



**upGrad**

# DATA STREAK

A monthly digest on all things Data

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# 01

## An Easy Guide To Machine Learning



**Prashant Kathuria**

Senior Data Scientist  
upGrad

Netflix and Amazon have become great at their game – they always seem to know what content or product you'd love to see or purchase. Don't you just love to have everything already curated to your taste and preference?

While most of us know the secret sauce behind the nifty Recommendation Engine of Netflix and Amazon (which is Machine Learning), how many of us are familiar with the inner mechanisms of Machine Learning?

### **To Put It Straight – How Does Machine Learning Work?**

In essence, Machine Learning is a data analytics technique (a subset of AI) that aims to 'learn' from experience and enables machines to perform tasks that require intelligence. Machine Learning algorithms apply computational methods to extract information and learn directly from data without being explicitly programmed for it (not having to depend on a predetermined equation).

### **The Anatomy Of Machine Learning Systems**

All ML systems can be disintegrated into three parts:

- Model – the component that deals with the identification, that is, predictions.
- Parameters – the factors used by the model to reach its decisions (predictions).
- Learner – the component that adjusts the parameters (and as a whole, the model) by considering the differences in predictions compared to the actual outcome.

## Types Of Machine Learning

Now that you are familiar with the core components of ML systems, it's time to take a look at the different ways they "learn."

### Supervised Learning

In Supervised Learning, a model is explicitly trained to map the input to the output. A supervised learning algorithm takes a recognised set of input data along with known responses (output) to that data and trains the model to generate reasonable predictions in response to new input data. Supervised learning uses two approaches to develop predictive models –

- **Classification** – As the name suggests, this technique classifies input data into different categories by labelling them. It is used to predict discrete responses (for instance, if a cancerous cell is benign or malignant). Medical imaging, speech recognition, and credit scoring are three popular use cases of classification.
- **Regression** – This technique is used to predict continuous responses by identifying the patterns in the input data. For instance, fluctuations in temperature or weather. Regression is used to forecast the weather, electricity load, and algorithmic trading.

### Unsupervised Learning

Unsupervised Learning approach uses unlabelled data and seeks to unravel the hidden patterns within it. Thus, the technique draws inferences from datasets consisting of input data devoid of labelled responses.

- **Clustering** – One of the most common unsupervised learning methods, clustering is an exploratory data analysis technique that categorizes data into "clusters" without any known information about the cluster credentials. Object recognition and gene sequence analysis are two examples of clustering.
- **Dimensionality Reduction** – Dimensionality Reduction cleanses the input data of all the redundant information and retains only the essential parts. Thus, the data not only becomes clean, but is also reduced in size, thereby taking up less storage space.

### Reinforcement Learning

Reinforcement Learning aims to build self-sustained and self-learning models that can learn and improve through trial and error. In the learning (training) process, if the algorithm can successfully perform specific actions, reward signals are triggered. The reward signals function like guiding lights for the algorithms. There are two reward signals:

- A Positive signal is triggered to encourage and continue a particular sequence of action.
- A Negative signal is a penalty for a particular wrong action. It demands the correction of mistakes before proceeding further in the training process. Reinforcement Learning is widely used in video games. It is also the mechanism behind self-driving cars.



# Inside The ‘Learning’ Function Of ML Algorithms

Behind the functioning and how they learn through experience, there are three common principles.

## Learning A Function

The first step in the learning process is where ML algorithms learn about the target function ( $f$ ) that best maps the input variable ( $X$ ) to the output variable ( $Y$ ). So,

$$Y = f(X).$$

Here, the form of the target function ( $f$ ) is unknown, hence the predictive modelling.

In this general learning phase, the ML algorithm learns how to make future predictions ( $Y$ ) based on the new input variables ( $X$ ). Naturally, the process isn't free of error. Here error ( $e$ ) exists independent of the input data ( $X$ ). So,

$$Y = f(X) + e$$

Since the error ( $e$ ) might not have enough attributes to characterize the mapping scenario from  $X$  to  $Y$  best, it is called irreducible error – irrespective of how good the algorithm gets at estimating the target function ( $f$ ), you cannot reduce the error ( $e$ ).

**How to Learn Machine Learning – Step by Step**

## The ‘Gradient Descent’ Learning Approach

It may be true that we have been successful in creating ‘intelligent’ machines, but their pace of learning differs – machines tend to take it slow. They believe in the ‘gradient descent’ learning process – you don't take the leap at once, but you take baby steps and slowly descend from the top (the metaphor here is that of climbing down a mountain).

While descending a mountain, you don't jump or run or hurl yourself down in one go; instead, you take measured and calculated steps to get down to the bottom safely and avoid mishaps.

ML algorithms use this approach – they keep adjusting themselves to the changing parameters (picture the rough and unexplored terrain of a mountain again) to finally get the desired outcome.

To conclude,

The fundamental goal of all Machine Learning algorithms is to develop a predictive model that best generalizes to specific input data. Since ML algorithms and systems train themselves through different kinds of inputs/variables/parameters, it is imperative to have a vast pool of data. This is to allow the ML algorithms to interact with different kinds of data to learn their behaviour and produce the desired outcomes.



# 02

## Trilogy: Machine Learning, Deep Learning And AI



**Nikhil Gupta**

PG Diploma in ML and AI  
(March 2019 Cohort)

An entrepreneur and ML enthusiast with more than 6+ years of experience in Front End Development

Nowadays, everyone is keen on having expertise in Machine Learning, Deep Learning and Artificial Intelligence (the fantasy word called AI). And why not, considering the huge demand they hold?

*According to a 2017 study the demand for Data Science and Analytical skills will reach around 2.72 million in 2020. (Source: Forbes)*

Now, people often ask the common question, “How to start?”. Here’s answering the same.

1. Enthusiasm
2. Patience
3. Dedication

### Three Python IDE I used:

1. Spyder
2. Jupyter Notebook
3. PyCharm

Although, it's a personal choice to select any IDE, I prefer to install the Anaconda platform where you will find Spyder and Jupyter Notebook but you need to install PyCharm directly. Looking inside dataframes and series is very easy in Spyder since it's focused on scientific computing. Whereas Jupyter Notebook super simplifies the prototyping and sharing notebooks with visualisations. Debugging and working on multiple Python versions is easier in PyCharm.

### Basics Of These Three:

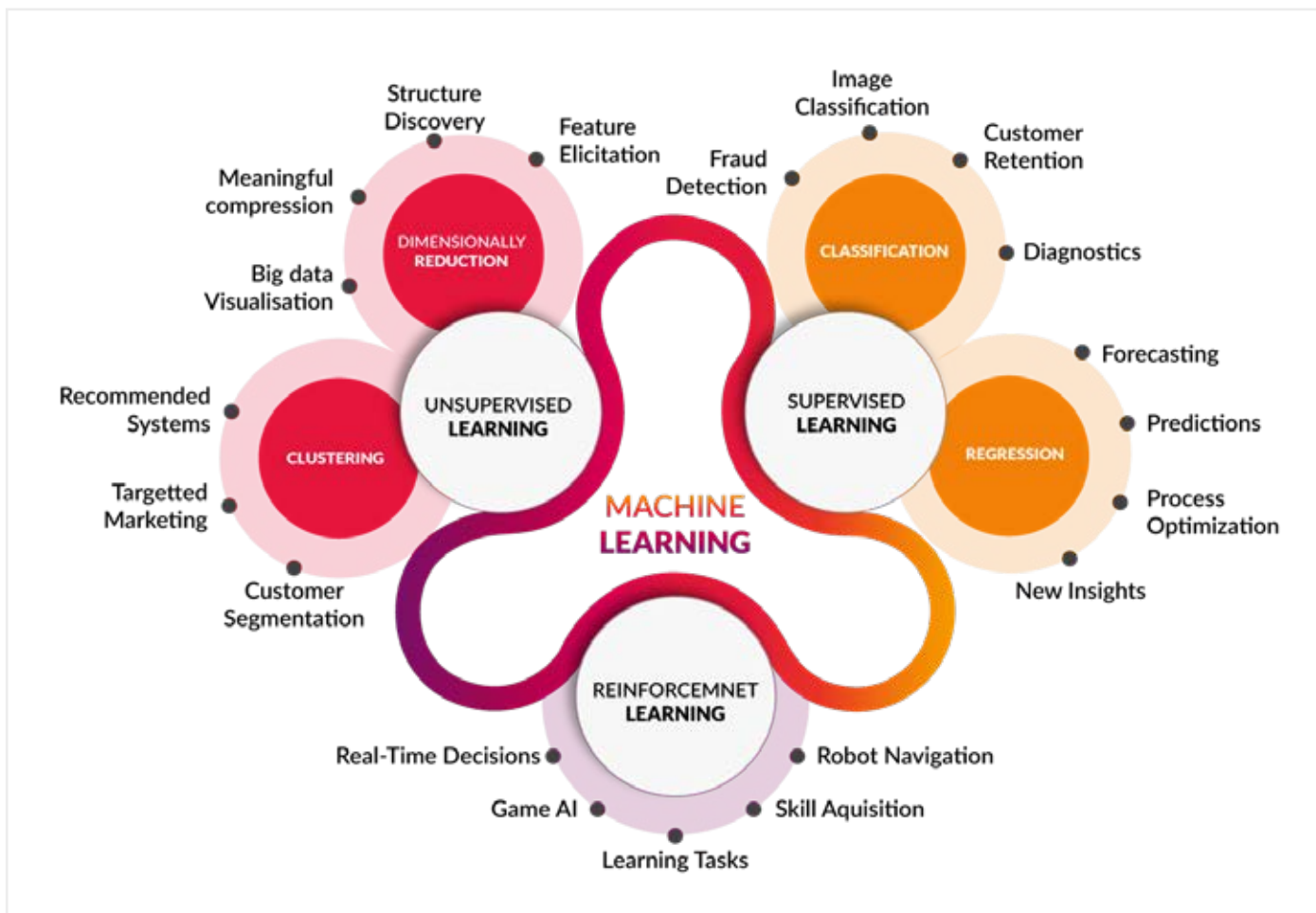
1. Python/R (General + Data Science + Visualisation)
2. Mathematics
3. Database

Before jumping directly to Machine Learning, Deep Learning or Artificial Intelligence Algorithms, it is recommended to first learn or brush-up Python (for people with technical expertise) or R language (for people without technical expertise). Both of these are super easy and most of the materials are available freely. You do need to clear some concepts of mathematics (e.g. Vector and Matrix, Algebra, Permutations and Combination, Statistics, etc). Mathematics will make it super easy for you to understand the concept of ML or DL or AI. Database is the core, it always has been.

# 1

## Guesstimate

What is the price of  
1 kilogram potato  
in India?



**Modelling can be divided into three major categories.**

- **Supervised Learning**

Where you have past data with labels (Regression, Classification, ANN, CNN, RNN, etc).

- **Unsupervised Learning**

Where you will have past data without labels (Clustering, SOM, DBM, AutoEncoders, etc).

- **Reinforcement Learning**

Work on a system on completing a level, you earn a badge (Q-Learning, SARSA, DQN, DDPG, etc).

**Focus On Three Steps While Working On Datasets:**

1. Exploratory Data Analysis (EDA)
2. Modelling
3. Analysing or Evaluating



Always divide your problem into three parts as listed above. Most of your time is consumed in EDA. Many people say that EDA is the most boring part but it gives insights about data that are very interesting. It is possible that your problem gets resolved by doing just EDA but nevertheless modelling is meant to perform algorithms on datasets to bring some meaningful outcomes. In the end, we always have to analyse and evaluate the forthcoming datasets. After that improvisation will begin and it is a continuous process.

Becoming an expert is not a joke and you'll have to work really hard to become one in data.

### **Three Sources Of Public Data:**

1. Commonly Available Datasets (Kaggle, UCI, Google, etc)
2. Country-Based Datasets (USA, India, UK, etc)
3. Web Scraping

Getting private data is not so easy, so you can start working on data available publicly. You will find multiple domain datasets, country wise and company wise datasets, etc from the sources listed above. You can also do Web Scraping to make sure you are not breaching the Privacy Policy of the website and solve real-world problems.

### **Three Places To Build Your Portfolio:**

1. LinkedIn
2. GitHub
3. Kaggle

You can build your portfolio in your Traditional Resume (list down projects with hyperlink for soft-copy), Infographic Resume, your own website (if you have, not mandatory), LinkedIn, GitHub, Kaggle, etc. This will help you showcase your learning.

# 2

## **Guesstimate**

How many laptops are  
sold in Bengaluru  
in a day?

# 03

## Article Barn

### 1. Could Robots Teach Sign Language To Children With Autism?

To start with, let's answer the first big question: Why use a robot in autism therapy? People with autism have an attention preference for objects over people (Kerola et al., 2009), and children with autism have shown more interest towards therapy when it involves technological or robotic components. Additionally, a robot's operation can be strictly controlled, which can make therapy less overwhelming for autistic people. Then, the second big question: Why teach sign language to children with autism? People with Autism Spectrum Disorder (ASD) experience problems with communication: 40–50% of people with ASD are functionally mute during adulthood. To mitigate this, they use Augmentative and Alternative Communication (AAC) methods. Assistive sign language — a simplified form of sign language — is the most common form of AAC. Other common AAC forms are symbolic pictures and photographs.

[Know More](#)

### 2. What Is Signal Density?

Signal Density: Basic Benchmarks, The idea of signal density is that advertisers and marketers are seeking as much data about a device as possible — every hour of the day and every day of the month, and the next month, and so on.

When we talk about signal density for targeting reach, advertisers need access to hundreds of millions of devices. For movement insights, they require location data from tens of millions of users supplied by apps with trusted Software Development Kits (SDKs).

Note: Only data of the highest quality will create major boosts when it comes to deriving actionable value from analysis. In the next section, the lens turns to how, once advertisers and marketers achieve a benchmark of density, they then assure the data quality necessary for successful campaigns.

[Know More](#)

### 3. Opinion: AI Beats Animal Testing At Finding Toxic Chemicals

Machine learning could be the key to reducing the use of animals in experiments.

There are more than 100,000 chemicals in consumer products. For the vast majority, there is very little information about their toxicity. Traditionally, researchers will test chemicals of interest in animals. As an extreme example, a pesticide undergoes about 30 animal tests, costing about \$20 million and consuming more than 10,000 mice, rats, rabbits, and dogs over five years. About 20 kilograms of the chemical are needed for this testing; obtaining such a volume can be quite a challenge for a substance that is not yet in the market. Other substances receive less scrutiny, but even products with lower regulatory standards, such as industrial chemicals, can require \$5 million worth of animal testing before entering the marketplace.

[Know More](#)

### 4. Starbucks Offer Personalisation — Sending The Right Offer To The Right Customer

How to predict the most effective offers for individual users by extracting key user behaviors from the transaction log?

Starbucks is arguably one of the most successful coffee chains in the world. It is also one of the pioneers to introduce its own 'rewards apps' back in 2010. Customers can get promotional offer notifications, order and pay through the mobile app and earn reward points for their orders. This allows Starbucks to not only connect with customers directly and improve brand loyalty, but also collect valuable first-hand customer information as well as their transactional behaviors.

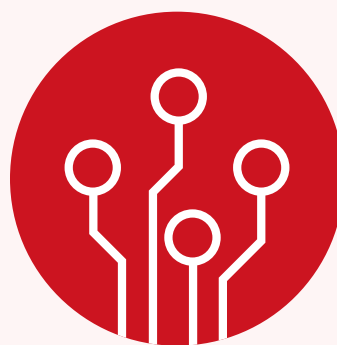
But here is the question - do all the users get the same offers? Imagine you are a data scientist at Starbucks, what would you do to determine what the most effective offers are to send to each individual customer that he/she is most likely to use to improve user engagement?

[Know More](#)

# 04 In A Nutshell

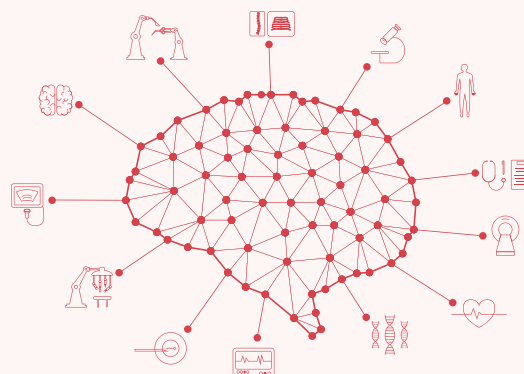
## TCS, Infosys And Wipro Are Now Offering AI Platform

To improve the delivery of solutions and drive faster growth from clients, Indian IT services provider Tata Consultancy Services (TCS), Infosys and Wipro are offering AI platforms embedded as part of solutions to clients. Until now, this was sold separately to clients. AI-based solutions are now, more than ever, being used to solve complex business problems, and service providers who can bring their own IP to the table are being rewarded.



## Let Artificial Intelligence Do The Health Check

A software algorithm, the IDx-DR, uses AI to analyse images of the eye using a camera and achieved an 87.4% accuracy rate while detecting diabetic retinopathy - a condition where high blood sugar levels damage the blood vessels in the retina. The good news is that this device has recently received approval from the US Food and Drug Administration. This is a historic moment in healthcare globally.



## These Contact Lenses Zoom In and Out With The Blink Of An Eye

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We could be just a few steps away from being able to create a fully functional prosthetic eye. Researchers from the University of California, San Diego, have designed contact lenses that use the electro oculographic signal naturally produced by our eyes to perform vision-enhancing tasks like zooming in and out. The contacts are actually soft robots, and means that we could now have the ability to zoom in and out of objects with a literal blink of an eye.

## Indians Are On A Smartphone Upgrade Mode

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Indian consumers are placing more value on owning better smartphones, thereby losing its reputation as a “budget smartphone market”. Consumer aspirations push up demand for higher priced models.

The share of smartphone shipments from the largest category (by volume) — ₹ 10,000 - ₹ 15,000 range has significantly reduced and moved into the next price range ₹ 15,000 - ₹ 20,000. Analysts attributed the shift to consumers willing to loosen their purse strings and move to the next bracket.



# 05

## Data Scientists To Follow



### KYLE MCKIOU

Founder and CEO  
Data Science Dream Job

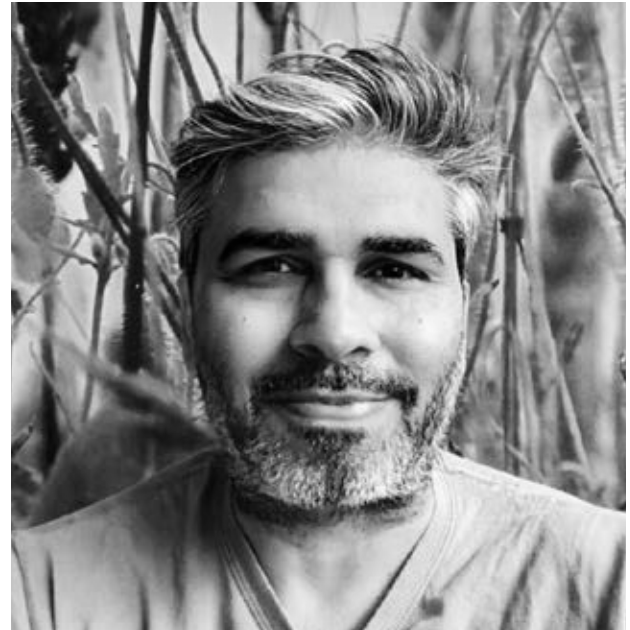


Kyle is the founder of Data Science Dream Job that teaches aspiring Data Scientists from different backgrounds how to get jobs in the Data Science domain.

The course by itself is worth more than anything as he and other amazing mentors teach aspiring Data Scientists the mindset, technical and non-technical skills required for this industry, job search techniques and how to ultimately get their careers started in this industry.

This is not just another online course on Udemy or Coursera that only teaches technical skills in programming or machine learning.

Kyle also regularly shares his experience and insights in Data Science on LinkedIn with the Data Science community.



### TARRY SINGH

CEO, Co-founder & AI Researcher  
deepkapha.ai, curae.ai



Experienced, entrepreneurial and a well rounded data obsessed professional with over 25 years experience in multiple industries.

He has co-authored several research publications and books – in research (IEEE, ACM etc) as well as practical industry areas. He has also worked with various humanitarians and NGOs to help build the broken world with technology.

Highlighted domain expertise in:

1. AI & Data Skills: Digital & Data Analytics Transformation with Deep Learning, Machine Learning, Artificial Intelligence
2. Innovation & Startup Growth: Advising Enterprises, startups and VC/PEs



# 06

## DataShots

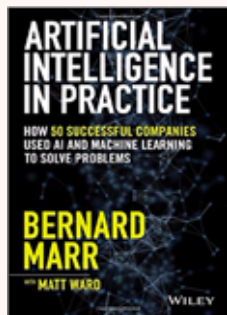
### **3 Emerging Analytics Startups In India To Watch Out For In 2019**

1. Pentation Analytics
2. Thoucentric
3. Zendrive

### **Top 5 AI Stocks To Invest In:**

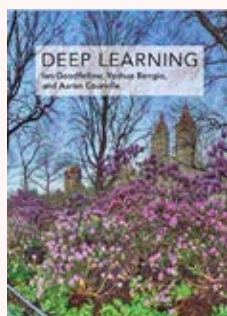
1. Tencent
2. Microsoft
3. Nvidia
4. Twilio
5. Salesforce

# 5 Amazing Books Every Aspiring Data Scientist Should Read:



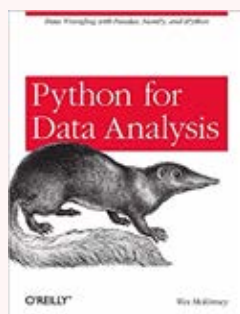
## Artificial Intelligence in Practice

Bernard Marr



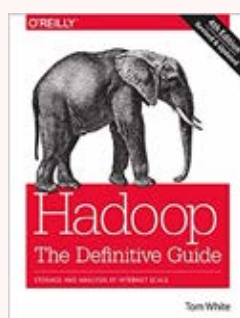
## Deep Learning

Ian Goodfellow, Yoshua Bengio and Aaron Courville



## Python for Data Analysis: Data Wrangling With Pandas, NumPy and IPython

Wes McKinney



## Hadoop, the Definitive Guide: Storage and Analysis at an Internet Level

Tom White



## Doing Data Science: Straight Talk from the Frontline

Rachel Schutt

## Top Linkedin Profiles Of The Month:



### LAKSHMI KALYAN SUNKU

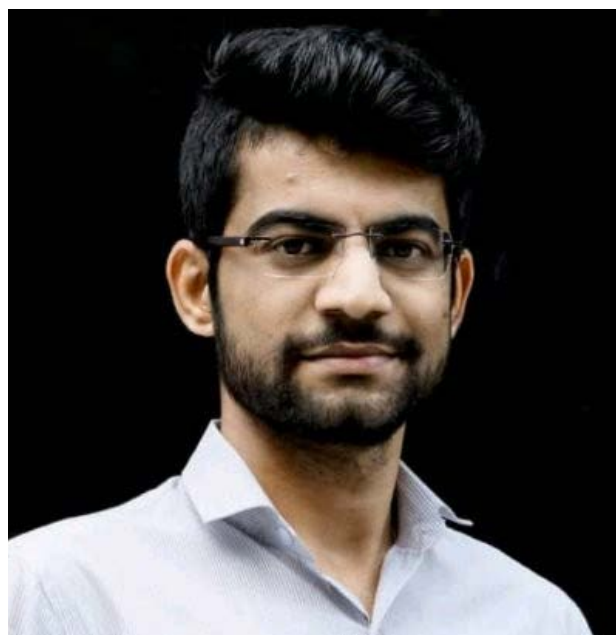
IT Consultant (Freelancer) - Ceal Counter Party  
Deutsche Borse - Frankfurt, Germany

**Data Science - June 2019 Batch**



He has 15+ years of experience in development of Digital Products from conception till product support. Majority of his experience is in Wireless Telecommunications (2G till 4G) and Embedded Systems. He has been working in Financial Technologies since 5 years.

Like every company, he has been ramping up his skills on Cloud Technologies and Analytics to be part of the digital transformation and to build innovative IoT solutions. His technical experience is in Systems Integration, Product Tests, Acceptance, Introduction of complex critical systems and now evolved as lead to deliver and manage the same. A business strategist who plans and manages projects aligning business goals with technology solutions to drive process improvements, competitive advantage and bottom-line gains.



### SURAJ KUMAR TALREJA

Freelancer- Digital Marketing and Analytics  
StartUp Monk - Kuala Lumpur, Malaysia

**Data Science - March 2018 Batch**

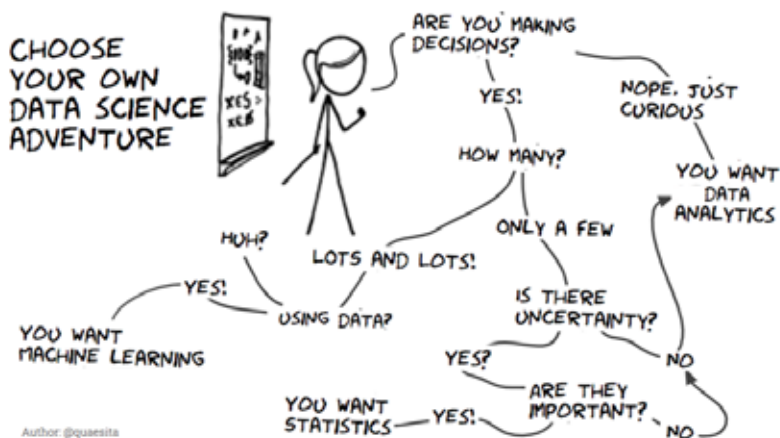


He is a self-motivated and result-oriented professional with excellent Analytical, Communication, Leadership, Team Management and Negotiation skills. He is always ready to face challenges and has the right attitude towards work and believes that it is more important to have a right attitude than required skills, as skills can be acquired if one has the attitude.

He has experience in the BFSI domain particularly General Insurance and also has Licentiate certification from the Insurance Institute of India.

He is always enthusiastic to learn new skills, help others and share his knowledge. He loves to read books related to Personal Finance, Self Development and Autobiographies. He is also quite active on LinkedIn to learn and help others by writing post and articles. He also loves to train and teach people.

# 07 Data Ticklers



# 08

## Upcoming Events And Hackathons

### 7th International Data Science Summit

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The 7th International Data Science Summit, organised by the Data Science Foundation will take place on 20th September, 2019 at Biswa Bangla Convention Centre, Kolkata, India. The Summit will provide insights into creating a data-driven culture in organisations, and the benefits of using data and analytics to drive the decision-making process.

Catch the best minds in Data Science and Artificial Intelligence and get a chance to connect with some of the most innovative people and ideas in the world of Data Science, while learning first-hand from core practitioners and contributors. The Data Science Summit will welcome renowned speakers from the space to share innovative ideas on how to correctly and efficiently extract knowledge and insights from data.



20<sup>th</sup> September, 2019



Biswa Bangla Convention Centre, Kolkata

[Register Now](#)

### Cypher 2019

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A three-day conference for AI and Data Science professionals and innovators.

Cypher started as a simple idea in 2015: Let's connect the analytics community with all industries, both old and new. It seemed to resonate. Cypher has grown to become the "largest analytics conference in India". No conference has ever grown so large so fast.



18<sup>th</sup> - 20<sup>th</sup> September, 2019



Bengaluru

[Register Now](#)

### upGrad Pro Hacking League

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Online hackathon

[Register Now](#)

# 09

## Niche Domain - Sports Analytics



**Karan Mehta**

Student Mentor

Data Science Vertical

upGrad - Student Success Team

### What is Sports Analytics?

Sports analytics can be nicely translated to the use of data related to sports such as statistics of players, weather conditions, pitch information and many others. The primary objective of sports analysis is to improve the game. Sports organisations are looking for advantages in business and on-the-field competition by gleaning hidden insights from the data they own. They're using data analytics tools to improve their decision-making, which enables them to plan better and innovate faster and to create predictive models which helps make informed decisions.. The popularity of data-driven decision-making in sports has trickled down to the fans, who are consuming more analytical content than ever. There are now websites dedicated to the research and analysis of sports statistics and how they relate to a prediction in performance.

### Can Sports Analytics Be Powerful?

Analytics has gone beyond just tracking data on paper and gaining actionable insights. Today real-time videos are used for finding key analysis points. If you have been interested in the world of sports analytics, you might have heard of the company SportVU. SportVU is a camera system hung from the rafters of dugouts or any place which can leverage a camera and that has the whole view of the play area. The cameras capture data at a rate of 25 frames per second. Take the case of baseball or basketball, the camera tracks every movement of the ball and the position of the players throughout the game in real time. Analytics companies provide statistics based on the recorded data and combining this with state of the art statistical algorithms and software.

Making use of player tracking, analytics companies can provide performance metrics about players. Taking the above example in case, a simple thing like, what was the position of the players X, Y and Z when the ball at the points A, B and C. On realising the potential of companies like SportVU hold, it has been adopted by many teams in the MLB, NBA and MLS. Today, it is the official tracking partner of the NBA!





## Royston D'souza

Student Mentor

Data Science Vertical

upGrad - Student Success Team

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### Can Sports Analytics Be Powerful?

Most definitely not! Each and every sport is unique and the analysis performed for each sport will vary in terms of methodology. The only thing that is universal to all sports when it comes to predictive analytics is that “more data will lead to better results”. Predictive analytics particularly suffers when there is fewer data and when critical interactions have less linearity.

An ideal example of this would be the sport of soccer. With less sophisticated metrics to play around with, the team composition can vary a lot. This makes the available data not too helpful for predictions. If you take the case of physiological metrics, soccer is way ahead of the curve. Having more data is definitely more advantageous. Analysis has helped show the effect of pitch framing (the art of making a pitch near the border appear to be a strike) in baseball. The offensive line play in football also greatly benefits from having tons of data.

We have spoken about data in soccer, baseball, football and basketball. All sports do not have the same testing metrics. They differ in terms of the metrics being measured. It may be player profiling, distance management, throughput conversions etc. All of these will not be applicable in all sports. Finding innovative ways of using these methods in the most unconventional ways is what will actually help you gain the analytics advantage.

### The Future Of Sports Analytics

Technology and innovation in sports is way too often applied in order to acquire data and information while users struggle to understand the true value of it. Innovation, and thereby sports analytics, should always have the purpose to answer crucial questions for teams and their coaches. Without any doubt, sports analytics will continue to evolve, and the game strategies will heavily rely on the insights from the analysis than instinct. The next breakthrough the sports world is expecting from analytics is in the area of predicting a player's mental ability to adjust to the rigours of the professional sports world. There are already researches about finding the correlation between emotional regards of responsibility and on-field performances.

The current analysis is not capable of measuring an athlete's desire to be a top performer. Lack of such features brings a slight chance for drafting busts. Looking at the rate at which the sports analytics have grown to today's state, it is evident that more of these data-driven advancements in sports can be expected in the years to come by.



# 10 Career Transitions



ASHOK SINGH

**ASSOCIATE AWS  
SOLUTIONS ARCHITECT**  
Applied Cloud Computing



**DATA ENGINEER**  
Star India Pvt Ltd



SANGMESH SEEGE

**MODEL LEAD**  
Applied Cloud Computing



**DATA ENGINEER**  
Star India Pvt Ltd



AYUSH MODI

**JAVA DEVELOPER**  
Capgemini



**MARKETING ANALYST**  
Globalisation Partners



MANAN VERMA

**DEV OPS ENGINEER**  
Enterprise(Zycus)



**DEV OPS ENGINEER**  
upGrad



ANSHUMAN DAS

**RISK ANALYST**  
TCS



**DATA ENGINEER**  
Star India Pvt Ltd



ONKAR DHARMADHIKARI

**SENIOR SOFTWARE  
ENGINEER**  
HCL



**LEAD DATA  
SCIENTIST**  
Star India Pvt Ltd

# 11

## GUESSTIMATE SOLUTIONS

### 1

What Is the price of 1 kilogram potato  
In India?

Let's try to guesstimate the price of one kg of potato in India. There could be multiple ways to do it, but your aim should be to keep the "scope of error" to the minimum. To estimate the price of one kg potato, you can take up any food item which has potato in it. You can estimate the price by using french fries, Potato burger, etc.

I will choose the classic Indian snack to guesstimate the price of a kg of potato.  
Why choose Samosa over French Fries?

Advantages of choosing Samosa -

- A Samosa is sold at ₹ 10 from roadside vendors
- It is easy to estimate the operational cost and the profit earned by a roadside vendor

Disadvantages of French fries:-

- The pricing of French Fries varies from ₹ 50 to ₹ 200
- In order to estimate the price of potato using French Fries from McDonalds, you need to estimate the operational cost as well.

We take guesstimates to reduce the error percentage and come to a close number.

Assumptions:-

- One samosa weighs 150 gms
- The price of one samosa is ₹ 10

We will divide the price of a samosa in 4 parts

- Profit
- Cost Price of Potato
- Price of Flour, oil, spice and gas
- Labor cost(if any)

We can safely assume that flour will weigh around 30 gm in each samosa and the rest will be potato, so we have 120 gms of potato

Profit – 30% (It can be anywhere between 40 to 20% because it seems logical to expect such a high percentage of profit considering the fact that the selling price is on the lower side)

Profit – ₹ 3

Flour, oil, spices, and gas – Flour and oil used by the roadside vendors are generally of cheap quality. So, we can assume an investment of 20% in these items. ₹ 2 for other ingredients

Operational Cost – There will be some operational cost like salary to one or two permanent staff and the rent of the venue. Let's take it as 20% i.e. ₹ 2

Now we are left with only potato, which is the main ingredient of the Samosa.

₹ 3 for 120gms of Potato. Using the unitary method to solve it further

120 gm = ₹ 3

1000 gm =  $\text{₹}((3/120)*1000) = \text{₹ } 25$  per Kg

Roadside vendor mostly gets potato from wholesale. So, you can also state that the normal market rate of one kilogram of potato is 1.2 times the wholesale rate

**₹ (25\*1.2) = ₹ 30 per Kg**

# 2

## How Many Laptops Are Sold In Bengaluru In A Day?

What is the number of laptops sold in Bengaluru on an average routine day?

Laptops are a costly product. I am assuming that people buy laptops only when needed. Hence, I am going to calculate the potential market of laptops in India.

Total population of Bengaluru = 18Mn ~ 20Mn

Let's divide the population on the basis of age

0–18 Yr – 30% of 20 Mn = 6 Mn -> We can neglect this age group because generally they don't need personal laptop and when needed, they prefer to use laptops belonging to others.

19–22 Yr – 10% of 20 Mn = 2Mn ->  $0.6 \times 2 \text{ Mn} \rightarrow 1.2 \text{ Mn}$  (This is the college age group. Most college students need a laptop. Assuming that 60% of them own a laptop)

22–50 Yr = 40% of 20 Mn = 8 Mn. 22-50 age group is the working class of the society. I have divided this class into 3 major categories.

- White collar employees (25%)
- Blue collar employees (50%)
- Small business owners (25%)

Assuming 80% and 30% of the people in the category of white collar employees and Small business owners respectively own a laptop or PC. We can neglect blue collar employees.

80% white collar own a laptop or PC -> 1.6 Mn

Small business owners own laptops or PC -> 0.6 Mn

50–80 Yr = 20% = 4 Mn -> we can neglect this age group

Total laptop + PC users in Bengaluru =  $1.2 + 1.6 + 0.6 = 2.4 \text{ Mn}$

Corporate offices/schools/computer centers generally have desktop computers. Let's assume 60% are desktops.

Laptops = 40% -> 0.9 Mn

Average life of a laptop = 5 years ( in India )

Number of laptops sold per day in Bengaluru =  **$0.9 \text{ Mn} / 365 \times 5 \sim 500 \text{ laptops}$**

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