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Entertaining Data: Business Analytics and Netflix

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ABSTRACT

Business analytics has become an integral part towards the success of many organizations. Accordingly, business analytics is therefore regarded as the process of transmuting data into activities through analysis and perceptions in the context of organizational decision making and problem solving. As a result, business analytics is regarded as an essential element which offers managers, leadership with significant information for use in predicting the future of the organization. The purpose of the paper was to look at the business analytics was to look at the business benefits and what the future look like for using big data in business application. Last section of this paper looks at Netflix as successful big data example. The goal of predictive models is to examine data trends to gain analysis insight in to customers buying patterns and product preferences, while at the same time, to gain an understanding of future opportunities and potential risks. Generally, the greatest benefit of business analytics for organizations pertained to driving efficiencies and to optimize operating environments, Netflix as taken example in this paper has mastered analytics and used it efficiently to create value, the team has looked at Netflix in detail. Today if you open your Netflix account; ask yourself what is the % match showing on your screen, how Netflix can predict and suggest your interests.

Keywords: *#Business analytics, #predictive data analysis, #descriptive data analysis, #analytics, #Netflix.*

INTRODUCTION

Business analytics is the study of data using operations and statistical analysis. Therefore, business analytics calls for quantitative approaches and evidence-based data for decision-making and business modelling (Evans, 2016). Basically, from the business and managerial perspective, business analytics is a vital element which is used by managers to gain knowledge regarding their organization which aid them in making insightful decisions. As a result, business analytics provides managers with key information to predicting the future of the organization's sales.

There are several sources of big data that individual or company can access, and this is all depending on the type of analysis, variables & goal of the study, in today's world there are multi-software and applications can be used to study, analyze, simulate and optimize data for best use.

No one can deny that big data today will give big benefits, the curious questions today are about the benefits as well as the limitations – in part II in this paper the team has tried to answer some of these questions, addressing the "predictive" data models. The big advantages are noticeable ROI % in a very competitive time, all companies seek to create value to shareholders and by improving customer satisfaction and operate more efficiently they are absolution create value by applying analytics.

On another side, there are some identified risks & limitations such as cost of development, customization and maintenance, managing the change in implementing new big BI project as example is one the main failure issues organization can have.

Big data is the future where we will see more upcoming revolutionary solutions based on advanced algorithms being developed and exponentially improving in last decades, ROI and value created will be humongous as the team explains in "Future of big data" section.

Companies who are using big data today are in blue ocean zone, they explore un-identified potential, this is not about how do you optimize budget, but it

is an exploration of new ERA, the team has showcased some benefits example from Walmart/ACS and some other failure from KMART/NHS UK and then put together a recipe for success in our new digital world.

In last section of the paper, the team has looked at Netflix and how the analyze everything, focusing on productions the last section is examining in detail how Netflix analyze and optimize cost of production for their new Netflix originals, interesting part in today's Netflix practice and how they adapted advanced machine learnings for personalizing recommendations and optimizing the cover movie page to customers.

BUSINESS ANALYTICS INTRODUCTION AND BACKGROUND

Business analytics and big data are popular topics these days and have a track record back to ancient times such as Egypt, Rome and Babylon (Min, 2017).

Business analytics has defined as "use of data, information technology, statistical analysis, quantitative methods, and mathematical or computer-based models" (Evans, 2016; p.4). It is also "a process of transforming data into actions through analysis and insights in the context of organizational decision making and problem solving." (Evans, 2016; p.4).

From business and managerial aspects, business analytics is a vital tool for managers to gain knowledge about their organization and make solid and insightful decisions accordingly. Additionally, business analytics provides essential data and information for managers to predict the future of the organization, i.e. sales (Evans, 2016).

The following Figure [Fig.1] shows the relationships between data analytics and data science

for business analytics

Fig. 1 Source: Kevin (2017)

Almost all departments in any organization can benefit from utilizing business analytics to improve their operations or predict future trends/activities. This may include customer relationships, sales, marketing, supply chain and financial activities, human resources etc. (Evans, 2016). There is a direct relationship and positive impact between utilizing business analytics and better performance of companies from various aspects such as profitability and customer satisfaction (Evans, 2016). Other possible impacts include "reduced costs, better risk managements, faster decision, better productivity, and enhanced bottom-line performance" (Evans, 2016; p.8)

According to Min (2017), business analytics facilitates and helps organizations to:

1. "Gaining insights into business practices and customer behaviors"
2. "Improving predictability"
3. "Identifying risk"
4. "Improving the effectiveness of communication"
5. "Enhancing operating efficiency"

[Fig.2] shows the relationship between various elements in business analytics

Fig.2 Source: Evans (2016)

There are various methods to understand the collected data in business analytics including descriptive analysis, predictive analysis and prescriptive analysis. The data collection can be done by using annual reports, sales and marketing data, financial statements, etc. (Evans, 2016). Descriptive data analysis helps the companies to figure out the past and current company's performance and make decision accordingly (Evans, 2016), whereas, predictive data analysis provide uses the current patterns/historical

of data to predict the future of the company (Evans, 2016). Prescriptive data analysis "uses optimization to identify the best alternatives to minimize or maximize some objective" (Evans, 2016; p. 10). [Fig.3] shows the relationship between these methods as well as how they help the organization during various stages of the data collection, interpretation and forecast (Kevin, 2017).

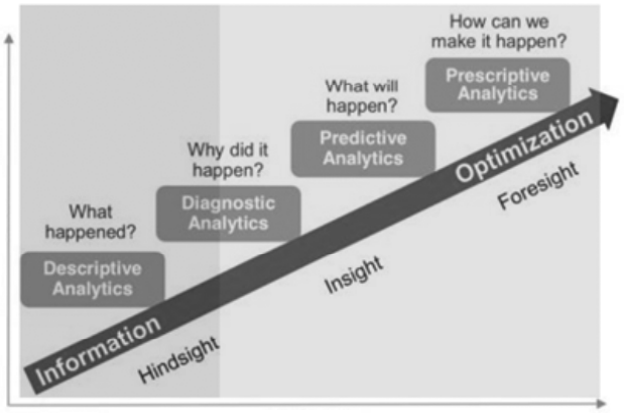


Fig. 3 Source: Evans (2016)

These days there are various programs and software's available to preform business analytics such as Microsoft Excel and SAS. "In 1980's and 1990's business analytics was doing by pen and paper or early versions of Microsoft Excel" (Manning, 2015), However, those new versions were not user friendly and business analysts had a hard time to use it (Manning, 2015). The available software's such as new and updated versions of Microsoft Excel are much more user friendly and are a major help for business analysts and companies. There are also many cloud based programs and applications available these years to perform business analytics which are more visual and easier to work and understand than Microsoft Excel.

The Benefits and Limitations of Business Analytics – Overview

Predictive models are commonly used to examine existing information and historical patterns to help predict future opportunities and as well as risks. This process uses various probability techniques, such as data mining, statistical modelling, and machine algorithm learning to assist analysts to determine future business intelligence forecasts (Georgetown University, 2018).

Overall, the goal of predictive models is to examine data trends to gain analysis insight in to customers buying patterns and product preferences, while at the same time, to gain an understanding of future opportunities and potential risks.

For example, "Today's advances in analyzing big data allow researchers to decode human DNA in minutes, predict where terrorists plan to attack, determine which gene is mostly likely to be responsible for certain diseases and, of course, which ads you are most likely to respond to on Facebook." (Beal, n.d.).

The use of Big Data tools and software allows companies to sort and assess vast quantities of data that has been accumulated in order to assess information which data has merit and should be further assessed to assist making operational decisions in the future. Data, both structured and unstructured, is gathered from all levels of an organization, and data sets may be consolidated, compared, and analyzed, to detect trends and other useful business data. (Beal, n.d.).

Using Netflix and Amazon as examples; Netflix uses predictive data analysis to gain insight in to which movies customers tend to enjoy. Amazon uses data analytics to predict customers' buying preferences, even going as far to then deliver these products to specific regional warehouse locations based on his data before customers even order the products.

BUSINESS ANALYTICS – BENEFITS

Besides competitive advantages in the market place, there are lucrative advantages to implementing a BI system. Based on research findings from 43 businesses in North American and Europe, the average return over a five-year period on BI implementations was 112% for an investment of $2 million. "ROIs ranged from 17% to 2000% with an average ROI of 457%. Thus, business intelligence system implementations can be very beneficial to the organization investing." (Madewell, 2014).

It is also interesting to note that both the organization investing in business analytics software, as well as their customers, benefit from BI.

"The investing firm benefits by operating more efficiently and offering better customer service. The customer benefits by receiving better customer service which allows the customer to operate more efficiently and possibly gain a competitive advantage." (Madewell, 2014).

In a survey by Webopedia' s parent company, 'QuinStreet', 540 executive managers associated with big data implementations, stated their purpose to invest in Big Data analytics was to assist the organization improve operations. In addition, about 50% of the survey participants said, "they were applying big data analytics to improve customer retention, help with product development and gain a competitive advantage." (Beal, n.d.).

Overall, the greatest benefit of business analytics for organizations pertained to driving use big data analytics to improve speed and reduce complexity." (Beal, n.d.).

BUSINESS ANALYTICS – LIMITATIONS

Although there is a vast increase in the availability of digital data, the costs associated with using big data can be expensive, especially for many small businesses. Typical costs related to BI installs include: "hardware costs, software costs, implementation costs, and personnel costs. Maintenance costs can be significant, as well. Maintenance costs for BI installations average around 15% of the purchase cost." (Madewell, 2014).

BI installation costs for many large organizations could end up in the $6 million to $3 billion range. As a result, many smaller organizations are not able to commitment the necessary investment dollars, leaving these companies at a disadvantage (Madewell, 2014).

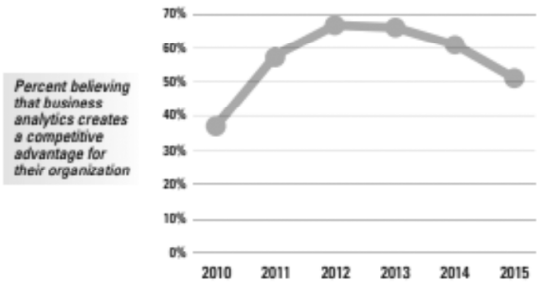
In addition, a significant number of BI installations end up failing due to ineffective change management. "Having knowledgeable personnel on-hand to manage BI implementations by conducting opportunity analyses, readiness assessments, process engineering, ROI analyses, and change management is key to successful implementation. Being able to identify key opportunities is also very important." (Madewell, 2014).

During the past six years, 'MIT Sloan Management Review' has been conducting surveys of business managers to enquire to what degree they felt business analytics resulted in the creation of a competitive advantage for their business. During the initial years of the survey, the percent of managers who reported the creation a competitive advantage as a result of using big data increased significantly.

However, in 2013, the progressive incline reversed direction, and for the past two years, there has been a major decline in the survey participants' responses regarding the creation of competitive advantages (Ransbotham, Kiron, & Prentice, 2016).

The following [Figures 4, 5 & 6] are associated with MIT Sloan Management Survey and their findings pertaining to the decline in competitive advantages from the use of business analytics: (Ransbotham, Kiron, & Prentice, 2016).

Fig. 4 Competitive advantage from analytics is declining

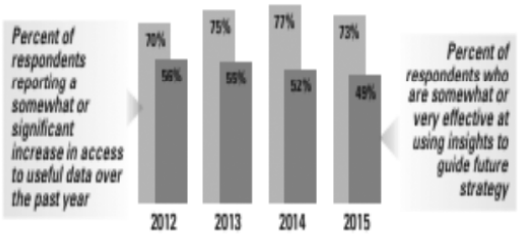


source MIT Sloan Management Survey

Fig. 5 Difficulties gaining an edge with analytics

source MIT Sloan Management Survey

Fig. 6 More data but insights have less effect on strategy



source MIT Sloan Management Survey

ALIGNING EXPECTATIONS WITH REALITY

The MIT Sloan Management Review Survey results showed that greater than one-third (38%) of the survey participants concluded that big data had not lived up to all the expected hype, and 32% stated they felt management's goals associated with the use of business analytics are too high. "The hype has been around not only the amount of data but also around the idea that data can solve all your problems. Analytics can help you a lot, even give you a competitive advantage, but only if you know how to use it." (Ransbotham, Kiron, & Prentice, 2016, p7).

The following highlights in [Fig 7] some of the risks associated with applying Big Data

THE FUTURE OF BIG DATA

Each organization will need to conduct their own due diligence to determine if the advantages of big data analytics outweigh their limitations and related risks. Regardless though, the growth of big data today is an important consideration to all businesses.

Research has proven that there is direct correlation between companies who have increased their investments in Big Data and the associated pay back for such initiatives. "For a typical Fortune 1000 company, just a 10% increase in data accessibility will result in more than $65 million additional net income." (Ciklum, 2017).

THE IMPORTANCE OF BUSINESS ANALYTICS IN COMPANIES' SUCCESS/FAILURES

The use of Big Data is becoming a differentiator between high and low performing companies, it is transforming the business environment, helping business leaders making decisions based on knowledge and not intuition (Liu, 2018). The companies can measure what they need, to based decision on the results of these metrics, but not only decisions, but strategies and investments as well (Liu, 2018). However, not all companies using analytics can take advantage of them, some of them failed to achieve their goals when introducing that tool. Implementing a business analytic system is not only purchasing hardware and software, it involves setting up resources and infrastructure (Yeoh & Popovic, 2016).

Yeoh & Koronios (2010) have developed a set of factors to be considered for implementing a such a system in a firm, they are stated in the following table:

Dimension	Critical success factor (CSF)
Organization	Committed management support and sponsorship A clear vision and a well-established business case
Process	Business-centric championship and a balanced team composition Business-driven and iterative development approach User-oriented change management
Technology	Business-driven, scalable and flexible technical framework Sustainable data quality and integrity

Source: (Yeoh & Koronios, 2010)

Yeoh & Popovic, (2016) said that the organizational factors are the cornerstone of the implementation and suggested that companies that failed are due to focus more on techno-logical, to the expense of organizational ones. They emphasized the need to approach them in the right sequential order, and managerial implication as well.

Some examples of success and failures implementing business analytics, on the retail industry, and on the healthcare one:

1- Success in the retail industry: WALMART

They collected 2,5 petabytes of unstructured data from about 1 million customers per hour (Liu, 2018). These are consolidated in an ecosystem and analyzed into multiple keywords. This is used by Walmart to try to optimize the shopping experience of every customer. The result has been an increase of 10-15% of the online sales, year over year ((Liu, 2018). Walmart based their strategic decision in four functions:

- Understanding what customers are buying
- Understanding customer behaviors at the competition
- Research what is on customer's minds
- Understanding how online behavior and in store behavior influence each other

Analyzing data in that way, the company has been able to gain multiple perspective of customer behavior impact sales.

2- Failure in retail industry: KMART

This company is an example of poor management and inability to use data to gain adaptability to the market through strategical decisions. They were not able to align business analytics to strategic goals, they neither understood product trends nor been able to manage inventory level suitably for satisfied their customer needs, resulting in a poor customer experience (Liu, 2018). To the contrary of Walmart, Kmart was not able to implement a just in time system to refill their places quickly.

According to Liu (2018), Kmart shew a clear lack of leadership and organization, needed to take data driven decision, and therefore it has been in a continuing decline struggled to compete with other companies such as Target or the own Walmart.

3- Success in healthcare organizations: THE AMERICAN CANCER SOCIETY (ACS)

The ACS wanted to have a better understanding of their users, and a better approach to marketing. The idea was to use analytics to understand the interactions between their users with ACS applications and websites. With this information the organization group the users, depending the behavior observed in three different segments: donors, information seekers, and events participants (Liu, 2018)

The company also developed a scoring system to measure the user's trends over the time and check how each website was functioning. The end of this was that ACS could develop patterns and based on these patterns the marketing strategies for specific users groups

4- Failure in healthcare organizations: THE UK NATIONAL HEALTH SERVICE

The aim of this organization was to integrate all patients records in a central database. That way, information about illness, treatments, and cost could be tracked, and the resource could be managed more effectively (Liu, 2018).

The initial budget was to spend 6,4 billion euros in the project but was shut down after having spent more than 10 billion euros (Liu, 2018). What has happened for such a failure? According to Lui (2018):

- The leadership team did not define clearly the benefit of this project, and the healthcare providers continue working in silos, so the platform was built without clear business objectives
- There was a lack of expertise in the analytical team. The National Health Service (NHS) did not understand the complexity of the project and this ended in disputes between vendors which handicap the progress of the project
- The project was defined with the NHS as the customer, whilst the customers should be the patients and the healthcare providers

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As we are seeing, to succeed in Business Analytics technology is not the key, but strategy (Kane el al, 2015). These authors said that the ability to digitally imagine the business is helped by a clear strategy supported by leaders who incentive a culture focus on change and invent. Also important are the commitment of the employees to the digital world. Kane et al (2015) highlight some factors:

- Digital strategy drives digital maturity. 80% of the respondents to the MIT-Sloan school research that have achieved digital maturity said that their companies had a clear and coherent digital strategy
- The power of transformation lies in the scope and the objectives.
- Digital strategies in the matured digital companies had developed, according to the research, with the aim of transforming the business.
- Build skills to realize the strategy. The most digital maturing companies are four times more likely to attract the most skilled employees than the les maturing or the less known ones.
- Risk becoming part of the culture. The more digital maturing the company are, the more comfortable taking risk. One step is that is to assume failure as part of the successful agenda. Not always all goes well at the first time, and from failures it can be learn lessons for the future.
- The digital agenda is lead top down. It is important to rely in leadership, and it is relevant that leadership is digitally fluent, but it is also important to understand that digital fluency does not mean mastery in technology.

Kane et al (2015) have found three trends impacting digital strategy forward as well as leadership and culture supporting it:

1. Greater integration between online and offline experiences. It is important to make these two channels complementary and not competitive
2. Organizations must embrace analytics and use their data in decision making and processes
3. Business models will reach their sell by date quicker. John Chambers, Cisco's CEO said" By the time it's obvious you need to change, it's usually too late," "Very often you have to be willing to make a big move even before most of your advisers are on board. And you need a culture that lets you figure out how to win even without a blueprint".

To succeed in these processes, it should consider 3 relevant questions (Kane et al, 2015):

- "Does the organization have a digital strategy that goes beyond implementing technologies?"
- "Does the company culture foster digital initiatives?"
- "Is the organization confident in its leadership's digital fluency?"

NETFLIX CASE STUDY

They use several techniques involving data such as Analytics, Data Science, & Machine Learning. This is all a science of attracting clicks on movies within your account. They know what you watch and how to attract you to watch it. They recommend movies based on past movies, but they also recommend visuals based on past movies here we will take a deeper dive in to how Netflix is using data to help you make decisions.

They analyze everything from how you get recommendations to even production; let's start with production. "Netflix has released hundreds of Originals and plans to spend $8 Billion over the next year on content." (Kumar, et al., 2018)

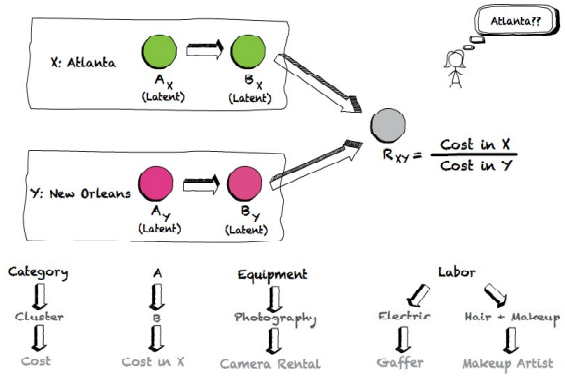

Fig 8 An Example Hierarchical Cost Model (Kumar, et al., 2018)

Everything from how long work days are, to costs of venues, supply costs, cost of extras, etc. [Fig 8] is an example Netflix provided of how they calculate these costs.

This example highlights how they can calculate data to pick locations do they need a set are they using natural surroundings, is weather good for script etc.

Production is a bit trickier because it could be a one-off shoot or an ongoing season series for example which brings in more planning and data required.

How do they use data for recommendations? I'm sure we all know when you watch a movie that you start to get recommendations for similar movies. "This gives an equation of the form frank(u,v) = w1 p(v) + w2 r(u,v) + b, where u=user, v=video item, p=popularity and r=predicted rating." (Amatriaian & Basilico, 2012) The example in the formula is one that was used in 2012 to determine how to rate popularity within their

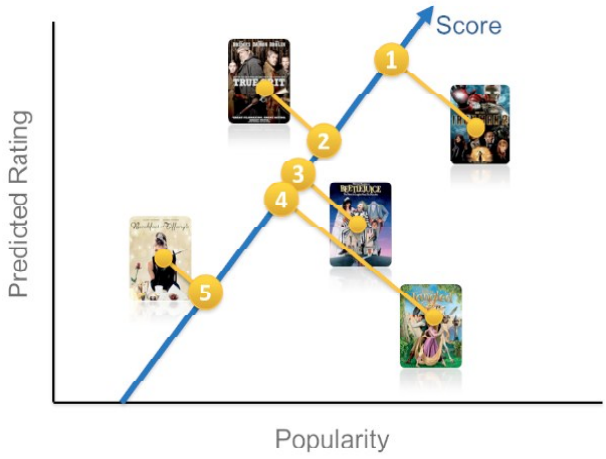

Fig 9 Predictive Rating and Popularity Image (Amatriaian & Basilico, 2012)

rating system. Example as in [Fig. 9] is the formula gives split testing results that basically give different weights based on the users scoring of rating where they can almost predict what future ratings of that user will be and make recommendations as a result. Below shows how the 2 dimensions are used.

Netflix stated in this same study that they are using the following methods of data analysis in conjunction with their "machine learning for personalization: Linear Regression, Logistic Regression, Elastic Nets, Singular Value Decompression, Restricted Boltzmann Machines, Markov Chains, Latent Dirichlet Allocation, Gradient Boosted Decision Trees, Random Forest, Clustering Techniques from the simple k-means to novel graphical approaches such as Affinity Propagation, and Matrix Factoring." (Amatriaian & Basilico, 2012)

Luckily Netflix is open on how they come to test their theories as well leaving the following model to show how they test processes before rolling them out to consumers. Here is a diagram as in [Fig 10] of that process from 2012.

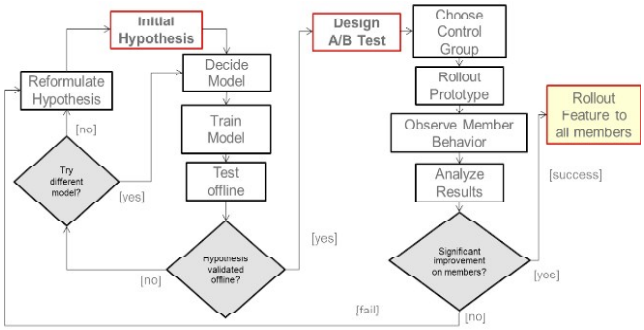

Fig 10 Hypothesis Testing (Amatriaian & Basilico, 2012)

So how do they draw us in to spend more and more time on their site by customizing every little detail from what's recommended to what visuals we see. Yes, they even change the look of the site based on our individual experience. Example of this is how they even change box covers of movies for individual personalization. [Fig 11] shows when they are working on artwork for the screenshots they may make up a sampling to test for click through rates. Example for Stranger Things shown below.

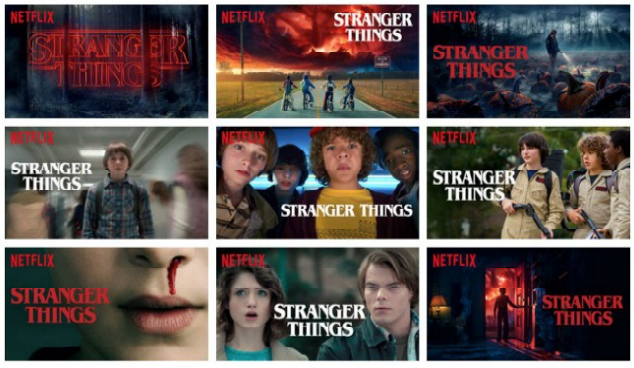

Fig 11 Stranger Things Example (Chandrashekar, Amat,

Basilico, & Jebara, 2017)

Fig 12 Good Will Hunting Example (Chandrashekar, Amat, Basilico, & Jebara, 2017)

But it goes into more than just testing images that's simple A/B split testing has been done by companies for a long time Netflix is testing emotional responses to films they've watched in the past. Example showed in [Fig 12] if you are watching movies with certain actors you may see more images of that actor in your recommendations as opposed to those that watch more action scenes where they may focus images based on action scenes. Here is an example of this using the moving Good Will Hunting.

The example above shows that images that had romantic scenes clicked led to a screenshot of the romantic scene in the movie to convey similar interest. The one that viewed comedy led to an image of someone laughing to convey the comedy in the movie. This is based on algorithms that are developed using machine learning and data science. They also consider how long people watch the movies they click on to make sure the images aren't being perceived as click-bait (a term meaning enticing someone to click then swapping content to something else).

CONCLUSION

As it is clearly shown in the paper, analytics is a key differentiator factor today in the digital age, development of advancement algorithms and machine learning has a big impact on how companies are today using advanced tools that is vital to take decisions and becoming more competitive in market. Business analytics and successful use of big data facilitates and help organization to gain insights, improve predictions, identify risk and operate efficiently.

It is imperative in every company now to embrace digital transformation and build this into company strategic mandate as well as setting clear scope and objectives and build the right skills to realizing this strategy and most importantly there should be leadership understand their role in driving this top down.

Clear examples as shared in this paper showed why some companies and organizations have failed or succeed to be digitally fluent, define right needs and manage the data sources into successful data application.

Netflix is innovating data science within their organization and with initiatives they put out. They offered a challenge in 2012 to come up with a predictive algorithm and the prize was $1 million which they stated netted them incredible returns on. They are mixing and matching models and creating new models by correcting them to meet their organization's needs. This is important as companies may find themselves looking at data and seeing that it doesn't apply to them. When they need to think how I can modify this to work for my organization so that we can use this as a strategic advantage.

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