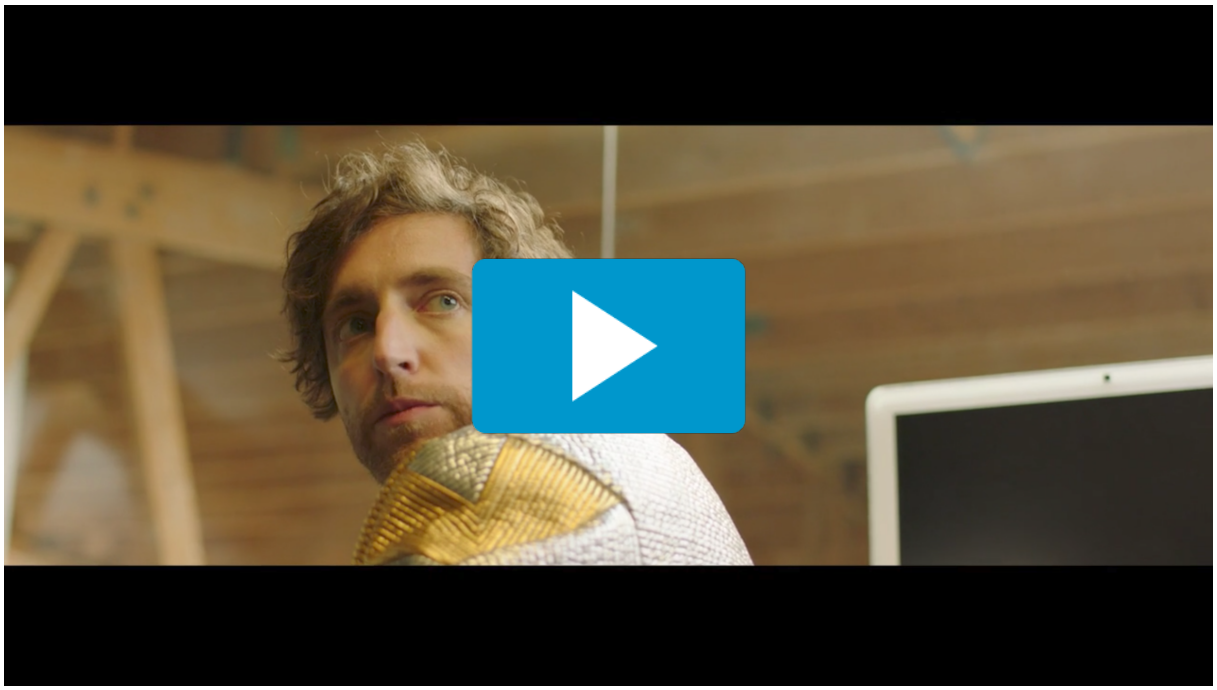
HD prints of the films, credits as Associate Producers on IMDb, t-shirts and the mysterious properties used in the movie. From analytics to trailer edit, machine learning involved to a great extent in the production of Impossible Things. Then, how about the output? Well, the team shared the trailer on their Facebook page in 2016 and it earned more than two million views and thousands of impressions. Amazing, isn't it? For you, here we got the trailer:

SOURCE : IMPOSSIBLE THINGS TEASER TRAILER

SURPRISING SUNSPRING

For most of the science fiction lovers, Sci-Fi London needs no special introduction. Originally called The London International Festival of Science Fiction and Fantastic Film, SFL recognizes and screens amazing sci-fi and fantasy works from across the world. The festival encourages short film makers through the 48 Hour Film Challenge, in which the contestants have to make a film that includes the given prompts in the plot. So far in its eight editions till 2015, the competition witnessed several beautiful short films being conceived and produced, winning the hearts of their audience. But there was something miraculous happened in 2016 when Benjamin wrote the complete sci-fi script and screenplay for Oscar Sharp's

directorial, Sunspring. The short film depicts the triangle love story of three characters H, H2, and C who live in the future world. One should never miss the intense short film, and here it is for you:



SOURCE : SUNSPRING BY 32 TESLA K80 GPUS

Emotional and entertaining, eh? But why the character names all are single letters?

You would be amazed to know that the writer of the film, Benjamin, is not a hollywood hunk but a computer system powered by Artificial Intelligence. There is an interesting story behind it, which started at the New York University (NYU).

When Sharp was in a film school at NYU, he happened to meet Ross Goodwin, a postgraduate in Natural Language Processing and Neural Networks and a former ghost writer as well. Both share a common passion for machines that can be used for creative writing, but there was no such thing invented by then. However, Goodwin had an experience of using machines and Markov chains to assist him writing for his clients.

Thereafter, the duo worked together to build a machine that can write an original piece of writing and a year later, after trying various algorithms, Goodwin created an AI system using Long Short-term Memory recurrent neural network and named it **Jetson** . Then, who named it Benjamin? Well, it might scare you, but the AI system itself named it so. Through Machine Learning, Benjamin studied the screenplays of dozens of sci-fi films, mostly from 1980s and 90s. And how well this machine learning went, can be seen in the way Benjamin wrote some critical directions like the man sitting on the floor and standing in the stars. The AI system broke each and every corpus down to words and observed the way they followed each other and the sentences framed. Thus, it mastered the art of framing its own sentences according to the context, rather than copy-pasting from somewhere. However, it was not so good at naming the roles and for the convenience of Benjamin, Goodwin named the characters in single characters.

MCCANN'S AI-CD β

On 1 April 2016, McCann Japan, a creative ad agency, organized an employee welcoming ceremony to invite its new creative director, AI-CD β. Yeah, you read it correct. Their new Creative Director is a computer system powered with Artificial Intelligence developed by McCann Millennials. The machine learning algorithms in the robot was fed with top TV commercials from the past ten years to enable the AI system direct creative TV commercials at the agency.

Well, but the actual potential of the AI creative director was known to the world when McCann Japan conducted a competition between the robot director and its homosapien counterpart Mitsuru Kuramoto. Food and confectionary brand Mondelez Japan approached McCann to create an ad film for its product Clorets Mint Tab to spread its brand message, "instant, long-lasting refreshment that lasts for 10 minutes". The agency assigned the task to both the creative directors and got two ad films of 30 seconds each in length and went for a public pole to decide the winner.

The man who led the team behind the creation of AI-CD β, Shun Matsuzaka said, "Honestly, it was a major blow", when he heard that 46% of voters prefered the ad created by the AI system. Though Kuramoto won the race with 54% of votes, he felt that the robot could win the hearts of its audience and could be a major contribution for the agency, if developed further.

And yeah, his intuition is proven true in September 2017 when the robot creative directed a music video for Japanese pop band Magical Punchline. But the point that should not be missed here is, the agency was asked to create the video even before the music was written and it seemed to be a big challenge for AI-CD β and team.

But the machine learning algorithms written for the robot made it possible for him to achieve what seemed to be impossible. The AI system did a structural analysis of the music-centered TV commercials added to its database and found the optimal visual expression. After an extensive learning from the data, the creative director guided his team to 'create an appealing video that conveys hunting instinct through a tone of ennui using objectification and school motif'. The team followed his instructions and shot a video that features all the dance-numbers without a supporting score and for which the team Magical Punchline wrote a music afterwards.

For sure, we can consider this as the best example for the possibilities made out of machine learning and AI.

MACHINES PREDICTING EMOTIONAL ELEMENT IN CREATIVE CONTENT

How do you feel while watching the film Conjuring? It's one of the scariest films ever made in Hollywood, isn't it? Friends - one of the most hilarious TV series that keeps you in stitches. And the list of such successful films is endless and so is failures. What is the deciding factor in a film, especially for genres like horror, comedy, and drama? Obviously, it is the emotional element that takes a film closer to the hearts of audiences. Computer systems may not be able to cry or laugh, but they can identify when humans do and this is what Massachusetts Institute of Technology (MIT) is experimenting on. We have already seen IBM's Watson creating an enticing trailer for the movie Morgan and an AI system writing a complete script and screenplay for Sunspring. MIT wants to take this human-machine collaboration further and hence, they taught machines how to manipulate human emotions thereby helping creators. improve their work. In their experiment, the scientists fed small slices of video content to the deep neural networks. These networks are capable of analyzing each and every aspect in the video, from the plot, characters, dialogs, close ups, to background score thereby identifying the emotional element in the video and constructing an arc.

Here is a sample of the results that the research team obtained while testing the system with the movie UP. You might have watched this Pixar's fantasy film which tells the story of an old man Carl. the first few minutes of the film shows how meets his wife Ellie, love, and marry her. Later, Ellie falls sick and dies. And that scene definitely makes everyone weep, doesn't it? Then how did the computer system responded to it? Have a look at it for yourself:

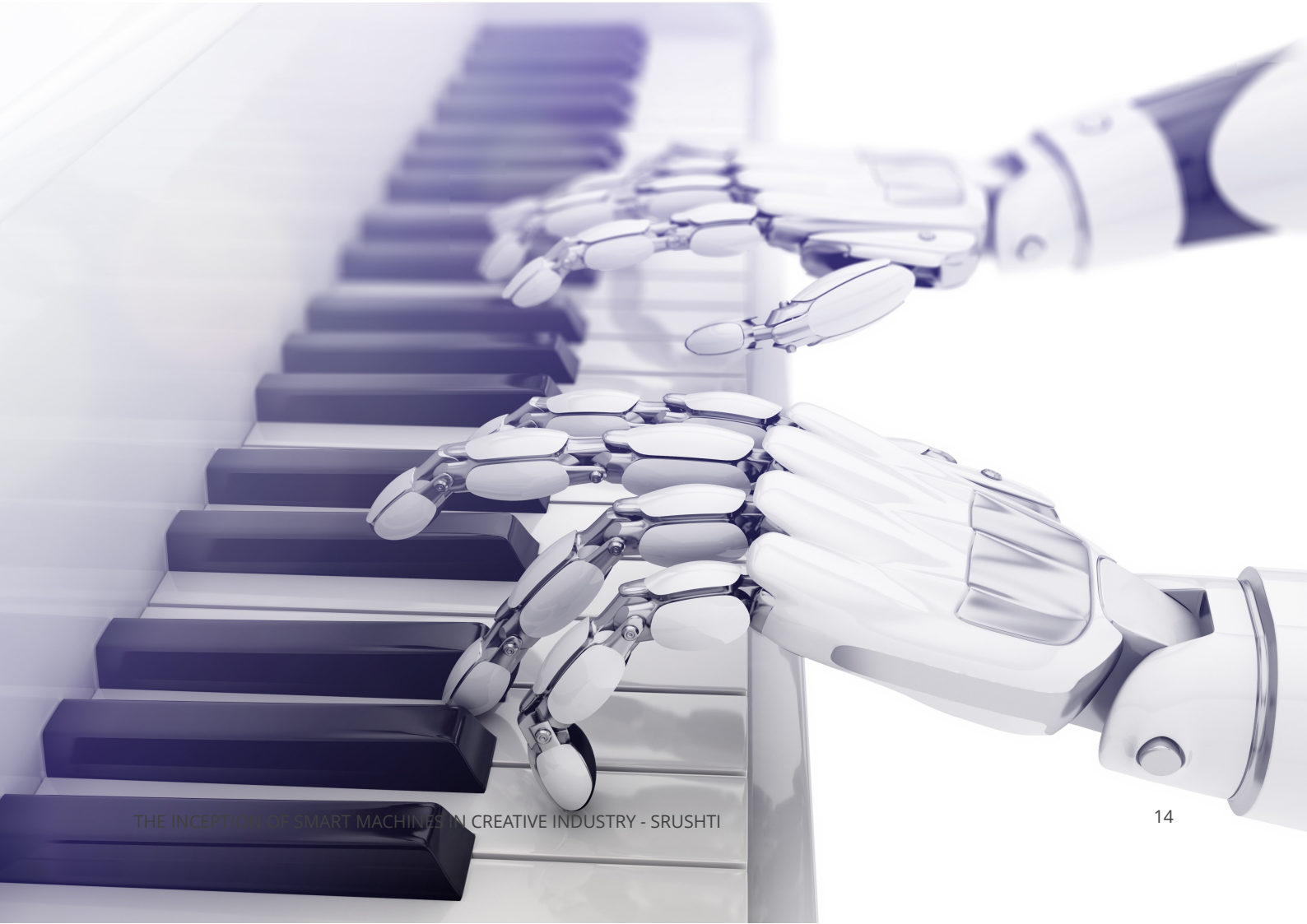
If you observe the graph, you can see time and visual valence taken on X-axis and Y-axis respectively. The visual valence was taken on a scale of 0 to 1, representing the machine's response to the content as a whole.

Analyzing the results, the researchers were quite content with the way the system performed. During the twelve minutes of the video which features different emotions in different sequences, the system responded with positive and negative emotions. The highest point of the curve occurred when the young couple, Carl and Ellie, think of having children and the arc drops to a low when the elderly couple embrace each other. The experiment was not over with just this one movie. The team had fed more and more video content to the machine learning system that it prepared emotional arcs to every video. To test the accuracy of the arcs, the team had also shown the same content to several volunteer human audiences and recorded their response to every provoking aspect of the content.

Actually, the researchers at MIT felt that the story written by an AI system at Sci-Fi London, Sunspring, was not so great and in fact, it is awful. And they expressed a feeling that AI would not be able to create the much needed human element by itself, at least in the near future, thereby eliminating the urge for creative human brains. However, these smart systems, powered with Machine Learning, can make good assistants for the creators and help them improve the content with predictions and that was their intention in developing the deep neural network. Supporting this development of MIT research fellows, IBM's Watson helped Alex Da Kid in creating a hit record.

MACHINE LEARNING FOR MUSIC

“It’s not easy…breaking your heart…” such an amazing song from Alex Da Kid! The lyrics, background score, and visuals - everything about the song is amazing. But there is something else in the production of the song that makes it so special. It just added another feather to the cap of Watson. Yeah, it’s IBM’s AI brainchild Watson who composed the song, together with Alex. The Grammy award winning music producer wants to connect emotionally with his fans and audience and so, paired up with the AI system to see if they could together create a song. He trusted in the ability of Watson to learn from the hundreds of hit tracks to determine what most of the listeners are connected to. With the aid of Watson’s analysis, Alex decided to compose a song centred around the concept of Heartbreak and that is how ‘Not Easy’ took shape to shake the records. Definitely, we can say that this is one of the best man-machine collaboration. Well, what did Alex Da Kid feel about working with Watson? Let’s listen to him:



MACHINE LEARNING FOR CONTENT PROVIDERS

There is an ocean of content on the internet where you have to choose the kind you love. The total number of internet users across the world is quintupled in the past decade and so is the consumption of content. On the other hand, more and more content providers and distributors are coming up to entertain the users. This all would create a chaos in the web if there were no solution like Machine Learning to personalize experiences on the online channels. All it takes is the data that gives an insight into your previous activity on a platform and how it works is something that you might experience quite often.

Let us start it with the biggest online streaming services company in the world, Netflix. The technology team at Netflix developed an AI framework, Meson, to run Machine Learning algorithms in large numbers to predict the interests of its mere 110 million users across the world. Let us make it clear for you. There are numerous genres of content made available for its subscribers from around 190 countries. When visiting Netflix for the first time, we can have a customized experience on the homepage according to the whereabouts of us. Suppose we watch an English thriller film on the website once, the website will suggest us some more most watched English thrillers available with them when the next time we visit it. And if you have any unfinished program on the channel, the 'Continue Watching' row on Netflix helps you resume watching the show. This all happens, because Netflix learns our interests from our activities and tries to provide the best experience on their website. And thanks to Meson and the Machine Learning workflows, we all enjoy it.

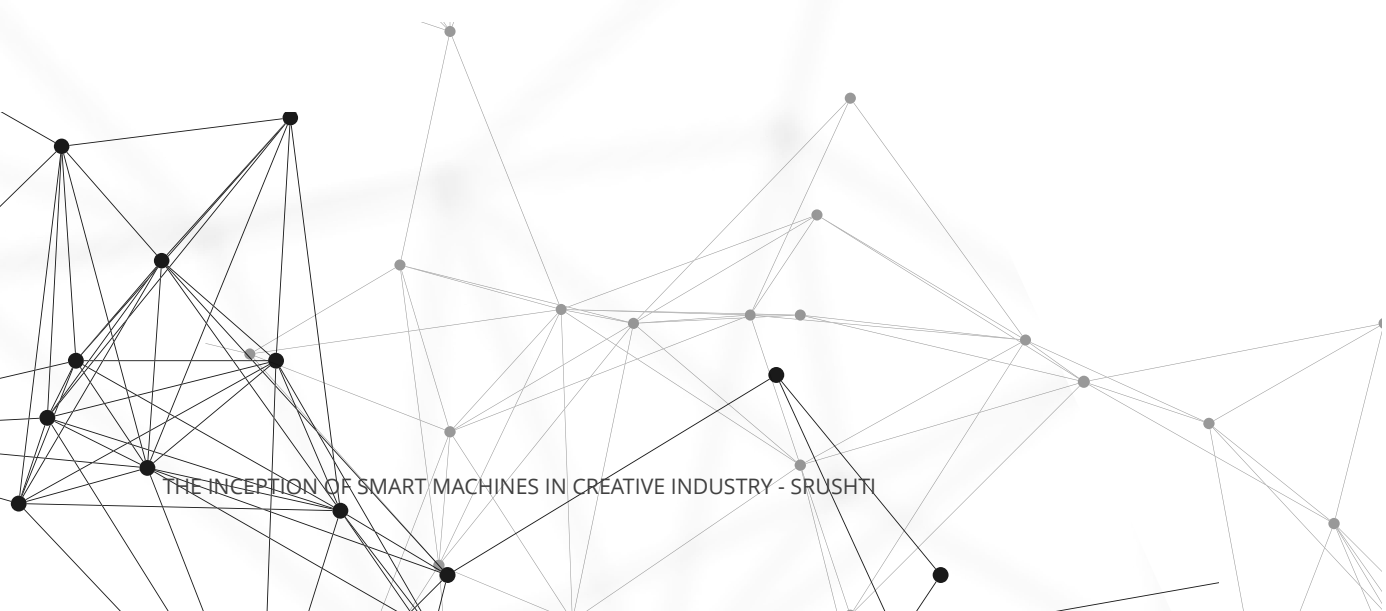
We take the instance of another major online streaming services provider, Hotstar, which boasts to be the first Indian mobile app to cross 100 million downloads. This content provider offers content from eight Indian languages along with English. Speaking about the way they use Machine Learning for their business, Hotstar stated several interesting things in their blog post. The company uses Machine Learning majorly for two reasons - personalization of user experience and Adtech.

MACHINE LEARNING FOR PERSONALIZED USER EXPERIENCE

Accounting for a fifth of the global population, India is a diverse nation with numerous regions and languages. In line with the Indian demographics, Hotstar has a variety of content like TV serials, regional movies and sports. So, the company relies highly on Machine Learning to give personalized experience to each and every one of its users. To meet this purpose, the engineers at Hotstar use recommendation engines that learn from the watch history of every single user.

ADTECH

As an acronym to technology enabled advertising, Hotstar use this term Adtech. Usually, one can enjoy the services of Hotstar for free too. And the company generates revenue by showing ads to such users during the time it serves them content. However, it makes sure that it shows only the most relevant ads to its users, lest they would feel irked.And of course, this is a win-win situation for both advertisers and users as the businesses can reach the right audience, thereby increasing the Click-through rates and conversion rates. Hotstar wants to use Machine Learning and Deep Learning to the fullest and does work on various POCs such as machine translations for subtitles, Audio to Text conversions, and Video processing-compression, object detection, and scene classification to shape up future.



CONCLUSION

As technology keeps on scaling monumental heights, we as a species keep evolving. Every generation up until now has made sure that life is better for the next. Here, in the twenty first century we are on the verge of not just changing the future generation, but the entire species as well. Automated machines play a big role in our daily lives today. It will only expand its potential in the future. However, there is a growing concern about the negative impact of such powerful machines as well. That too can also not be ignored. But, we as a race have found our way to move on eliminating every potential danger that came our way. Humanity has survived this far. And when wise and intelligent brains utilize technology the way it is supposed to, we will continue to excel and prosper.

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