Edition 1

RESONATE 1.0

IETE-SF MPSTME 2020-21 / Vol. 01 / September 2020

Resonate 1.0 is the first edition of Newsletter published by Institute of Electronics and Telecommunication Engineers Student Forum of NMIMS Mukesh Patel School of Technology Managment and Engineering. We aim to maintain the scientific temperament and keep our readers up-to-date about latest developments.

CONTENT

ABOUT IETE

The Institute of Electronics and Telecommunication Engineers (IETE) is India's leading recognised professional society devoted to the advancement of Science and Technology of Electronics, Telecommunication & IT. Founded in 1953.

The IETE is the National Apex Professional body of Electronics and Telecommunication, Computer Science and IT Professionals.
It serves more than 1,25,000 members (including Corporate, Student and ISF members) through various 64 Centres, spread all over India and abroad. The Institution provides leadership in Scientific and Technical areas of direct importance to the national development and economy.

Government of India has recognised IETE as a Scientific and Industrial Research Organization (SIRO) and also notified as an educational Institution of national eminence.
The objectives of IETE focus on advancing electro-technology. The IETE conducts and sponsors technical meetings, conferences, symposia, and exhibitions all over India, publishes technical journals and provides continuing education as well as career advancement opportunities to its members.

The IETE focuses on advancement of the Science and Technology of Electronics, Telecommunication, Computers, Information Technology and related areas. Towards this end the Institution promotes and conducts basic engineering and continuing technical education programmes for human resource development.

IETE MPSTME

IETE MPSTME was founded in 2014 with the aim of advancing the Science and Technology of Electronics, Telecommunication, Computers, Information Technology and related areas among the Students.

Since it's very Inception IETE MPSTME has played a very useful and stimulating role by improving the standard of education and counselling the students in the emerging new opportunities.

Providing a common platform for the student members to exchange ideas and information on the topics of their interest are the objectives of the IETE MPSTME Student Forum.
They have always encouraged team work and the spirit of self-reliance among student members and served as a focal point at our institution on all aspects of personal development.
IETE MPSTME in association with Electronics and Tellecommunication department are the proud host of annual project summit U'Lectro along with various technical seminars, workshops and industrial visits throughout
the year.

President's Note

It is my great pleasure to extend heartfelt greetings to the readers of the first edition Technical Newsletter of IETE MPSTME.
Firstly, I would like to thank Mrs. Vaishali Kulkarni, Mrs. Sumita Nainan and Mrs. Kanchan Bakade for always encouraging our team to keep doing our best. They are the very reason IETE MPSTME is still such a reputable committee in the college after its inception in 2014.

By providing a platform for the student members to exchange their ideas and information on the topics of their interest, they have always encouraged team work and a spirit of self-reliance among student members and served as a focal point at our institution on all aspects of personal development.

Data Analytics is a new term for many people. If you are confused to as to what data analytics is and what it is used for, then you're at the right place. Organisations collect data that they have gathered from customers, businesses and practical experience. Data is then processed and is categorised as per the requirement and analysis is done to study purchase patterns and etc.

As we all know in the current time, data and information are increasing rapidly. The growth rate of the information is so high that the information available to us in the near future is going to unpredictable. Data Analytics is no more a surprising concept for a student to study as there is an explosion of tech tools that are available to make sense and also the industry is growing rapidly. There is need of more and more institutional research and there is so much scope for exploration that the budding curiosity has also made this field an haute course.As the need for jobs is growing, more people are gravitating towards data analytics. More and more businessmen are looking for world class analysts to help them see a way to make a profit. In this newsletter, we explore various topics related to data analytics, like Data Analytics for Machine Learning, Predictive Analytics and Data analytics in Sports to name a few, to help our readers grasp the importance of data analytics in modern world.

To conclude, it is with immense pride that I can say, I am a part of this incredible organisation and I invite the readers to join me in this amazing journey by rowing into this river of knowledge, that is our newsletter, and work your way towards whatever goal you have in life.

"Extraordinary potential exists in all of us. With the right environment, resources, skills and knowledge, 'ordinary' people can produce extraordinary results."

Umang Jain
President

Teacher's Message

"The secret of getting ahead is getting started. The secret of getting started is breaking your complex overwhelming tasks into small manageable tasks, and then starting on the first one."

Dear reader, Education and the co-curricular activity are the part of student life, to inculcate the responsibility of self being and team work for their better future. IETE has always helps students to push their limits and be creative in their own ways to make each and every event held in our prestigious college a success. IETE is presenting the newsletter to provide information on current affairs, new technological development and research in the various fields of engineering. I compliment the entire team for their earnest contributions of innovation and creativeness. I express my sincere wishes to team IETE for future endeavours.

-Kanchan Bakade
Student In-charge

"Success doesn't just find you. You have to go out and get it."

Its with great pleasure and pride that I introduce the 1st newsletter 'RESONATE' from the desk of IETE MPSTME.
It has been an exciting journey for team IETE since its inception at MPSTME in 2014. Every year brings in new challenges which are met with equal enthusiasm and dedication by a team of passionate students. We endeavour to bring forth a bouquet of various technical events each year to keep the students abreast with the latest in the field of technology.
'RESONATE' the IETE MPSTME newsletter is one such effort in these unprecedented times of COVID-19, to keep our students informed, engaged and excited.
As the ISF Co-Ordinator of this ardent team, I wish them the very best and assure you of many such exciting news and events from team IETE MPSTME.

-Sumita Nainan
ISF Co-Ordinator

Chief Editor's Note

"A Life of joy and happiness is possible only on the basis of knowledge and science."
- Dr. Sarvepalli Radhakrishnan

I am **Swapnil Singh** from MBA Tech Computer Engineering, 3rd Year. I have written three research papers, out of which one has been published and the other two are in the review phase. I have made many projects in Python and machine learning.
I am glad to introduce Resonate, a newsletter by the Institute of Electronics and Telecommunication Engineers Student Forum, Mukesh Patel School of Technology, Management and Engineering. This issue is being released on Engineer's Day. wwSir M Visvesvaraya's Birthday is celebrated as Engineer's Day in India, Sri Lanka, and Tanzania. This edition marks the 160th Birth Anniversary of Bharat Ratna Sir Mokshagundam Visvesvaraya. This edition also hails ISRO on the first anniversary of Chandrayan 2. Though, Vikram Lander did not fulfil the expectations with the mission, it was a big step in the Indian Space Program.

The objective of Resonate is to provide up to date and latest information about trending topics. It would also provide the readers with a road map to explore the domain, and provide recent research on the domain. Project topics requiring different levels of expertise are also provided. A small fun section is added to entertain the readers.

- Swapnil Singh
Chief Editor

"Alone we can do little, together we can do so much" - Helen Keller

It brings me immense pleasure to announce the first edition of Resonate, a newsletter of a kind by the Institute of Electronics and Telecommunication Engineers Student Forum, Mukesh Patel School of Technology Management and Engineering. This issue is released to celebrate Vikram Lander's achievement on reaching the moon and to appreciate the team efforts put into this mission.

I am **Shefalee Naseen Satpathy**, pursuing MBA Tech in Electronics and Telecommunication. I'm a well versed student with knowledge of hardware, programming and content writing. I have always been inquisitive about the smallest thing happening around me and have a keen interest in the domain of research - currently associated with international science forums and playing a key role as a social media content curator for a few organisations and start-ups.

Our team has worked relentlessly for the publication of our first ever newsletter and I would like to thank each and every one of them to make this happen in such a short period of time. We hope to bring up new technological dimensions in our further editions and are hoping to have an constructive response towards the same.

- Shefalee Satpathy
Chief Editor

Engineers Day: Birth Anniversary of Mokshagundam Visvesvaraya

"To the optimist, the glass is half full. To the pessimist, the glass is half empty. To the engineer, the glass is twice as big as it needs to be."

15th September marks the Engineers Day every year as a tribute to the greatest Indian Engineer Bharat Ratna - Mokshagundan Visvesvaraya.

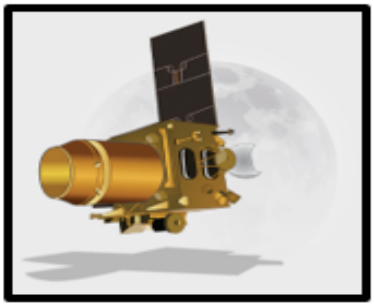
Mokshagundam Visvesvaraya was born on 15 September, 1861, in Muddenahalli near Chikkaballapur. He went on to become India's most prolific civil engineer, dam builder, economist, statesman, and can be counted among the last century's foremost nation-builders.

He was also the Diwan of Mysore from 1912 to 1918. He was the chief engineer responsible for the construction of the Krishna Raja Sagara Dam in Mysore as well as as the chief designer of the flood protection system for the city of Hyderabad. Due to his outstanding contribution to the society, Government of India conferred 'Bharat Ratna' on this legend in the year 1955." He was also awarded the British knighthood by King George V, and hence has the honorific "sir". His birthday, 15 September is celebrated as the Engineers day. He also designed and patented the automatic weir water floodgates, first installed at the Khadakwasla reservoir, Pune 1903. He transformed the Mysore state into what was then known as 'model state'.

His contributions to the society are very famous in the whole world - harnessing water resources, building and consolidation of dams and it was him who came up with the 'Block System'. The contributions of all the engineers across India and throughout world are commendable, hadn't been them - we wouldn't have known how to bring science to our real lives.

CHANDRAYAAN 2

The Chandrayaan 2 mission by ISRO (Indian Space Research Organization) was India's premiere attempt to perform a soft landing on the lunar surface. However, this was not the first time India was aiming to explore the moon. The Chandrayaan 1 mission was its first attempt. The mission was announced in 2003 and ended in 2008 after the vehicle crashed near the south pole of the moon. Nonetheless, Chandrayaan 1 confirmed the presence of water molecules on the lunar surface. In the same year (2008), ISRO received the approval for a second mission. Chandrayaan 2 was a highly complex mission that took over 10 years of planning. The mission was carried out using the GSLV Mk-III Launcher (India's most powerful launcher till date). The space vehicle constituted of the orbiter, the Vikram Lander and the Pragyan Rover. The entire vehicle and all its parts were fully developed in India.



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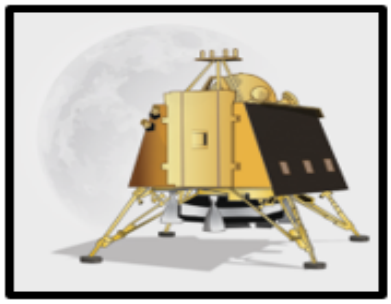
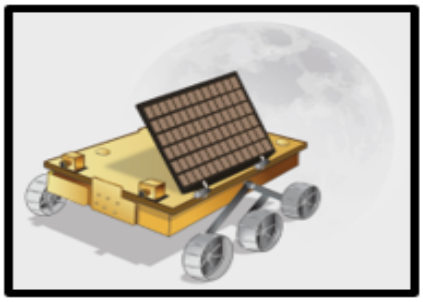


VIKRAM LANDER

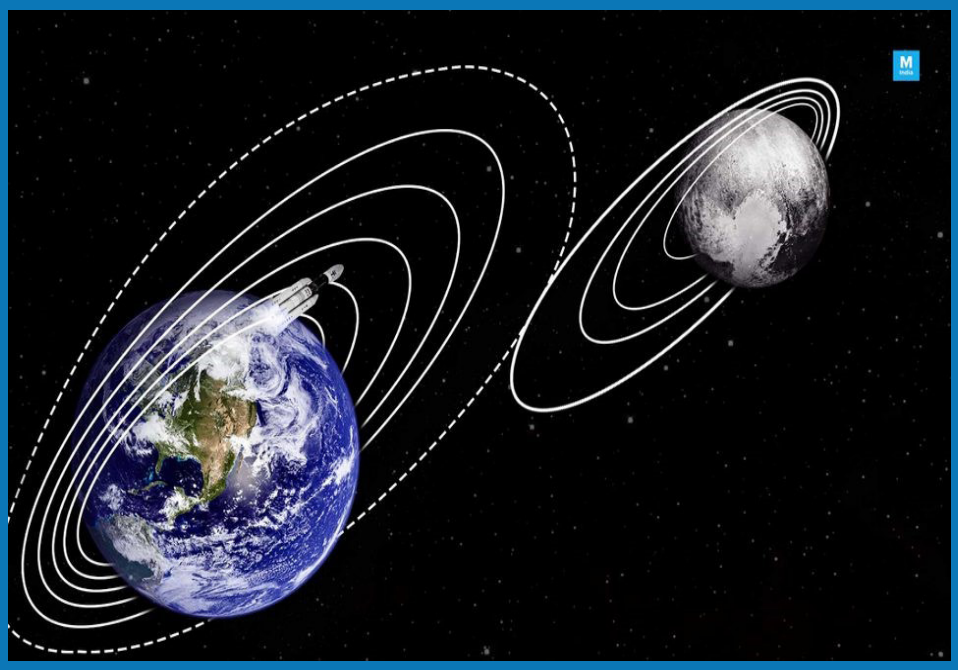


PRAGYAN ROVER

Timeline:

- After Dr. Manmohan Singh (then, Prime Minister) approved the mission on
- 18th September 2008, ISRO started the planning and designing. After a tedious 10 years, the mission finally reached its execution.
- Chandrayaan 2 was scheduled to launch on 15th July 2019 at 02:51 am IST.
- However, the launch was aborted due to some technical glitches. Finally, the mission was launched from Satish Dhawan Space Centre in Sriharikota on 22nd July 2019 at 14:43 pm IST. After its separation from the launcher, the orbiter performed 5 orbit raising manoeuvers in the next 23 days. On 14th August 2019, Chandrayaan 2 finally left the Earth's atmosphere and was on the Trans-Lunar Trajectory. After 6 days, the orbiter successfully performed the lunar orbit insertion after which it carried out 5 lunar orbit manoeuvers. On 2nd September 2019, we witnessed the separation of the Vikram Lander from the orbiter.
- After two de-orbiting manoeuvers, on 7th September 2019, Vikram finally began its descend to perform a soft landing near the lunar south pole.

Trajectory of the Orbiter



The last 15 minutes were the most crucial part of the entire mission and was defined as “15 minutes of terror” by ISRO chief Kailasavadivoo Sivan. In these 15 minutes, Vikram would execute some of the most important steps to perform the soft landing. It would scan the surface and was automated to decide the most favourable landing spot.

Absolutely normal parameters and performance was observed up to an altitude of 2.1 kms above the lunar surface. Unfortunately, Vikram lost contact with the centre, seconds before the landing. It was later concluded that Vikram had performed a hard landing and had crashed on the lunar surface.

Nonetheless, the orbit continues to revolve around the moon and is estimated to do so for the next 7 years before it finally retires.

Why the Moon?

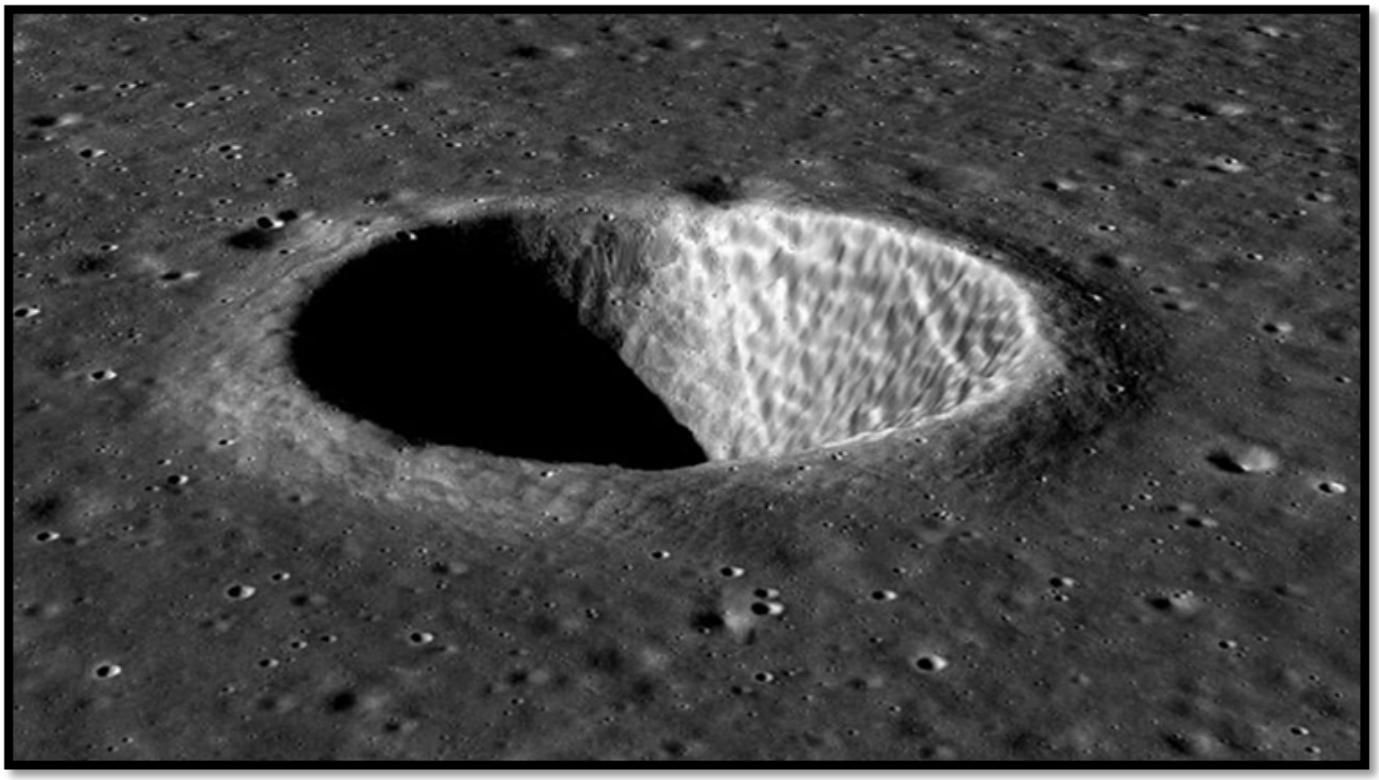
ISRO stated that Moon is the closest cosmic body to perform any scientific experiment, that would help further enhance Deep Space studies.

The lunar surface is also known to offer undisturbed historical record of the early solar system. The lunar south pole, unlike the north pole stays in shadow for very long periods.

This was an interesting area for research as it may be home to water.

Accomplishments of Chandrayaan so far:

- August 12, 2020: Chandrayaan-2 imaged Sarabhai crater on the Moon
- November 12, 2019: The triplet images from TMC-2 were processed into Digital Elevation Models
- October 31, 2019: Detection of Argon-40 in the lunar exosphere
- October 22, 2019: Initial imaging and observations by Chandrayaan-2 Dual-Frequency Synthetic Aperture Radar (DF-SAR)



Future Scope:

We are now looking forward to Chandrayaan 3 which would be the third lunar exploration attempt. It is estimated to launch in March 2021 using the GSLV Mark III rocket. Chandrayaan 3 will also attempt a soft landing on the moon but won't have an orbiter like Chandrayaan 2.

Data Analytics For Machine Learning

Data analytics is the process of analyzing raw data in order to make conclusions about that dataset. This information is in the form of matrices, that could be used to increase efficiency of a model on system.

The process of data analytics is as follows:

1) **Group the data**- The data may be numerical, ordinal, or categorical.

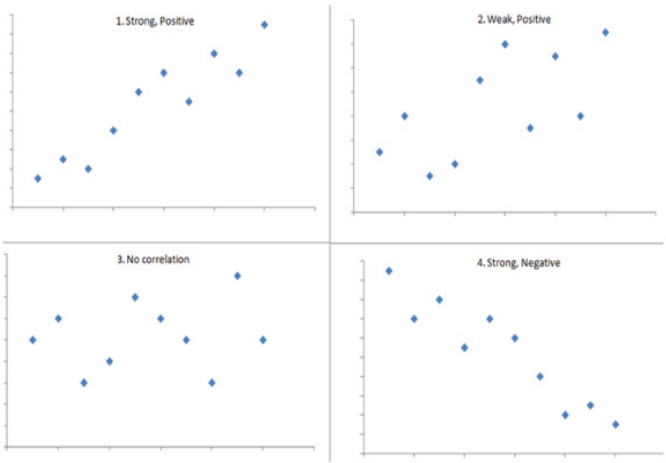
2) **Gather the data**- This would be done via surveys, online sources, cameras, environment sources.

3) **Cleaning data**- This is essential to be done before the analyzing the data. The cleaning includes removing duplicates, taking care of missing values.

4) **Analyzing the data**- Analysis is done by making graphs, histograms, and other form of software that can take statistical data.

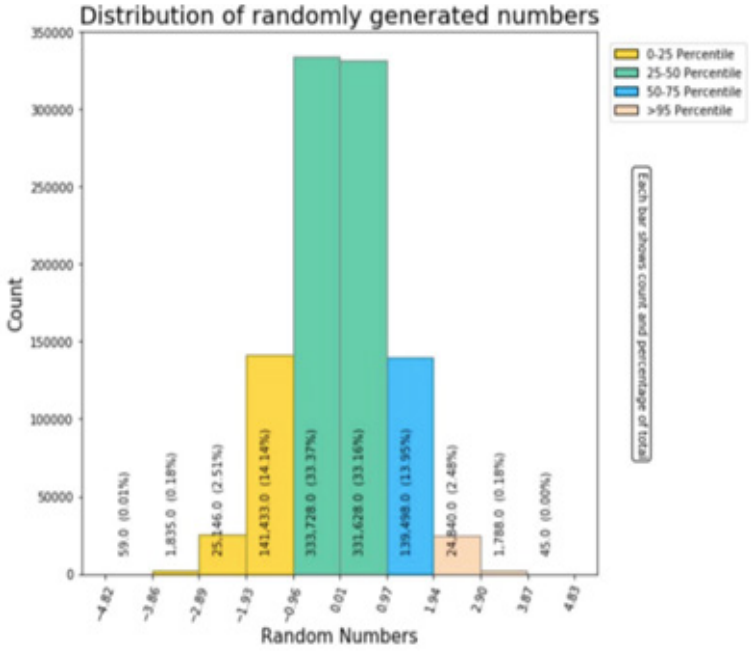
5) **Communication**- The results of the data analysis are to be reported in a format as required by the users to support their decisions and further action. The feedback from the users might result in additional analysis.

Machine Learning is a technique of training machines to perform the activities a human brain can do, albeit bit faster and better than an average human-being. Analyzing data for machine learning algorithm is done via looking at the data. The data scientist decides whether to use supervised or unsupervised model to solve the problem. In case the data has labels or is numerical, supervised model is used. For numerical data regression is used and for categorical data classification is used.

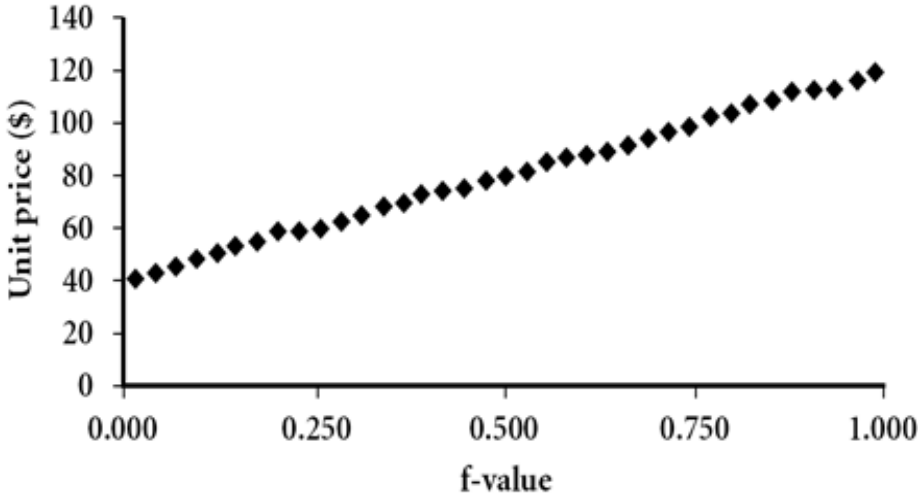


For regression data plotting scatter plots would help in figuring out the correlation, i.e. whether the department and independent variables are positively correlated or negatively corelated or independent. First and second graph shows positive correlation between independent and dependent variables, third graph indicates no correlation, whereas the last diagram shows negative correlation between the independent and dependent variables.

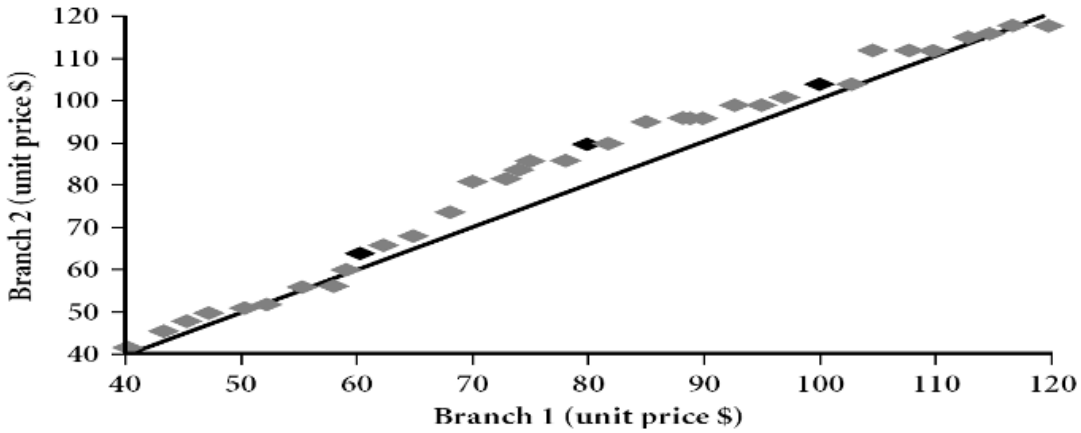
Histograms are the used to give us the entire structure of the data sets. They help us find the symmetry of the data.



Quantile plots are basic scatter plots, but the data points are sorted, and the quantiles also plotted.



Quantile-Quantile plot is a plot of quantiles of two datasets, it's helps in comparing behavior of two similar data sets. For example, comparing the business of two outlets of a franchise. The example shown below shows the quantile values of the 2 datasets.



Predictive Analytics

Predictive analytics is an advanced branch of analytics which is used to make predictions about future events that are not known. Predictive analytics mainly uses intense data mining, statistics, modelling machine learning and artificial intelligence to analyse and interpret current data to make future predictions.

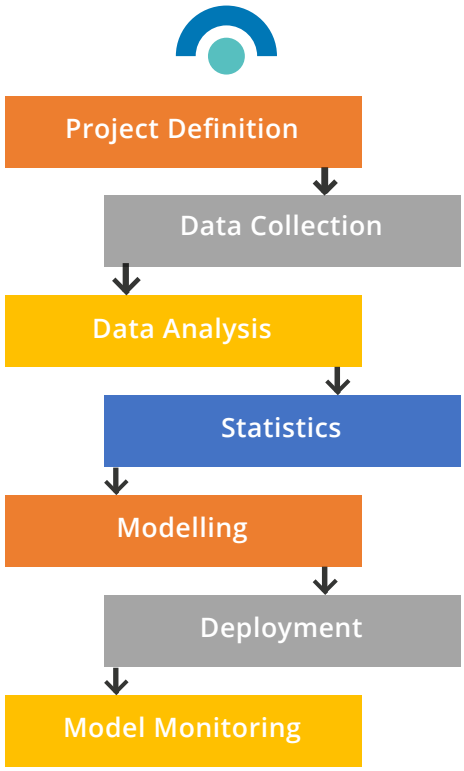
Why is predictive analytics important?

Organisations are using predictive analytics to solve many common problems and discover new opportunities. Common uses include-

- Detecting fraud.
- Optimising market campaigns.
- Improving operations.
- Reducing risk

Predictive analytics process

- Project definition- project definition is used to know the aim of the project, it's outcomes, deliverables, objectives and identifying the data sets required for the project.
- Data collection- for data collection data mining is used, and is known to be the most effective technique to collect data from multiple sources.
- Data analysis- data analysis is used to examine and remove a relevant part of the data collected and to transform the data with the objective of the project and arriving to conclusions.
- Statistics- statistics enables to validate the assumptions' hypothesis and test them by using standard statistical models.
- Modelling- modelling allows you to automatically clean and create an accurate predictive model about the future.
- Deployment- it provides the option to implement the analytical results in day to day decision making.
- Model monitoring-models of order are reviewed based on the performance to ensure results expected are reached.



1. Banking and financial services- as the financial industry handles huge amount of data and money at stake. It is used to reduce fraud measure, credit risk, maximize cross sell / upsell opportunities and retain valuable customers.

2. Oil, gas and utilities- whether it is predicting equipment failures and future resource needs, the race for improving overall performance, predictive analytics helps in all.

3. Government and public sector-the government uses data analysis to understand trends in population and criminal activities. It is also used it to improve service and performance, detect fraud, understand consumer behaviour and primarily to enhance cyber security.

4. Health insurance- the health insurance industry is taking steps to identify patients that are highly at risk of a disease. Large companies using analysis have nearly saved $1500 to $9500 for patient.

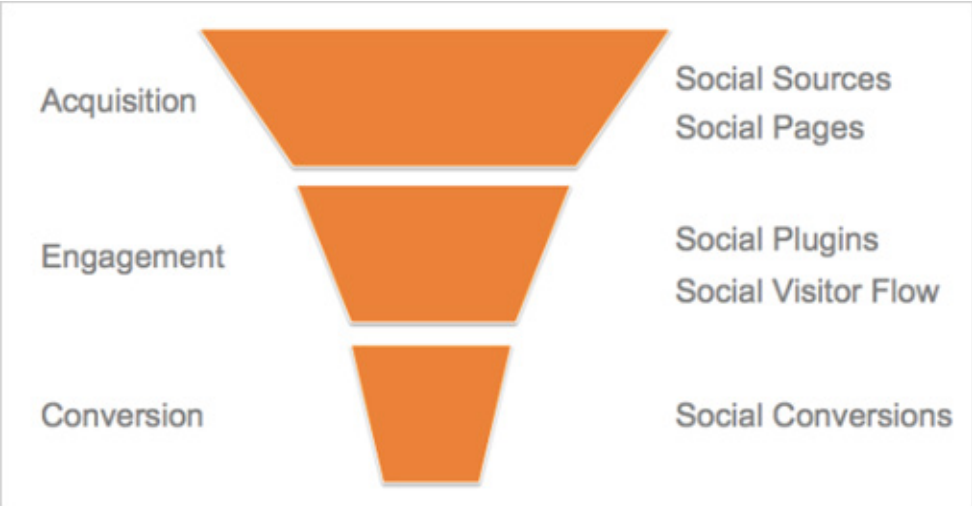
5. Health insurance- the health insurance industry is taking steps to identify patients that are highly at risk of a disease. Large companies using analysis have nearly saved $1500 to $9500 for patient.

Google Analytics

Deeper understanding of the customer's requirements is provided by google analytics. It gives free tools needed to analyze data for your business in one place. It helps you understand your state and app users hence helping in evaluating the performance of your marketing, content, products, and more. It processes and shares your data quickly with an easy to share interface and reports.

Google analytics woks on optimizing the purchase funnel. A basic purchase funnel includes:

- **Acquisition:** Building awareness and acquiring needs of interest
- **Behavior:** When users engage in business
- **Conversion:** When user becomes a customer and transacts with your business



One can track online behavior led to purchases and we use that data to make informed decisions about how to reach new and existing customers. Taking an example of an online store which wants to sell more t shirts. Using digital analytics, the store could collect and analyzes data from their online advertising companies to see which are most effective and expand marketing efforts. The store could analyze geographical sales data to understand if people in a certain place prefer to buy t shirts and can run additional campaigns in those areas.

Many different kinds of business can benefit from google analytics:

- Publications can use it to create a legal, highly engaged audience and be better align on site advertising with user interests
- Ecommerce business can use digital analytics to understand customer's online purchasing behavior and better market their products and services
- Lead generation sites can collect user information from sales teams to connect with potential leads

Google analytics also collects behavioral data from a variety of systems such as mobile applicants, online point – of – sales systems, video game consoles, customers relationship management systems, or other internet – connected platforms. Data is compiled into analytics reports, which one uses to perform in – depth analysis to better understand customers and their purchase journey.

How google analytics works?

1) A small JavaScript tracking code is needed to be attached to each site.

2) For every user visiting the page, the tracking code would be collected anonymous information about how that user interacted with the page

3) It provides the following data:
- Number of visitors
- Number of visitors purchasing stuff
- Language of browser
- Type if browser
- Device
- Operating system
- Traffic source: the source which led to the site

4) There is a session of 30 minutes. If a site is visited again 30 minutes, then the new session would begin.

Google analytics organizes data according to certain criteria. Once data is processed, it's stored in a database and cannot be changes. One can define filters for the data too.

HOW DATA ANALYTICS CAN HELP COMBAT COVID-19?

As we all know, the whole world is facing a very treacherous period fighting COVID-19, people being snuffed due to lack of treatment and vaccines and with that every country trying to cope up with its economical stature. The infection has caused immense damage to the incomes of each and every sector of the society leading to even more catastrophic events within the humankind. But the question that arises now is, "Sooner or later, does it get any better?"

Almost all the countries have started to grapple to their knees due to the challenges exhibited by the virus. Every businessman and worker is rethinking their strategies and code of conduct to this new reality and are turning to technology for more and more help. But are the existing technologies even enough?

Due to the rapidness in the spread of the virus, everyone has a wide sense of desire to seek information which has led to open-source data sets and visualizations. Analytics has now become the aggregation and examination of data from wide end sources to derive perceptions, use of this information during this global outbreak, pandemic analytics is an enduring way to combat the problem.

Big data has found a way to analyze and systematically extract information from data sets which are either too large or too complex to be dealt with. Data sets with so much of data about the infection offers greater statistical power. To fight COVID-19 and help people be aware, big data has many components like: capturing the data, storing the data, analyzing the data, searching, sharing, transferring, visualizing and updating the data source with each and every passing day.

It might take us a while to get over the situation but we can definitely count on data analytics to be used effectively in terms of supply chain challenges, crisis management issues, cost and operation upsurge.

The technology is really formulating itself under the idea of having the need of a platform for all risks. There can be differences at every starting point on how it is going to tackle the challenge or risk but eventually technology builds itself over a period of time.

The Coronavirus Infectious Disease (COVID-19) pandemic caused by critical respiratory syndrome coronavirus 2 (SARS-CoV-2) is presenting a challenge to humanity. Many researchers, health-workers and developers have got in advanced big data analytics tools to the front for monitoring and reducing the impact of the virus.

Each and every country's major business and technical groups are stepping up for the cause to enable and ensure a healthy community in a short span of time. In China and India, the governments launched "Close Contact Detector" and "Aarogya Setu" apps respectively to warn the citizens if they were in contact with someone who's having or had the virus. This step has got a positive response in these countries as it has allowed the people to be more aware in the rapidness of the spread and be capable of making decisions for their own well-being. Through the customer services and customer queries' section, they have been able to make adjustments to the apps in order to have a smooth running.

Very recently two U.S. tech giants i.e Google and Apple have come forward to help for the cause by developing software which would enable their users to be cautious if they ever come in contact with an individual who is tested positive for the infection. This is a very selfless gesture made by the companies to help everyone navigate through this crisis. Although there's been criticism regarding the privacy of a user but it is a very essential measure to help a bigger community than just one.

Technology has always been the prudent instrument in providing various ways to improve people's lives and bring growth for businesses throughout this resilient situation. This pandemic has triggered an unprecedented demand for digital health solutions and healthcare facilities which would help people consult doctors right from their homes.

OPPORTUNITIES & CHALLENGES FOR FIGHTING PANDEMIC WITH DA:

"The challenges confronting the world due to the unexpected coronavirus pandemic have brought to the fore the inadequacies of the global governance structures", said India's former UN envoy Ambassador Syed Akbaruddin.

Basing on the COVID-19 spread, top challenges faced by each and every country is mostly delay? detection of the infection, mobility and contiguity. Detained identification of high-risk areas around, patients affected with the virus and asymptomatic patients. If these factors aren't identified in the early stages of COVID-19 spread then it would lead to an exponential growth in the number of affected persons with the same. The major reason of the spread is that the people don't have the accurate information about the high-risk areas and affected individuals and hence, they come in contact being the next infection carrier.

The governments, IT companies and businesses have worked so hard to get onto top three measures of Geo Risk Profiling, Individual Risk Profiling and Speed Prediction through Modeling and Simulation to address the problems to ensure helpful and safe perception.

Geo Risk Profiling is a method of identifying the risky areas on the map of a country to figure out the vulnerability of an individual travelling in or from the place. It is an excellent measure to keep a check on insights of every community and section of the country. Individual Risk Profiling is pretty much the same because it jots down the information of an individual- like travel history, recent diseases or symptoms etc.
Speed Prediction through Modeling and Simulation is one of the easiest and most effective way to combat the virus because it enables the government to know well of the curves of the desired model to simulate the information and hence, strategise ideas for further betterment.

Although we have found certain answers to our question of the challenges faced, it is yet to be implemented in the best possible way to learn of the outcomes that are beneficial to the society.

There are not just technical issues faced by each and every government but they are also facing a major fallback in implementation of rules like contact tracing, quarantine enforcement and hospital capacity planning. Even after knowing the consequences, there are many who neither maintain social distancing nor care for not only their health but the whole community's. Why isn't community awareness building enough to make them understand what they are risking?

USE CASE:

Between identifying signs and symptoms, tracking the virus, and monitoring the availability of health care resources, scientists and researchers are dealing with a large amount of data-very large for us to even comprehend and analyze on our own. There are many big data analytic components to this pandemic where AI can play an enormous role.

A surveillance gets conducted every seven days to track the exposed people and quarantine them. Data gathering is a very challenging task but apps like Corona-madrid, Aarogya Setu etc. are helping governments to manage the pandemic and implement the self-diagnosis mechanisms. Tracking the symptoms of an individual will allow to understand the pandemic from spatio-temporal perspective with all the data gathered. A couple of countries are also using social distancing analysis and overcrowding analysis to decrease the transmission. Most of the online retailers and the respective logistic providers are following the supply chain optimization of an area enabling them to develop their practices and keep themselves safe and sound.

Data Analytics Use in Multiple Stages of Pandemic:

The data analytics and big data are practically based on four points:

Detection – The most important step to start with, if the detection of the appropriate number of cases is done on time, the infection can be brought to a stop.
Spread – The "spread" basically describes the flow of the infection from one individual to other and its influence in a particular area.
Managing the pandemic – To comprehend, after all the data of detection and spread is collected, data analytics updates itself and creates awareness among people of the spread in their locality or region.
Recovery – The recovery is one of the most significant part of the process, if affected, it is advised to them for stay quarantined at their homes to avoid further spread.

Methods to Build the Model:

To build a model of an area to fight the pandemic, there should be an enormous amount of database research on the datasets of each and every area of a country, counting the number of record screenings of individuals and last but not the least, extraction of information enabling to simulate an outcome of the descriptive model

Advantages of the Model for:

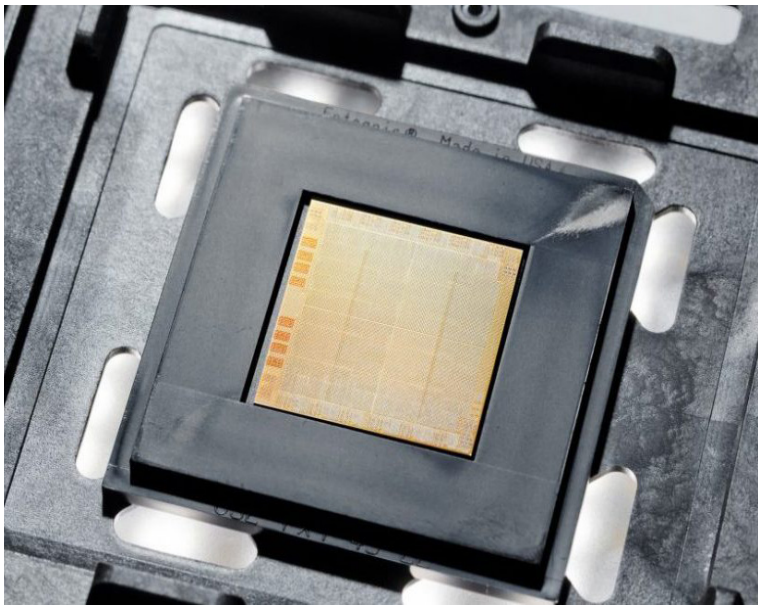
The descriptive models not only help governments in simulating a perfect outcome but also, helps all patients, medical practitioners and healthcare insurers to be safe and sound, keep them updated of what they are getting themselves into.

Technology is vital in the fight against coronavirus and future pandemics. In addition to being able to support modelling efforts and predicting the flow of a pandemic, big data, machine learning, and other technology can quickly and effectively analyse data to help humans on the frontlines figure out the best preparation and response to this and future pandemics. Infectious diseases have always co-existed with humankind, and while modern life has been instrumental in accelerating this pandemic, we have never been as well equipped to deal with it. Understanding this pandemic is vital in combating it, and of course, we still have much to find out about COVID-19. The more data we collect, the better data science and AI will be able to help us.

IBM Unveils Power10 Processor For Big Data Analytics & AI

At the Hot Chips 2020 conference, which was held virtually this year, IBM announced the IBM Power10. It's the successor to the Power9 and represents the next generation of the company's processor family. IBM claims that the Power10 delivers up to three times greater efficiency than its predecessor while at the same time delivering higher workload capacity and container density.

The Power10 was designed over five years and has the distinction of being IBM's first commercial 7-nanometer processor. (In 2015, IBM, Samsung, and other members of IBM's Research Alliance produced the first test chips as part of a $3 billion R&D investment.) There will be multiple configurations, and while the specifics aren't yet being disclosed, the maximum single-chip-module offering won't exceed 15 SMT8 cores and the dual-chip-module offering won't exceed 30 SMT8 cores, according to IBM distinguished engineer and Power10 architect William Starke.



IBM POWER10 is the IBM's first commercialized processor built using 7nm process technology. IBM Research has been partnering with Samsung Electronics Co.Ltd. on research and development for more than a decade, including demonstration of the semiconductor industry's first 7nm test chips through IBM's Research Alliance.

With this updated technology and a focus on designing for performance and efficiency, IBMPOWER10 is expected to deliver up to a 3x gain in processor energy efficiency per socket, increasing workload capacity in the same power envelope as IBM POWER9. This anticipated improvement in capacity is designed to allow IBM POWER10-based systems to support up to 3x increases in users, workloads and OpenShift container density for hybrid cloud workloads as compared to IBM POWER9-based systems.

Besides power savings, the Power10 offers hardware memory encryption with an estimated 40% faster cryptography thanks to new AES cores and enhancements such as support for homomorphic encryption techniques. The Power10 is also designed to deliver hardware-enforced container protection and isolation capabilities co-optimized with its firmware, enabling the prevention of other containers in the same virtual machine from being affected by a single intrusion.

The Power10 processor features dynamic execution register control, meaning users can design apps more resistant to attacks with negligible performance loss. Beyond this, it ships with what IBM calls "memory inception," which lets any Power10-based system in a cluster to share memory with other systems. Meanwhile, on the AI side of the equation, IBM says it expects the Power10 processor to achieve 10 to 20 times better performance for enterprise AI inference tasks compared with the Power9.

IBM cognitive systems GM Stephen Leonard asserts the Power10's reduced power consumption will drive datacenter efficiency and reduce costs while allowing hybrid cloud setups to achieve more work in a smaller footprint. Memory inception will driver further savings, he claims, as cloud providers offer more capabilities (such as AI workload acceleration) using fewer servers with pools of shared memory and cloud users lease fewer resources to meet their IT needs.

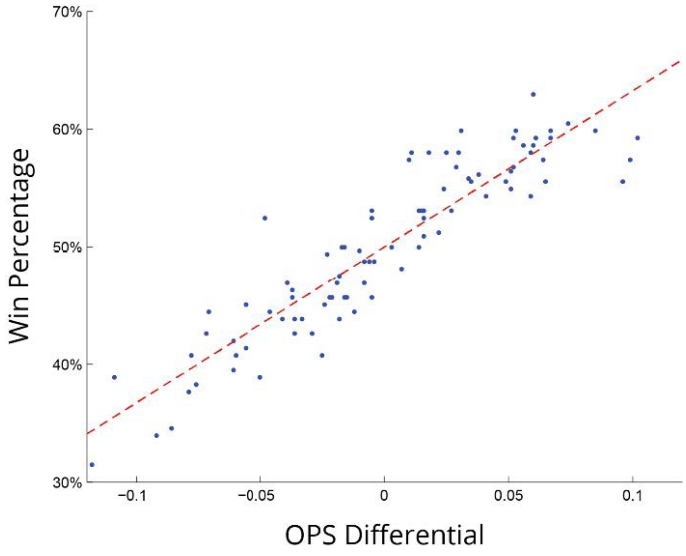
As announced back in 2018, Samsung will manufacture the Power10. Starke says it's already being sampled in multiple system offerings and will likely become available in the second half of 2021.

Like any other previous Power processors, the Power10 is open for licensing and modification by the OpenPower Foundation's over 250 members, including Google, Nvidia, Mellanox, and Tyan.

IBM's last Power processor family, the aforementioned Power9, was announced at the 2016 Hot Chips conference. As opposed to the Power10, it's manufactured on a 14-nanometer FinFET process, and it comes in 12- and 24-core versions. Summit at the U.S. Department of Energy's Oak Ridge National Laboratory, one of the fastest supercomputers in the world, is based on Power9 combined with Nvidia Tesla GPUs acting as accelerators.

Data Analytics In Sports

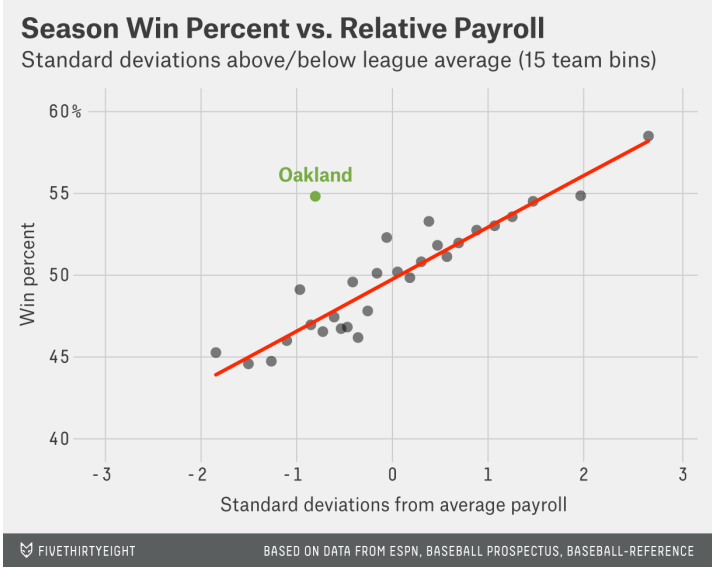
Technology initially made inroads into sports in 1912 when an early version of Photo Finish was used to determine the winners of the race. Since then the use of technology in sports has grown expeditiously. Be it the use of VAR and Goal Line Technology in football to eliminate human error or the Polyurethane full body swimsuits (later banned) which caused global outrage during the 2009 World Championship due to the clear advantage that athletes had because of the minimal drag offered by the material which resulted in twenty new world records being set.



One such breakthrough took place in 2002, when Billy Beane revolutionized the way scouting is done in baseball. He aimed to replace three of his star players who left as free agents while being on a limited budget. He chwwose to look past the dated statistics such as RBIs, hits and batting average and asked a simple question, "DOES HE GET ON BASE?"
He used video tracking system to mine raw data and used BILL JAMES's model of SABR metrics to identify undervalued players. He then used rigorous statistical analysis to scout players who had high slugging and on-base percentage, since he came up with the conclusion that the correlation between team winning percentage and OPS (On Base plus Slugging Percentage) differential was a whopping 0.933.

By using this new system Oakland Athletics went on to compete with the New York Yankies, despite one-third the budget. It helped Oakland to reach the playoffs in 2002 and 2003, and they won 20 consecutive games in a season. The system was later coined as "Moneyball".

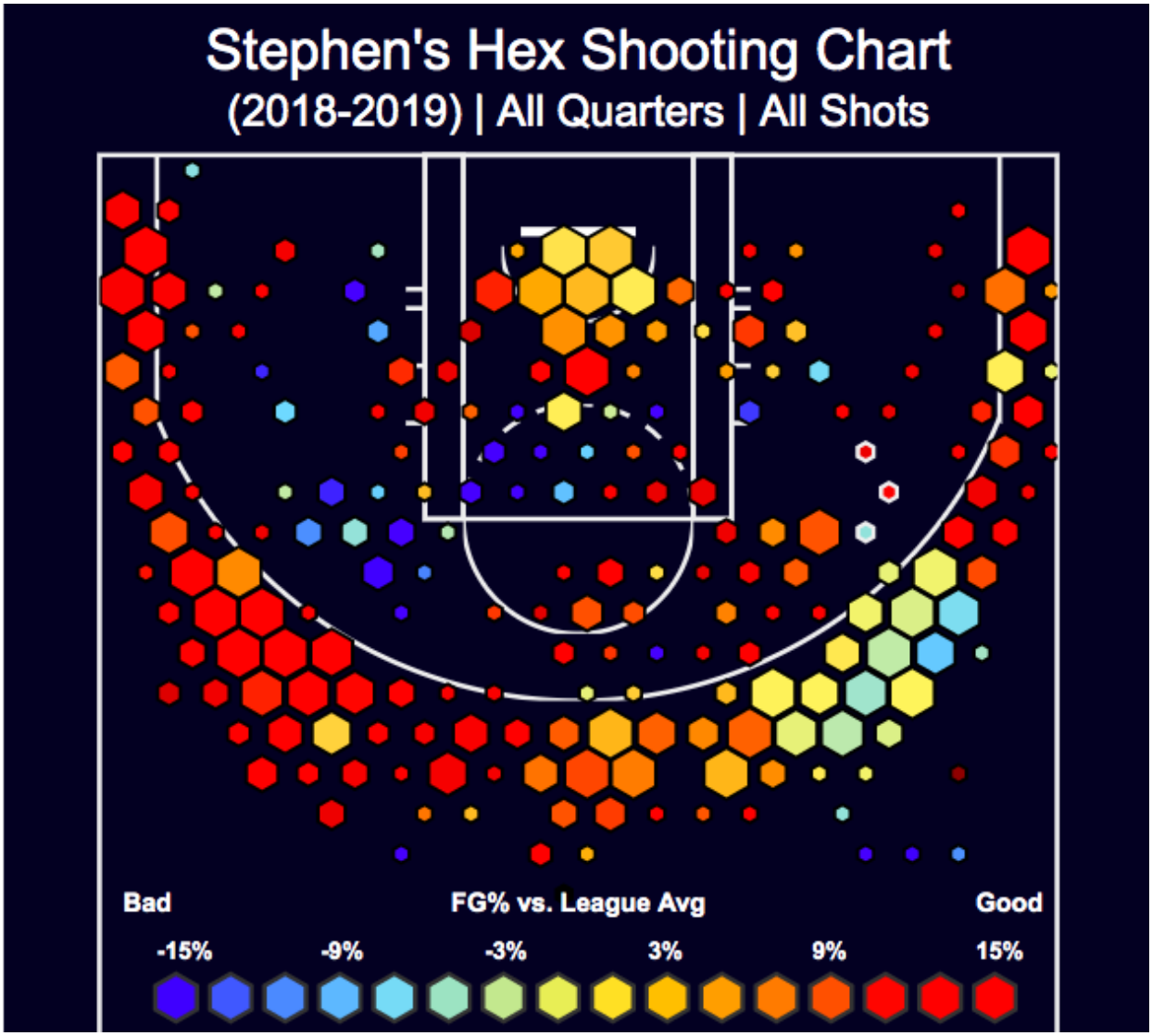
It paved the way for the future usage of data analysis not only in baseball but throughout various sports. Using Beane's model, The Red Sox broke the Curse of the Bambino and won the World Series under Theo Epstein.
Since then, the market for data analytics in sports is expected to reach almost $4 billion by 2022.



"The genie is out of the bottle and it ain't going back in."- Billy Beane

Another US-based sport that has taken advantage of data analysis to its fullest is Basketball. RSPCT and INTEL SENSE 3D have aimed to analyze data in real time in the future. Not only has data analysis changed the way the game is played, but it has also helped managers to prevent injuries by resting their players on the basis of collected data.

The biggest impact data analysis has brought in the NBA is the frequency of three pointers being attempted and scored over long range two pointers.



From the above data we can concur that three pointers are not only more potent or have a higher probability of being converted. But they are also much more valuable considering you have to make a third of your three pointers to make up for it to be worth a half of your two pointers.

Billy Beane and Daryl Morey had a luxury that they didn't have to worry about relegation, they had nothing to lose and could always experiment. However, football is much more ruthless. A single tier drop can be borderline catastrophic with the Premier league and championship having a difference of 133million pounds in TV rights.
"You can measure everything. The hard bit is working out what's important."

Leicester backroom staff and scouts perfected the "Moneyball" system by signing massively undervalued players who turned out to be world class players in a couple of years' time. They then sold them at a gigantic profit and then replaced them again with home grown talents.

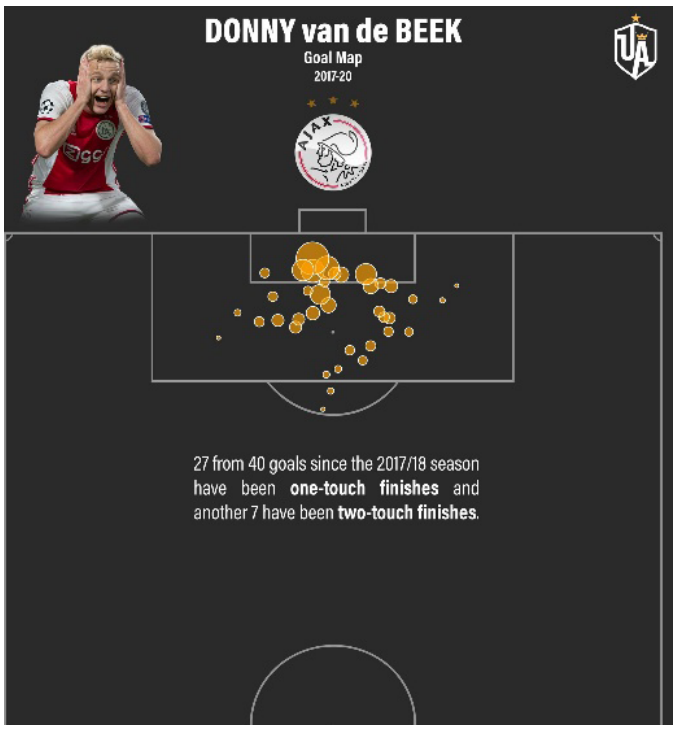
WHAT IS xG?

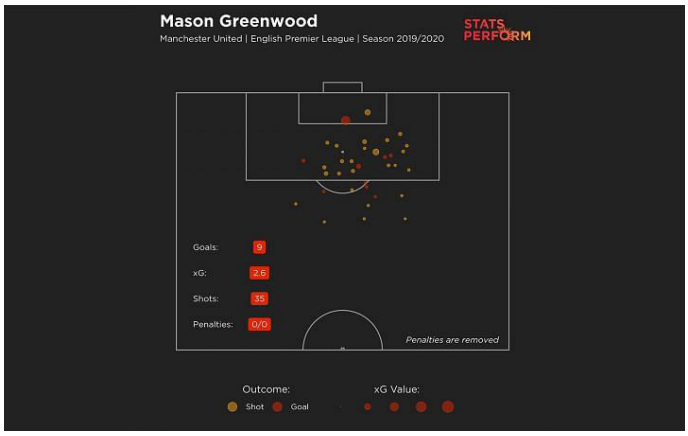
If you're a footballing fan like me, you must've come across this word. You either believe, it can be used to predict a match's result or you think it's just as useful as trying to unlock a door by saying alohomora in real life. Well, it's not perfect, but it's a bit like The Monty Hall Problem. There is a chance that the bookie/host is trying to trick me into picking the door behind which there isn't a car, but while making my decision I should keep my emotions away, and focus on the statistics and the data presented to me and then I have a better shot at beating the bookie/host.

Now what is xG? It is the chance of a player converting a shot into a goal, based on its distance and angle from goal, quality of pass received, position of the keeper, opposition players between the goal and the player (attempting to block or applying pressure) and other constraints which differ among various platforms.

The larger the circle means greater the xG, this clearly shows that shots from sharper angle have a lower xG. But it can also tell us about the clinical nature of the player.

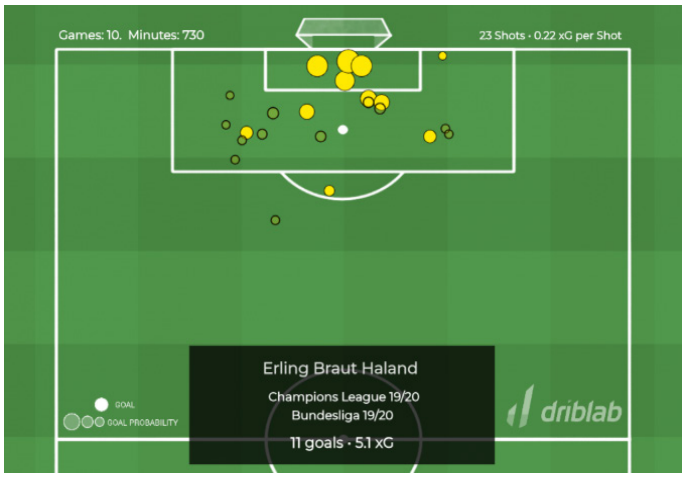
This is a tool used to measure performance instead of the result. This is an attempt to exclude luck from the picture and trying to come up with a stat which rates skill instead of chance.

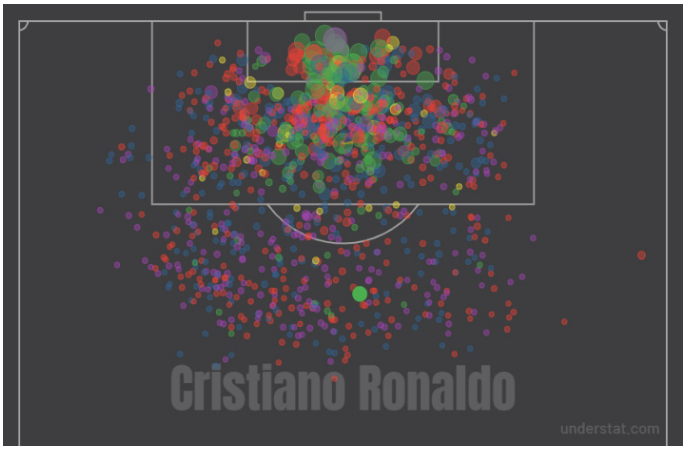




However, there are people who staunchly disapprove of this, one of them being Craig Burley who famously said, "What do you mean Expect, eh? I expect things on Christmas from Santa Claus, but it doesn't mean he's gonna give it to me."
The xG system does have its drawback when considered prematch. Since, its based-on average and most games end with total goals scored being 2.5, it fails to predict high scoring games.
However, it can be used to distinguish a prolific striker from an average one based on whether the fact the player outperforms his xG, since it's the accumulation of all chances and based on an average. Two of the examples being Halaand and Greenwood. Especially greenwood when the quality of passes are taken into consideration.

We talked about how shots closer from the goal have a higher xG, however in the below data set its visible that there is a high xG chance almost 30 yards out and that is due to the position of the goalkeeper who has been caught off-guard.





Other metrics include expected assists, passing models that assign a value to every pass based on how much it progresses the ball, and analysts are trying to come up with a way to rate a player's off the ball movements and their ability to create space by attracting players towards them due to their "gravity".

Data scientists at FC Barcelona found that Messi creates more space by standing still or jogging than any other player does by running

Percentage of team's total space gained in one particular match*, by player and moving speed

Barcelona vs Villarreal, January 2017
© FT

However good your system may be, it doesn't take into consideration your prolific strikers being injured or the result on the morale of the dressing room by the managers team talk.

Trending Research Papers

1. CityPulse: Large Scale Data Analytics Framework for Smart Cities

Citation:

D. Puiu et al.,
"CityPulse: Large Scale Data Analytics Framework for Smart Cities," in IEEE Access, vol. 4, pp. 1086-1108, 2016,
doi: 10.1109/ACCESS.2016.2541999.
https://ieeexplore.ieee.org/document/7447851

Summary:

Our world and our lives are changing in many ways. Communication, networking, and computing technologies are among the most influential enablers that shape our lives today. Digital data has connected the worlds of physical objects, people, and devices, rapidly changing the way we work, travel, socialize, and interact with our surroundings, and they have a profound impact on different domains, such as healthcare, environmental monitoring, urban systems, and control and management applications, among several other areas.

Cities currently face an increasing demand for providing services that can have an impact on people's everyday lives. The CityPulse framework supports smart city service creation by means of a distributed system for semantic discovery, data analytics, and interpretation of large-scale (near-)real-time Internet of Things data and social media data streams.

The goal is to break away from silo applications and enable cross-domain data integration. The CityPulse framework integrates multimodal, mixed quality, uncertain and incomplete data to create reliable, dependable information and continuously adapts data processing techniques to meet the quality of information requirements from end users. Different from existing solutions that mainly offer unified views of the data, the CityPulse framework is also equipped with powerful data analytics modules that perform intelligent data aggregation, event detection, quality assessment, contextual filtering, and decision support.

This paper presents the framework, describes its components, and demonstrates how they interact to support easy development of custom-made applications for citizens. The benefits and the effectiveness of the framework are demonstrated in a use-case scenario implementation presented in this paper.

2. Big Data Analytics and Mining for Effective Visualization and Trends Forecasting of Crime Data

Citation:

M. Feng et al.,
"Big Data Analytics and Mining for Effective Visualization and Trends Forecasting of Crime Data," in IEEE Access, vol. 7, pp. 106111-106123, 2019,
https://ieeexplore.ieee.org/document/8768367

Summary:

Big data analytics (BDA) is a systematic approach for analyzing and identifying different patterns, relations, and trends within a large volume of data. In this paper, the authors have applied BDA to criminal data where exploratory data analysis is conducted for visualization and trend prediction.

Several state-of-the-art data mining and deep learning techniques are used. Following statistical analysis and visualization, some interesting facts and patterns are discovered from criminal data in San Francisco, Chicago, and Philadelphia.

The predictive results show that the Prophet model and Keras stateful LSTM perform better than neural network models, where the optimal size of the training data is found to be three years.

These promising outcomes will benefit police departments and law enforcement organizations to better understand criminal issues and provide insights that will enable them to track activities, predict the likelihood of incidents, effectively deploy resources and optimize the decision making process.

3. A generic data analytics system for manufacturing production.

Citation:

H. Zhang, H. Wang, J. Li and H. Gao,
"A generic data a nalytics system for manufacturing production,"
in Big Data Mining and Analytics, vol. 1,
no. 2, pp. 160-171, June 2018,
doi: 10.26599/BDMA.2018.9020016.
https://ieeexplore.ieee.org/document/8336851

Summary:

The increase in the amount of manufacturing information available means that big data can be collected and, with appropriate deep analysis, could be of great value to manufacturers.

However, most small manufacturers cannot afford the overhead of a professional data analytics team. To address this problem, in this paper a generic data analytics system, Generic Manufacturing Data Analytics system (GMDA) is proposed.

This system can perform most manufacturing data analytics tasks and users can easily carry out data analysis even if they have no prior knowledge or experience of data analytics. To establish such a system, the authors designed an abstract language, GMDL, to describe the manufacturing data analytics tasks.

Aimed at factory data analytics, several algorithms were selected, tuned, optimized, and finally integrated into the system. Some noteworthy techniques were developed in GMDA such as proper algorithm selection strategy and an optimal parameter determination algorithm.
Case studies show the practicality and reliability of the system.

4. Measuring Objective And Subjective Well-Being: Dimensions And Data Sources

Citation:

Voukelatou, V., Gabrielli, L., Miliou, I. et al.
Measuring objective and subjective well-being: dimensions and data sources. Int J Data Sci Anal (2020).
https://doi.org/10.1007/s41060-020-00224-2

Summary:

Well-being is an important value for people's lives, and could be considered as an index of societal progress. Researchers have suggested two main approaches for the overall measurement of well-being, the objective, and the subjective well-being.

Both approaches, as well as their relevant dimensions, have been traditionally captured with surveys. During the last decade, new data sources have been suggested as an alternative or complement to traditional data.

This paper aims to present the theoretical background of well-being, by distinguishing between objective and subjective approaches, their relevant dimensions, the new data sources used for their measurement and relevant studies.

Authors of this paper also intended to shed light on barely explored dimensions and data sources that could potentially contribute as a key for public policing and social development.

5. A novel approach for ranking web documents based on query-optimized personalized PageRank

Citation:

Roul, R.K., Sahoo, J.K.
A novel approach for ranking web documents based on query-optimized personalized
PageRank. Int J Data Sci Anal (2020).
https://doi.org/10.1007/s41060-020-00232-2

Summary:

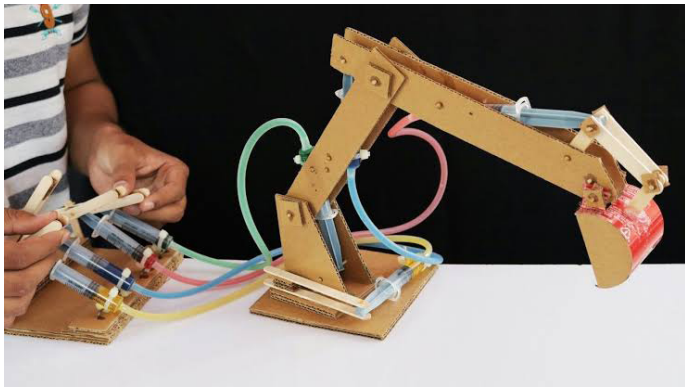
Ranking plays an important role in the search process of web documents on a huge corpus. This not only reduces the searching time but also provides useful documents to the users.

In this paper, the authors extend their earlier query-optimized PageRank approach by combining the TF-IDF and personalized PageRank algorithm to generate a robust ranking mechanism. In their earlier approach, they modeled a ranking scheme by considering the link structures of the documents along with their content.

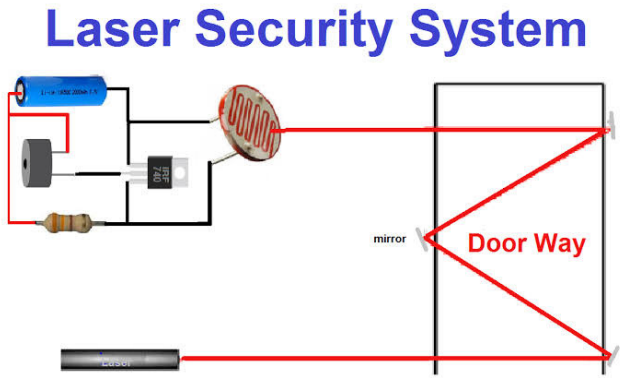
A novel feature selection technique named as 'Term-term correlation-based feature selection' (TCFS) is also proposed which removes all noise terms from the document before the ranking process starts. They believed that by incorporating TCFS and personalized PageRank of the documents along with their relevance will improve the retrieval results.

The aim is to modify the link structure based on the similarity score between the content of the document and the user query. Experimental results show that the proposed feature selection technique can outperform the conventional feature selection techniques, and the performance of the combined TF-IDF and personalized PageRank approach is promising compared to the traditional approaches.

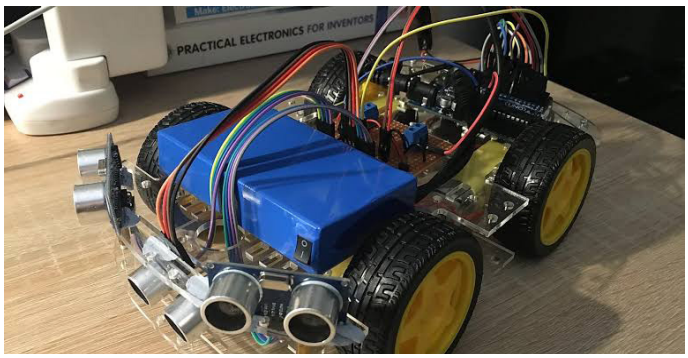
Project Ideas: General



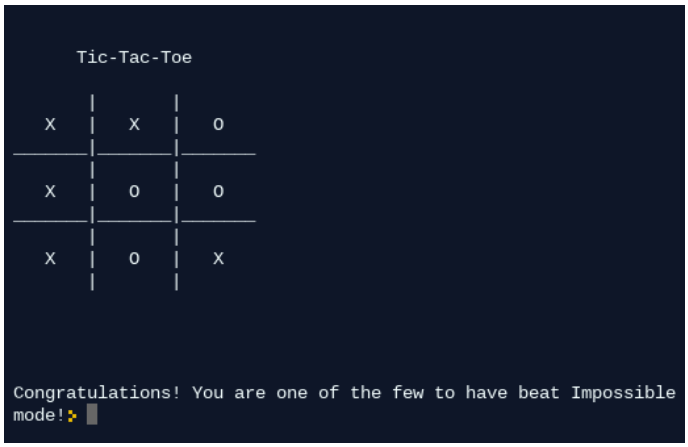
1. Hydraulic Object Picking Crane



2. Laser Security System/ Laser Alarm System

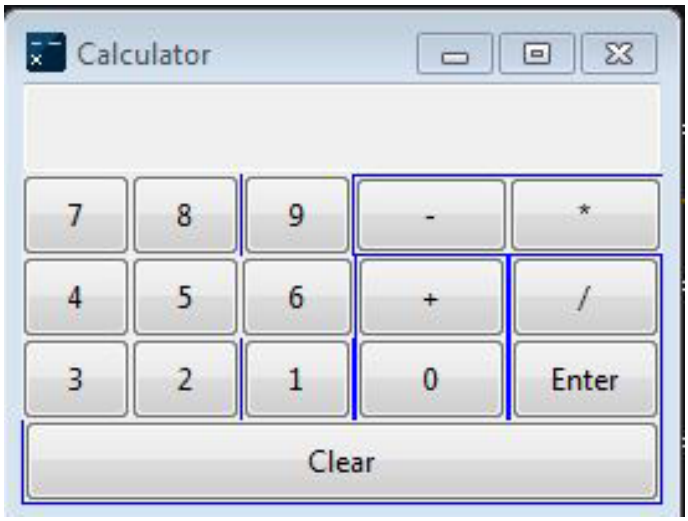


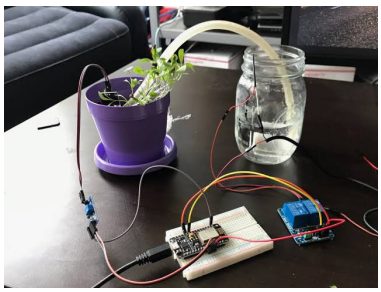
3. Arduino Self Driving Car



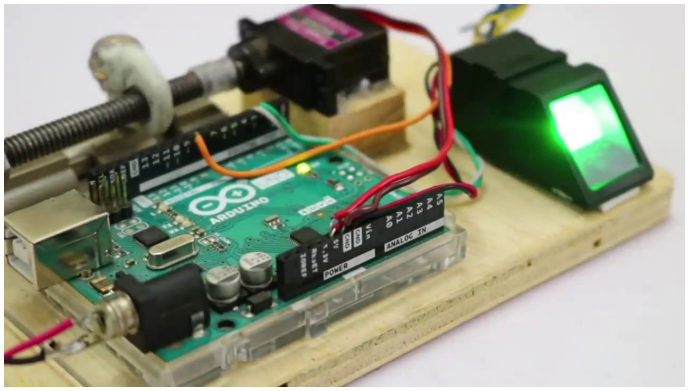
4. Tic Tac Toe – Basic Python Programming

5. Gui Calculator – GUI Python Programming

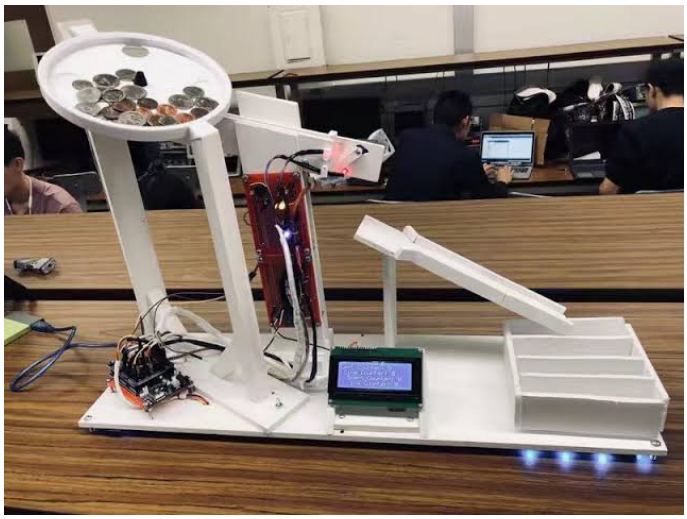




6. Automatic Plant Watering System – Arduino



7. Fingerprint Door Lock System – arduino



8. Coin sorting machine- arduino

Project Ideas: Data Analytics

1.Identifying Dog Breeds Using Neural Networks (Intermidiate) - https://github.com/thegarrickchu/Springboard-Dog_Breed_Classifier/blob/master/Capstone_2_Final_Deck.pdf

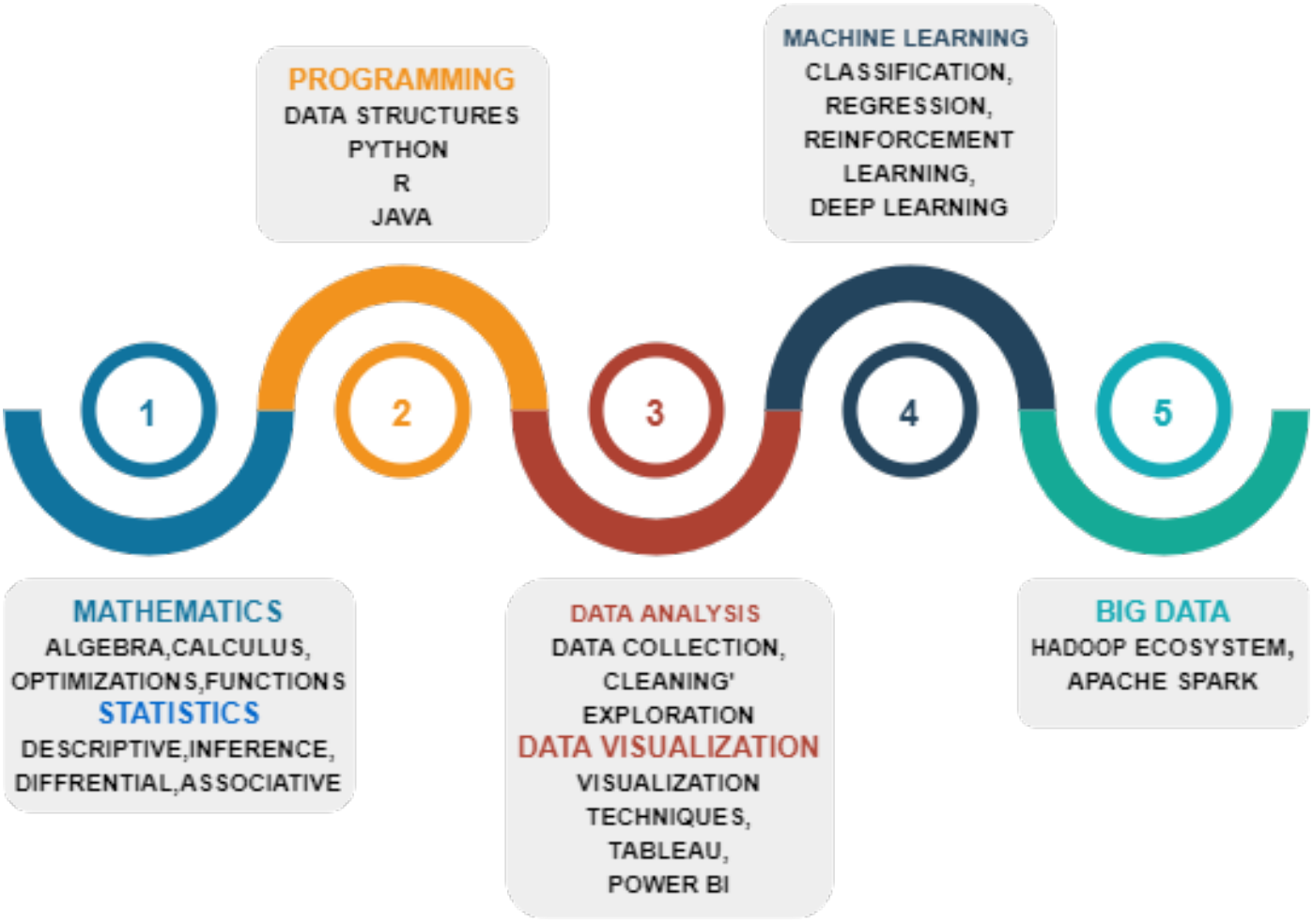
2.Amazon Vs Ebay Analytics (Advanced) – https://unlooted.com/blog/amazon_v_ebay/#results

https://makenewscredibleagain.github.io/

Road Map To Excel Data Analytics

- The idea of working with **data and technology** must have provoked your curiosity but what does a data analyst do all day?
- And how do you know if you are a right fit for it?
- Do you love to **distinguish the trends and patterns** in the data?
- Do you find difficulties in representing **data via reporting and visualization**?
- Are you passionate about **numbers and algebraic function**?
- Does the idea of **evaluating, processing, analyzing, and interpreting statistical data** make you want to roll up your sleeves and get the job done?
- If you answered yes to any of these questions then a career as a Data Analyst could be a perfect choice!!!

Here's a perfect road map for you to start working on becoming a Data Analyst/Scientist



Achievements By Committee Members

Aryan Irani-

Very recently, Aryan Irani's content about "**Google Sheets Automation Using Google Apps Script**" was featured in Medium. He has illustrated the basic idea of sending bulk mails in a proper way, without any hassle.
Link to refer the article
https://medium.com/@aryanirani123/google-sheets-automation-using-google-apps-

Swapnil Singh –

One of our most talented members, Swapnil Singh successfully managed to publish his research paper in the month of August, namely **"Impact of Machine Learning Algorithms on Heart Disease Datasets".**
Brief description about the research paper - Machine learning is advancing with great speed in the healthcare areas by developing algorithms and obtaining information regarding abnormalities in the human body. It has been seen that heart diseases are one of the leading causes of death. Thus, early detection leads to proper treatment and thus leading to saving many lives. Regular monitoring of the heart via different tests help in early detection. Automation of the detection process would not only increase efficiency but also decreases life risk.

This paper intends to find out the effect of machine learning algorithms on heart disease prediction. Algorithms such as Logistic Regression, XGBoost, Support Vector Machines, and some others were implemented over different datasets. The performance of each of the algorithms was analysed along with the variations in their hyper parameters for testing. Promising results were obtained for both the datasets with the help of Random Forest, Decision Trees and Neural Networks. The paper also provides the relative feature importance while making the predictions.
Link for the research paper - http://sersc.org/journals/index.php/IJAST/article/view/29849

Shreya Malhotra –

A dedicated member of our committee who believes in the fact that technology doesn't distinguish among people. This very thought of her has motivated her to help the visually challenged for experiencing technology the same way others do. She managed to developed an app **"Drisht"** for visually impaired which includes basic features like calling, emergency dialing, playing games and listening to music. This app has replaced the traditional method of cane stick where the application alarms if an object is coming closer by using the object detection method using phone camera.

She is the Winner of 1st Runner Upin IET's Software and Hardware Projectfor an application for visually impaired.
This doesn't limit to her skill set, she has also managed to crack the MTA exam and prove her Python skills. She's certified by Microsoft Technology Associate 98-381- Introduction to programing with Python.

Fun Zone

JOKES

Patient: “Will I survive this risky operation?”
Surgeon: “Yes, I’m absolutely sure that you will survive the operation.”
Patient: “How can you be so sure?”
Surgeon: “9 out of 10 patients die in this operation, and yesterday died my ninth patient.”

There are 10 kinds of people in this world, those who understand binary and those who don’t.

Your mama is so mean, she has no standard deviation.

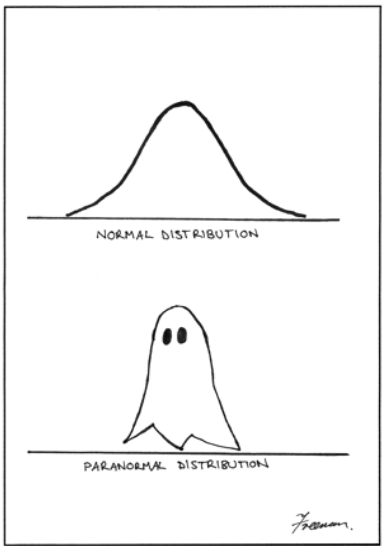
RIDDLE

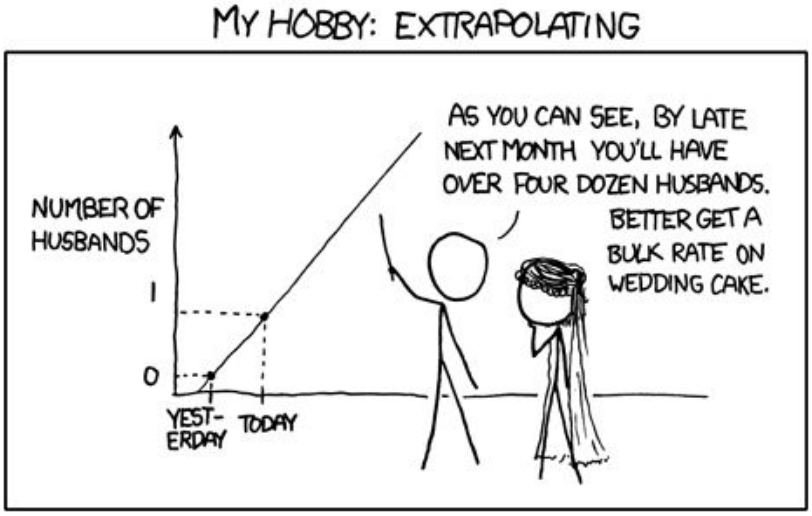
There are two sand timers which show 4 minutes and 7 minutes respectively. What would be the best approach to get a time of 9 minutes using both the sand timers, at one time or one after another or in any other combination?

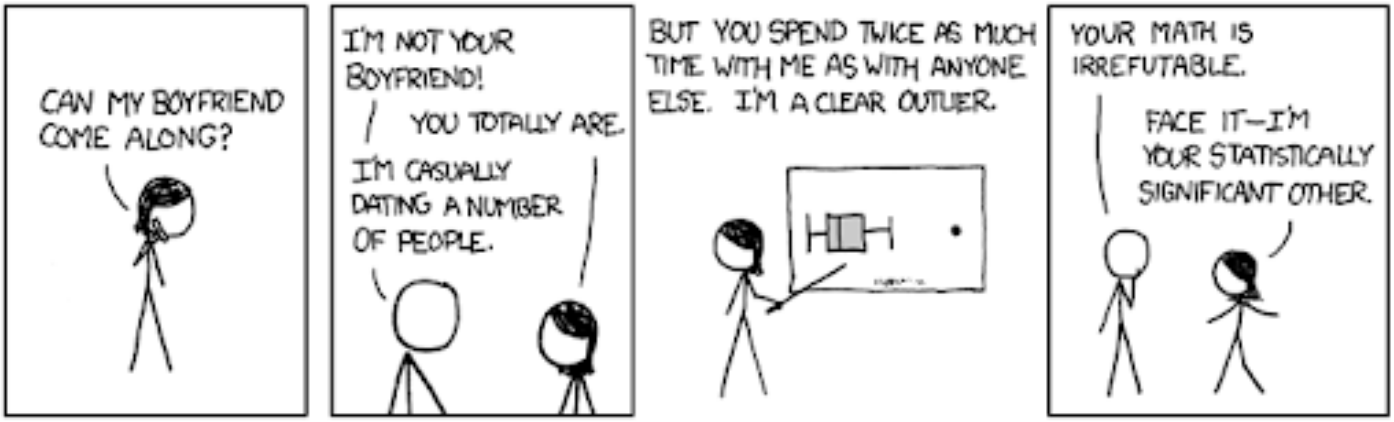
DID YOU KNOW?

- By 2025, the Data Science analytics sector in India is estimated to grow eightfold, reaching $16 billion.
- There are nearly as many pieces of digital information as there are stars in the universe.
- Bad data costs US businesses alone $600 billion annually.
- 1 billion pieces of content are shared via Facebook’s Open Graph every day.

Comics


NORMAL DISTRIBUTION
PARANORMAL DISTRIBUTION


MY HOBBY: EXTRAPOLATING
NUMBER OF HUSBANDS
1
0
YEST-ERDAY
TODAY
AS YOU CAN SEE, BY LATE NEXT MONTH YOU'LL HAVE OVER FOUR DOZEN HUSBANDS.
BETTER GET A BULK RATE ON WEDDING CAKE.


CAN MY BOYFRIEND COME ALONG?
I'M NOT YOUR BOYFRIEND!
YOU TOTALLY ARE.
I'M CASUALLY DATING A NUMBER OF PEOPLE.
BUT YOU SPEND TWICE AS MUCH TIME WITH ME AS WITH ANYONE ELSE. I'M A CLEAR OUTLIER.
YOUR MATH IS IRREFUTABLE.
FACE IT—I'M YOUR STATISTICALLY SIGNIFICANT OTHER.

Word Search

DATAANALYTICS
PROCESS
STATISTICS
SCATTERPLOT
MODEL
INFORMATION
GRAPH
TABLE
ALGORITHMS
DATABASE
CHART
VISUALIZA-
MINING
REGRESSION
HISTOGRAM
ANALYISIS

V	S	Y	E	G	C	H	L	E	V	R	L	N	U	S
R	K	C	R	L	H	V	S	G	E	Q	O	Y	D	I
V	Y	A	A	C	B	A	N	G	G	I	B	S	S	S
Y	P	J	U	T	B	A	R	L	T	I	Y	C	F	I
H	C	X	V	A	T	E	T	A	A	Q	S	I	A	Y
M	L	F	T	C	S	E	Z	J	N	Z	A	T	L	L
M	I	A	M	S	C	I	R	Z	V	A	Y	Y	G	A
O	D	N	I	A	L	G	X	P	N	J	N	L	O	N
D	V	O	I	A	R	Y	X	Q	L	I	Z	A	R	A
E	N	I	U	N	A	G	P	E	T	O	T	N	I	P
L	V	S	H	E	G	Q	O	X	R	N	T	A	T	K
M	I	N	F	O	R	M	A	T	I	O	N	A	H	K
V	P	R	O	C	E	S	S	V	S	Z	K	T	M	A
T	R	A	H	C	H	H	Y	K	L	I	T	A	S	W
S	C	I	T	S	I	T	A	T	S	X	H	D	F	C

Introduction To The Team

The Editorial Team of IETE MPSTME has endeavoured to shine a spotlight on the roaring necessities through Resonate 1.0.
Presenting to you, those very minds:

TEAM FOR FIRST EDITION OF RESONATE :

Editor-In-Chief - Swapnil Singh, Shefalee Satpathy

Directors - Yash Agrawal, Dhruv Bhatt, Kalp Pandya

Designers - Ganesh Hiremath, Angad Preet Singh Gadhok, Saachi Mogra

Editors - Saakshi Kushe, Rithwik Basrur

Proof Reader - Shreya Malhotra,Umang Havelia, Uditi Ghadi

Department Editor - Vidhi Vazirani, Nehal Mundra, Ashutosh Payannavar

Contributor - Aryan Irani, Aryan Shetty, Hridaya Lakhani, Rishikesh Vadodaria, Hitarth Joshi, Sneh Mehta, Siddhant Phatak

Introducing The Super Core For IETE 2020-21

A very calm and flexible personality,
President – **Umang Jain**, He can handle difficult tasks with ease and efficiency while having a smile on his face. He knows how to handle difficult situations and also cheers up his teammates at the same time.

Anshu Poswalia, **Vice-President** believes in working more, talking less which inspires all his team members. His qualities such as being the heart of the committee, being the driving force of the committee makes him the most adorable. He is always ready to face challenges and find a solution for it. These qualities make him a true gem. His skills make him perfect for this position.

Happy-go to person with no enemies,
Secretary- **Devika Pillai**, is the most enlightening one. She is a very calm and observant person. Qualities such as hard work, patience, persistence make her perfect. Her presence of mind can match no others in our committee.

Our **Treasurer** for this year is **Sahil Mane**, He has a never giving up attitude. He has qualities such as hard work, determination, professionalism make him perfect for IETE. His knowledge, experience and his wise use of money makes him unique.