Before starting…

- Please put yourself on mute
- Take pen and paper – make notes (don't forget to note slide number)
- If you have doubts, please type it on a chat window (I will cover it in the last if time permits)

Career in AI & Data Science

Shaikh Abdus Samad

At: Kawish Foundation (21/07/20)

About me

- Research Scholar at VIT University (Research Interest – Computer Vision)

- M.Tech. in CSE

- B.E. in CSE from Dr. BAMU

- Ambassador of AI6 community of Vellore

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Contents

- What is AI?
- Why this field?
- What AI can do?
- AI Industry -> Who does what?
- Roles and Careers
- Salaries
- Best Institutes
- Courses

What is AI?

- Merriam-Webster defines **artificial intelligence** this way: A branch of computer science dealing with the simulation of **intelligent** behavior in computers. The capability of a machine to imitate **intelligent** human behavior.

- Sometimes it is also called as **machine intelligence**.

How we can make machines intelligent?

- Example: Teacher ⎯ Student / Parents ⎯ Kid
- Solution: Training and Data

#197008841

A Day in DATA

- [Let's have a look at 'A day in data'](#)
- How human will predict something out of it?
- So, let the machine predict and decide for us.

Why AI?

- Today, the amount of data that is generated, by both humans and machines, far outpaces human's ability to absorb, interpret, and make complex decisions based on that data.

- Artificial intelligence forms the basis for all computer learning and is the future of all complex decision making.

Ref: https://www.netapp.com/us/info/what-is-artificial-intelligence-ai.aspx

Decisions are based on the prediction

- What is prediction?

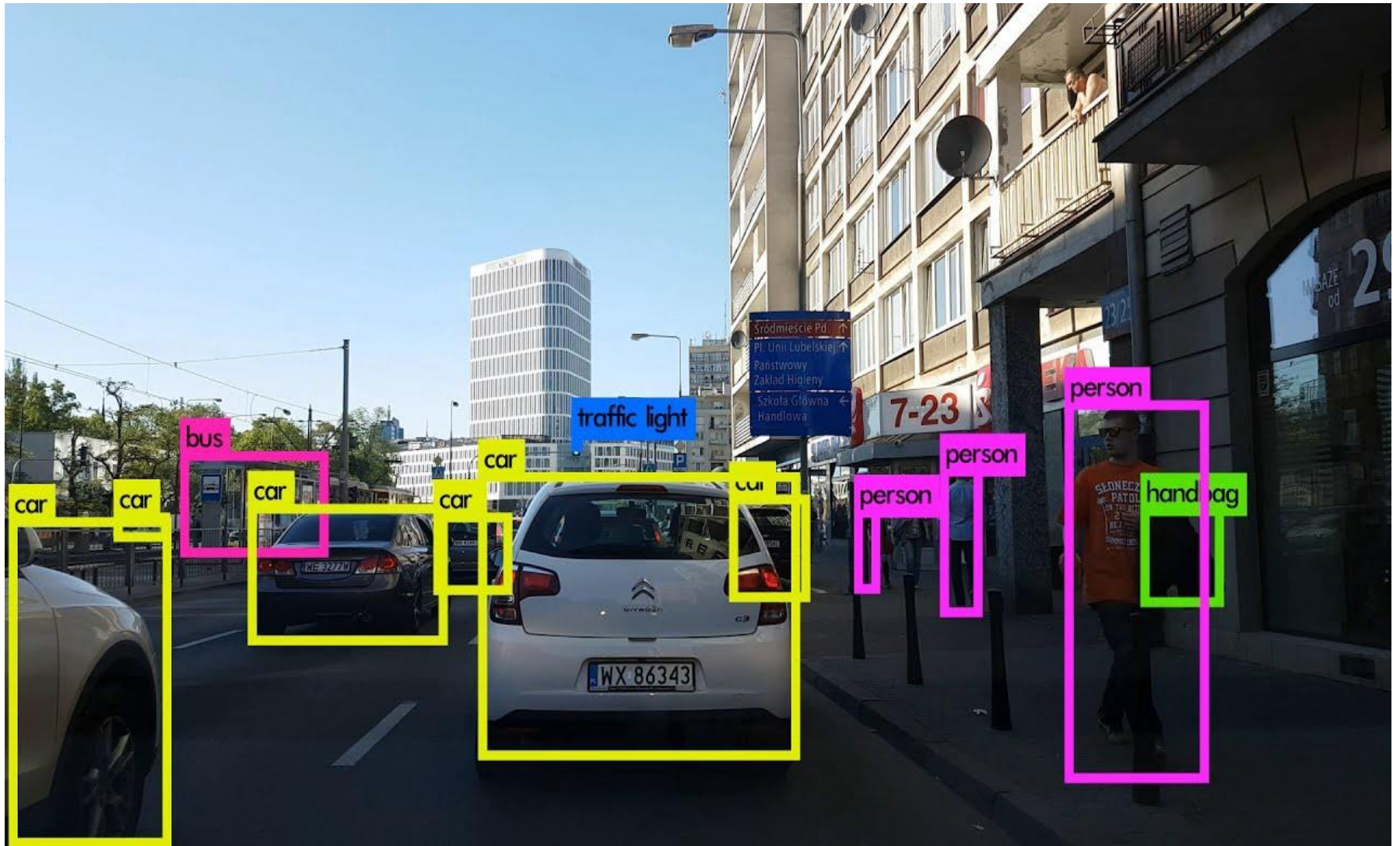| YearsExperience	Salary
1.1	39,343
1.3	46,205
1.5	37,731
2.0	43,525
2.2	39,891
2.9	56,642
3.0	60,150
3.2	54,445
3.2	64,445
3.7	57,189
3.9	63,218
4.0	55,794
4.0	56,957
4.1	57,081
4.5	61,111
4.9	67,938
5.1	66,029
5.3	83,088
5.9	81,363
6.0	93,940
6.8	91,738
7.1	98,273
7.9	101,302
8.2	113,812
8.7	109,431
9.0	105,582
9.5	116,969
9.6	112,635
10.3	122,391
10.5	121,872

Salary

Salary

The salary range of 5 Years Experience should be in this range
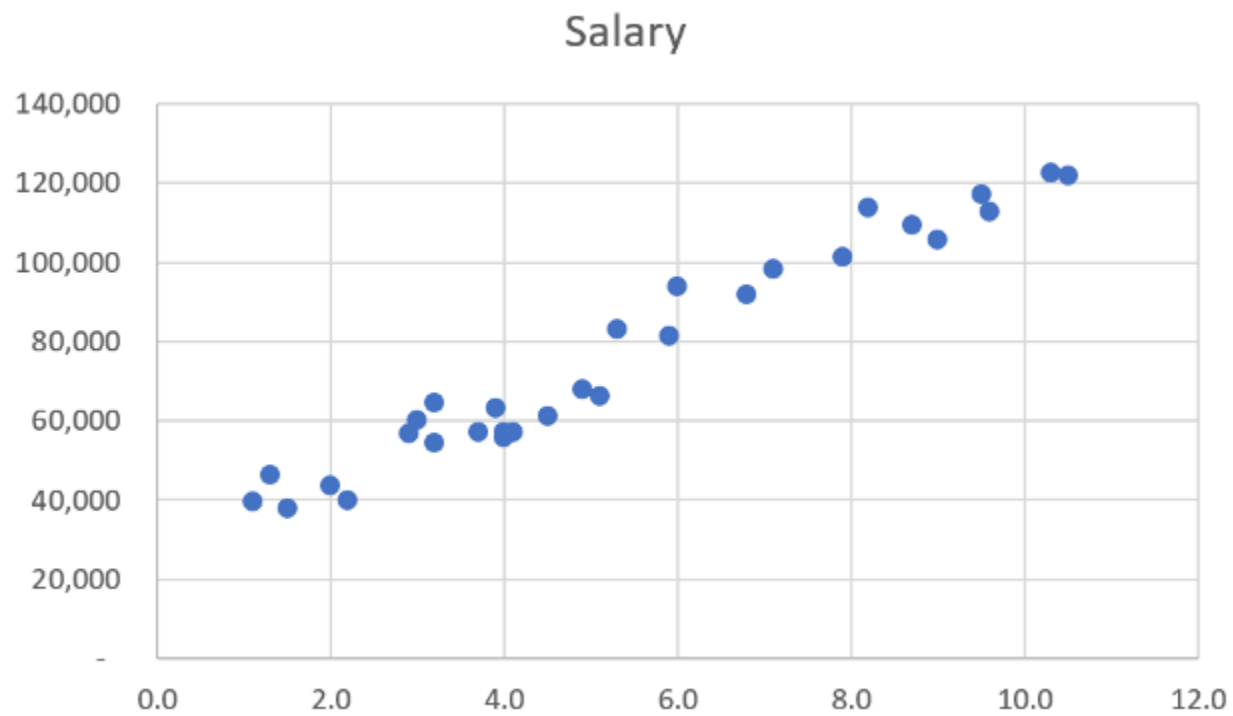
Not limited to prediction

- Object Identification

- Object Recognition

- Object Localization and detection
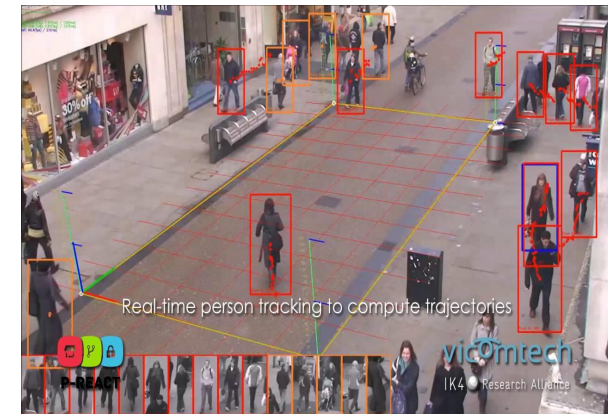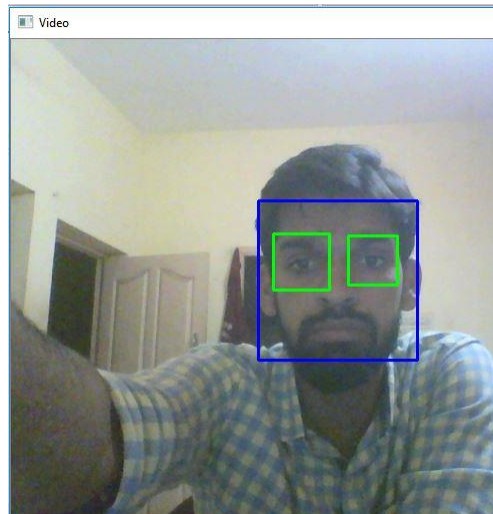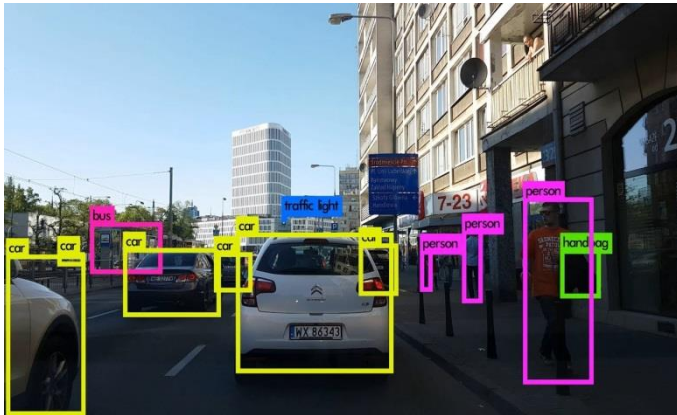
Real-time person tracking to compute trajectories
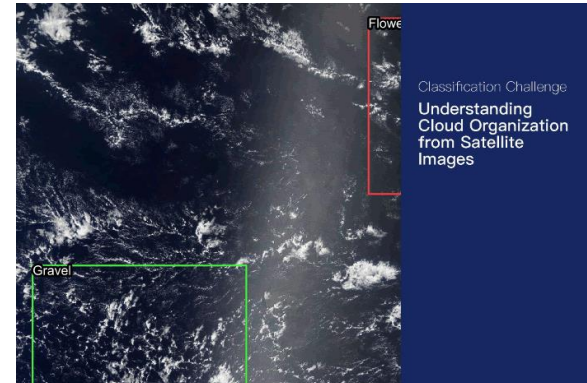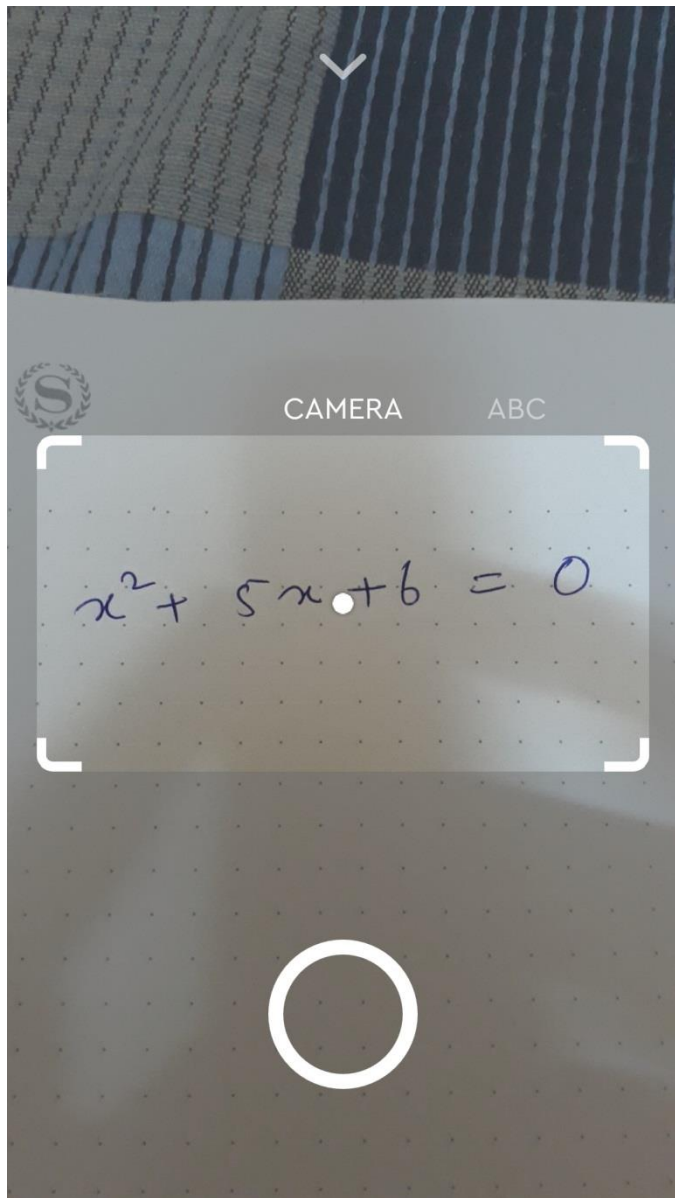
Exercise

https://thispersondoesnotexist.com/

AI is everywhere

- Detecting cancer cells, fracture
- Drone delivery
- Surveillance
- Defect detection (crack detection on railway track)
- Handwriting detection (Google Translate App)
- Agriculture (harvesting crops faster than human, crop monitoring, predict various environmental impacts, PLANTIX app)
- Game playing (Alpha Go, VizDoom)
- Satellite Image analysis
- Gmail's sentence completion suggestions
- Generating news headlines
- Summary of chapter or news article
- Extracting important points
- Google translate (lot of scope of improvements)
- Facebook's "Provide translation into Hindi". (need to improve a lot)
- https://cloud.google.com/vision/ (Live demo)

Crop just one question

$$x^2 + 5x + b = 0$$

Search

Left screenshot:
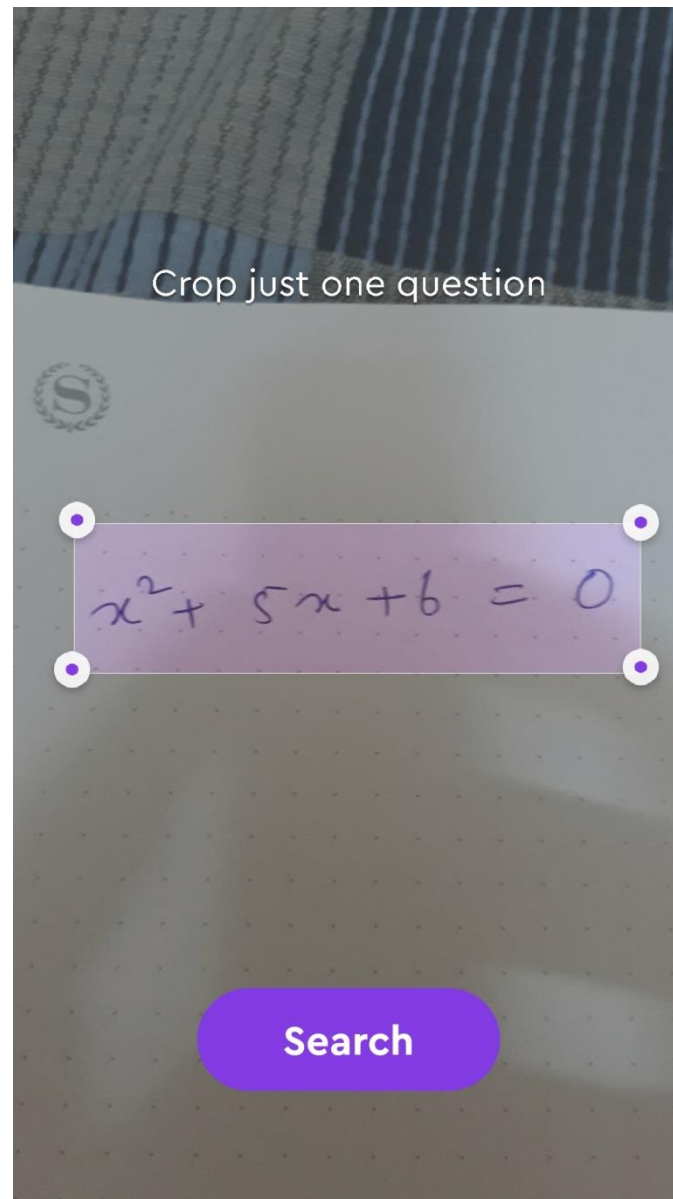
& Solution

1. $x^2 + 5x + 6 = 0$

💡 Use the sum-product method!

2. $(x + 2)(x + 3) = 0$ HINT

✓ $x = [-2, -3]$

$x^2 + 5x + 6 = 0$

Right screenshot:

& Solution

1. $x^2 + 5x + 6 = 0$

💡 Use the sum-product method!

2. $(x + 2)(x + 3) = 0$ HINT

Find the roots of the equation.

Subtract 2 from both sides.
$$x + 2 = 0$$
$$-2 \quad -2$$

Identify and group like terms.
$$x + (2 - 2) = 0 - 2$$

Combine $2 + -2$ to get 0.
$$x + 0 = 0 - 2$$

Ignore 0 when adding.
$$x = 0 - 2$$

Ignore 0 when adding.

$x^2 + 5x + 6 = 0$

Left screenshot:

$x^2 + 5x + 6 = 0$

The average of 20 numbers is zero... how many may be greater than zero?

Crop just one question

WHAT WAS THE NAME OF AURANGZEB'S FATHER?

Sheraton

Search

Right screenshot:

Google

NHAT AS THE NAmE of AUR/ ✕

ALL   NEWS   VIDEOS   IMAGES   MAP

Showing results for **WHAT IS** THE NAmE of **AURANGZEb's** FATHER 7
Search instead for NHAT AS THE NAmE of AURANGZEs FATHER 7

Aurangzeb was born on 3

NHAT AS THE NAmE of AURANGZEs FA...

GPU TECHNOLOGY CONFERENCE — SILICON VALLEY MAR 26-29, 2018 — Presented by NVIDIA

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I am interested.

Thank you for the information.

Count me in!

↩ Reply   ↩↩ Reply all   ➡ Forward

AI/ML/DL/Data Science
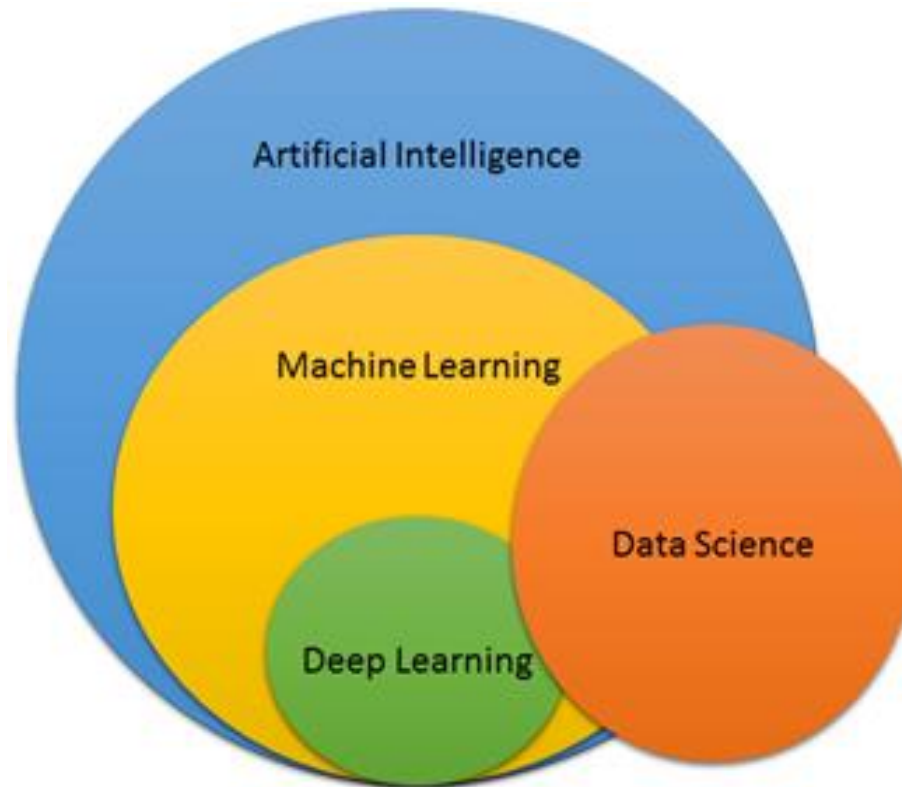
Data Science
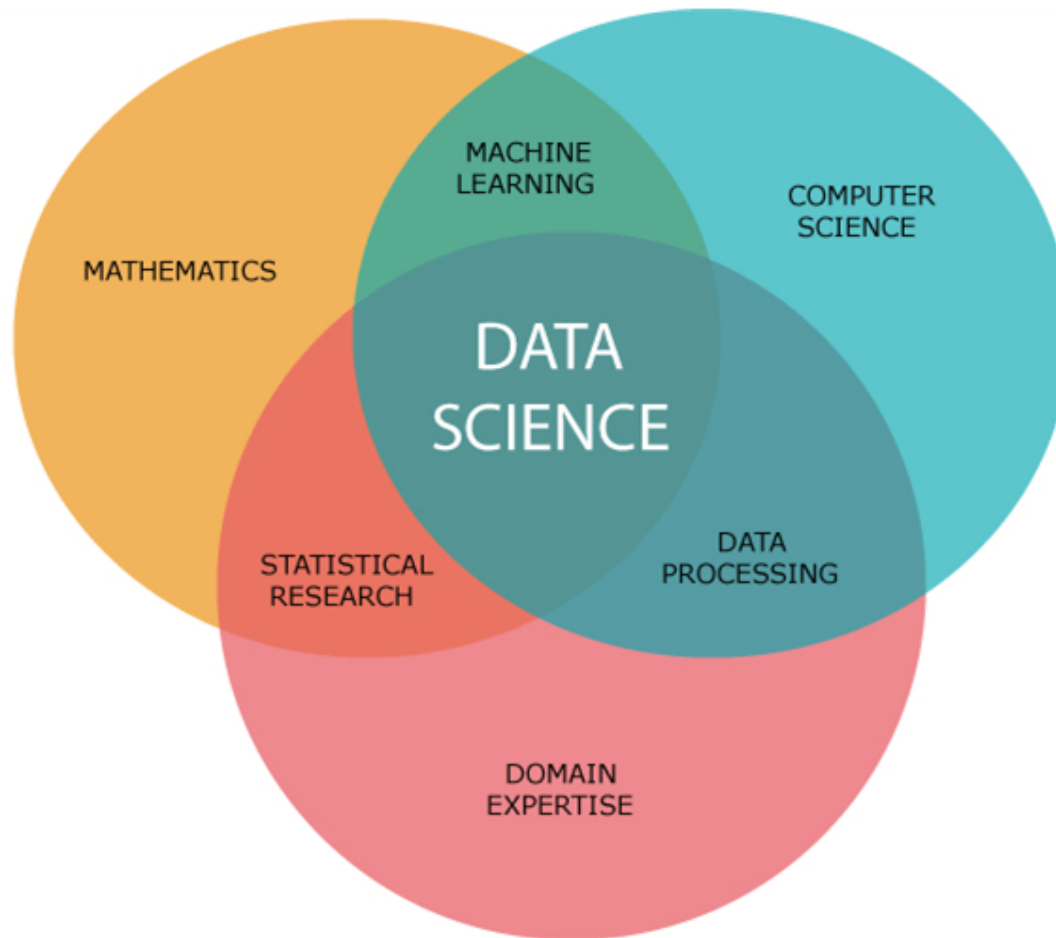
Data Integration versus Data Engineering

Business Intelligence collects, integrates, analyzes data using reports and dashboards to support decision making

Advanced Analytics uses sophisticated techniques to discover insights, make predictions and generate recommendations using data/text mining, deep learning/neural networks, machine learning, reinforcement learning and artificial intelligence

Data Integration
Ingests, transforms, integrates and delivers structured data to a scalable data warehouse platform

Data Engineering
Develops and maintains large-scale data processing systems for preparing structured and unstructured data for analytic modeling

Data Science
Builds analytic models that determine strength of patterns and relationships, quantifies cause-and-effect and measures model goodness of fit

Ref: https://image.ibb.co/kkrsCK/schmarzo_data_science_team_1.png

Data Science Roles & How They Interact

Enable data access & utilization & enable value capture
Builds and supports the infrastructure or 'data pipe' and all associated SW engineering infrastructure tasks.

Data Engineer
Core skills:
- Data Ingest, ETL Tools
- Database Systems
- Hadoop Ecosystem
- Data APIs
- Unstructured data & Data Modeling
- Data Warehousing

Collect, manage, analyze & visualize data

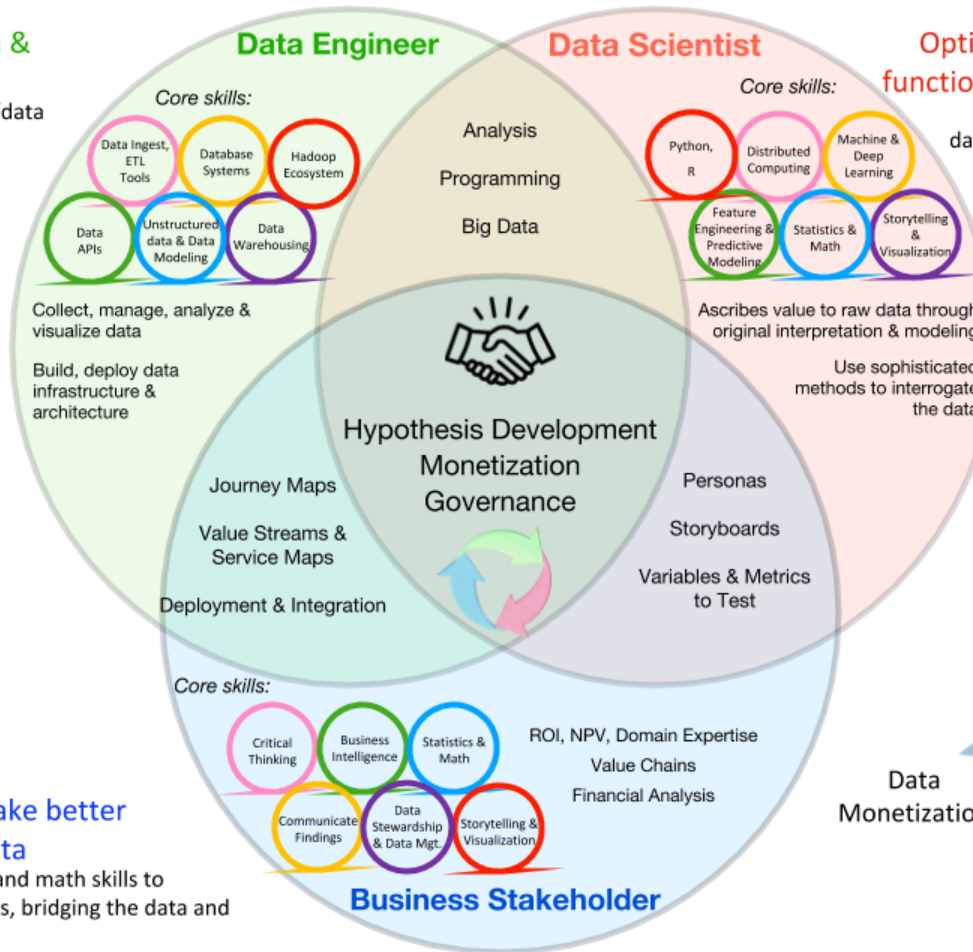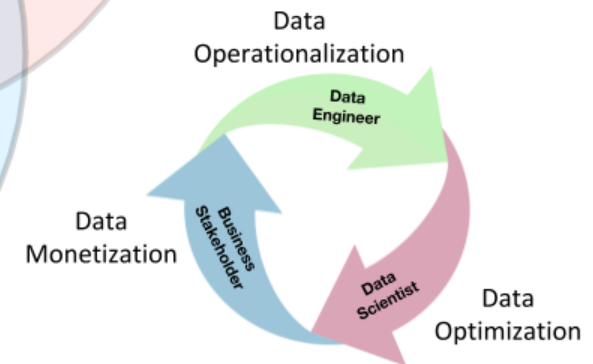Build, deploy data infrastructure & architecture

Data Scientist
Core skills:
- Python, R
- Distributed Computing
- Machine & Deep Learning
- Feature Engineering & Predictive Modeling
- Statistics & Math
- Storytelling & Visualization

Optimize & enable data for business & functional value capture & value creation
Analysis and interpretation of complex digital data to extract or discover knowledge and assist decision-making.

Analysis
Programming
Big Data

Ascribes value to raw data through original interpretation & modeling

Use sophisticated methods to interrogate the data

Hypothesis Development
Monetization
Governance

Journey Maps

Value Streams & Service Maps

Deployment & Integration

Personas

Storyboards

Variables & Metrics to Test

Business Stakeholder
Core skills:
- Critical Thinking
- Business Intelligence
- Statistics & Math
- Communicate Findings
- Data Stewardship & Data Mgt.
- Storytelling & Visualization

ROI, NPV, Domain Expertise
Value Chains
Financial Analysis

Help the business make better decisions through data
Blend of business, analytic and math skills to explore and solve challenges, bridging the data and business communities.

Data Operationalization
Data Monetization
Data Optimization
Data Engineer
Business Stakeholder
Data Scientist

Ref: https://image.ibb.co/hK1sCK/schmarzo_data_science_team_2.png

Roles and Careers
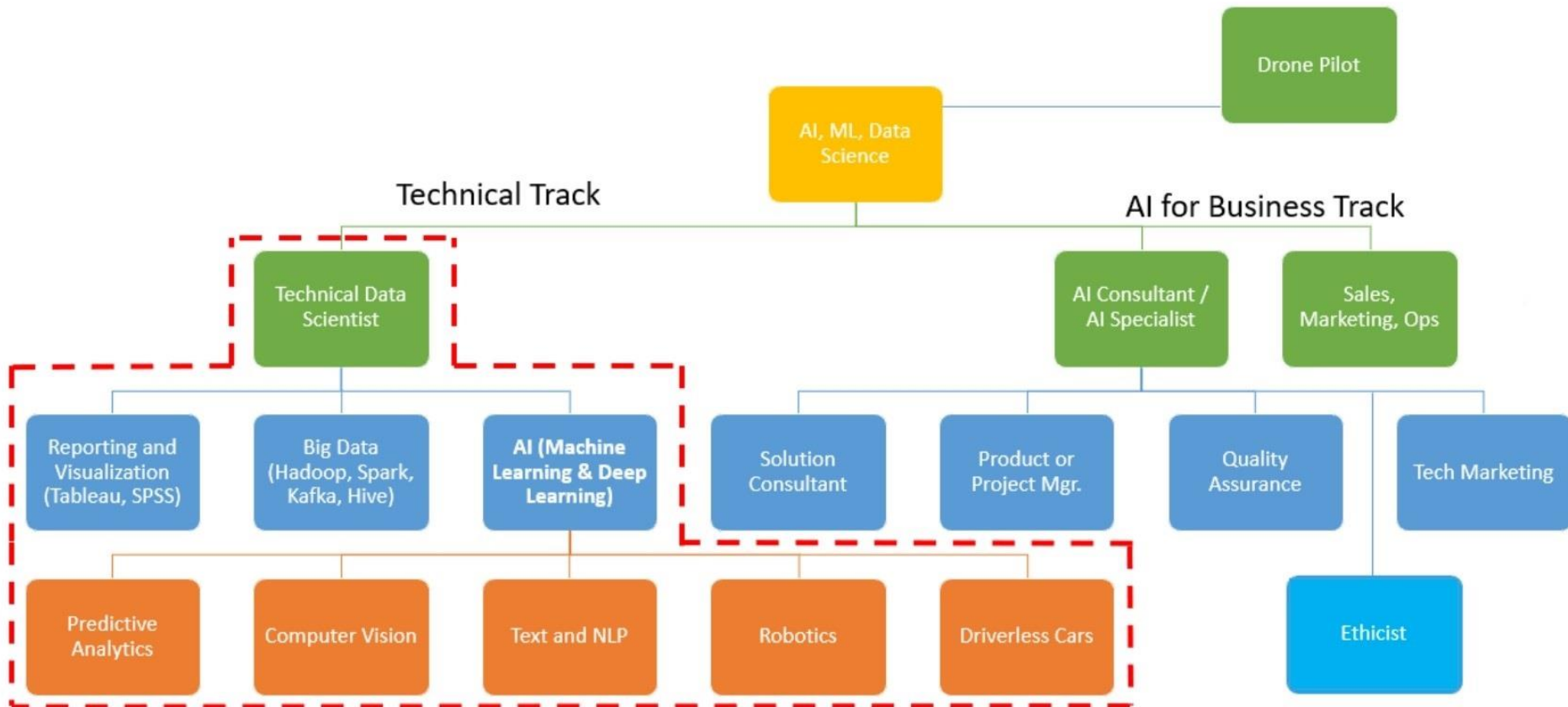
Image Credits: CellStrat

Skills needed for ML and Data Science

Skills needed to become Data Scientist

Machine Learning

Maths: Differential Calculus, Linear Algebra, Statistics

Data Science

Data Analysis: Feature Engineering, Data Wrangling, EDA

IDE: Pycharm, Jupyter, Colaboratory

Communication Skills

Data Visualisation: Tableau, Power BI, Matplotlib
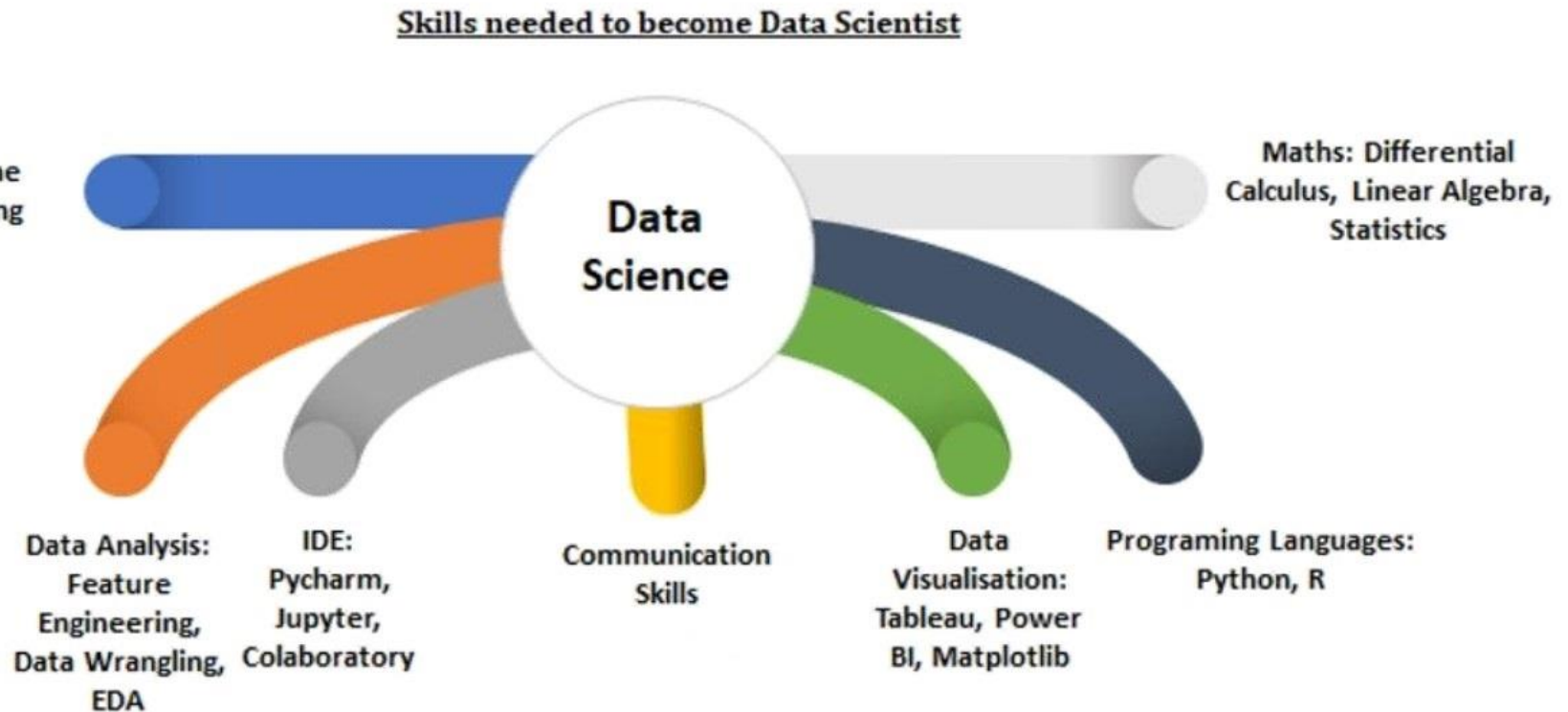
Programing Languages: Python, R

Image Credits: CellStrat, Vishal Singhal

Job roles in industries

1. Product analyst
2. Product manager
3. Data visualization engineer
4. Analytics engineer
5. Decision scientist
6. Machine learning engineer
7. Data engineer
8. Research scientist
9. Applied scientist
10. Metrics analyst
11. Statistician
12. Business intelligence engineer
13. Analytics manager
14. Sales and marketing analyst
15. Insights specialist
16. Market research Analyst
17. Financial analyst
18. Operations analyst
19. Operations manager
20. Data governance
21. Solution architect
22. Enterprise architect
23. Learning analytics scientist
24. Psychometrician
25. Data analyst

26. Business analyst
27. Marketing manager
28. Statistical analyst
29. Quantitative analyst
30. Data steward
31. (Clinical) biostatistician
32. Algorithm engineer
33. Data manager
34. Risk analyst
35. User researcher
36. Analytics translator
37. Data privacy analyst
38. Reporting analyst
39. Data product owner
40. Continuous improvement manager
41. Business intelligence analyst
42. Marketing operations
43. Data strategist
44. UX/UI specialist
45. Healthcare analyst
46. Public health analyst
47. Econometrician
48. Data architect
49. Public policy research
50. Data journalist

Comments by authorities

- *Data Scientist: The Sexiest Job of the 21st Century (by Thomas H. Davenport and D.J. Patil)*

- *The shortage of data scientists is becoming a serious constraint in some sectors. (Harvard Business Review)*

- *Data Scientist Is the Best Job In America According Glassdoor's 2018 Rankings (Forbes)*

- Data Scientist is the best job according to glassdoor in United States (2016-2019) – Ref:https://www.glassdoor.com/List/Best-Jobs-in-America-2016-LST_KQ0,25.htm

Salaries

0 − 5 years

5L − 15L

5 − 10 years

10L − 50L

10 − 20 years

20L − 1Cr
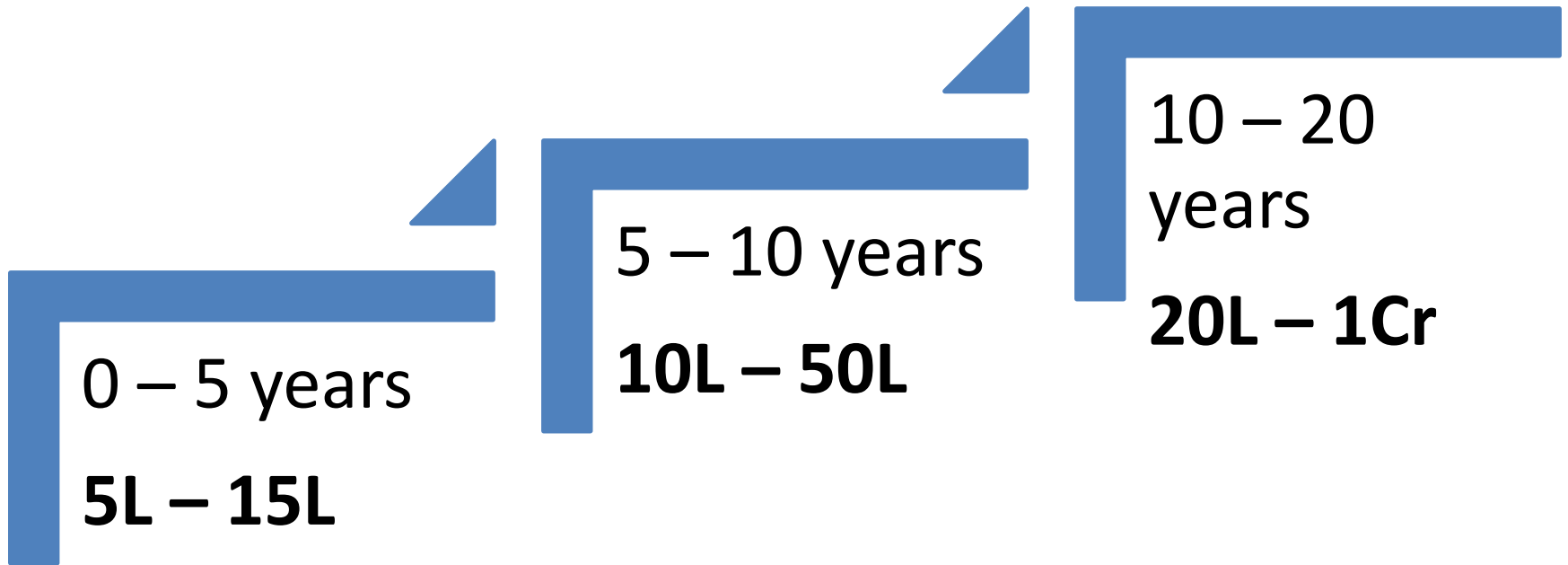
Institutes

- While it is not a requirement to have a college degree to become a data scientist, a **strong academic background** helps in this regard and if presented with the opportunity, it is worth taking.

- Most Data Scientists are **highly educated**, **91%** have at least a **Master's degree** and **48%** have **PhD**s. The most common fields of study to Data scientists are **Mathematics and Statistics** (25%), **Computer Science** (20%), **Engineering** (18%) and Natural Sciences such as **Physics** (20%).

Ref: https://medium.com/total-data-science/top-schools-that-offer-degree-in-data-science-india-outside-36dc3042cec8

Institutes

Institute	Degree
IIT Hyderabad	M.Tech in Data Science
IISc Bangalore	M.Tech. Computational and Data Sciences
IIT Guwahati	M.Tech. in Data Science
IIT Ropar	M.Tech. in Artificial Intelligence
IIT Jodhpur	M.Tech. and M.Tech.-Ph.D. Dual Degree Program in Data and Computational Sciences
IIIT Delhi	M.Tech.(CSE) with specialization in Data Engineering
Vellore Institute of Technology	-M.Tech. CSE with Spl. in Artificial Intelligence and Machine Learning -M.Tech. CSE with Spl. in Big Data Analytics
IIIT Bangalore	PG Diploma – Data Science (12 months)

Institutes

Institute	Degree
IIT Hyderabad	B.Tech. in AI
DIT University	-B.Tech. CSE in ML -B.Tech. CSE in AI and DS -B.Tech. CSE in Big Data Analytics
VIT	-B.Tech. CSE in DS -B.Tech. CSE in DA -B.Tech. CSE AI and Robotics -B.Tech. CSE in AI and ML

Online Courses

- Coursera
- Edx
- Greatlearning
- CellStrat
- Cloudxlab
- Udacity
- Datacamp
- Harvard University