

# Introduction to AI & MLOps

# Data Science

## Why, What, Where and How?

### Disclaimer:

- Only working definitions
- No clear agreeable-to-all definitions and subject classification
- No one right answer, and there are no 100% wrong answers
- Everything depends on the context



# Data Science

## Are DS, AI & ML same?

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# What is Data Science?

2022

People also ask	
What is the difference between data science machine learning and artificial intelligence?	▼
Is AI and ML part of data science?	▼
How is data science related to artificial intelligence?	▼
What is the relationship between artificial intelligence and machine learning?	▼
Which is best AI or ML?	▼
Should I study AI or data science?	▼
Which is the application of AI?	▼
Is machine learning part of AI?	▼
What should I learn first AI or ML?	▼
Is AI a good career?	▼
What should I learn first in data science?	▼
Can data science be self taught?	▼
Can I learn Data Science in 3 months?	▼

2023

People also ask :

What is data science artificial intelligence and machine learning?	▼
Is machine learning used in data science?	▼
What are the differences between data science machine learning and artificial intelligence?	▼
What is artificial intelligence data science?	▼
Is AI better than CSE?	▼
What is the salary of an AI specialist?	▼
Does AI require coding?	▼
Is artificial intelligence a good career?	▼
Is artificial intelligence course difficult?	▼
Is machine learning a good career?	▼
Can a data scientist become AI engineer?	▼
What is the average salary of an AI engineer?	▼
<a href="#">Feedback</a>	

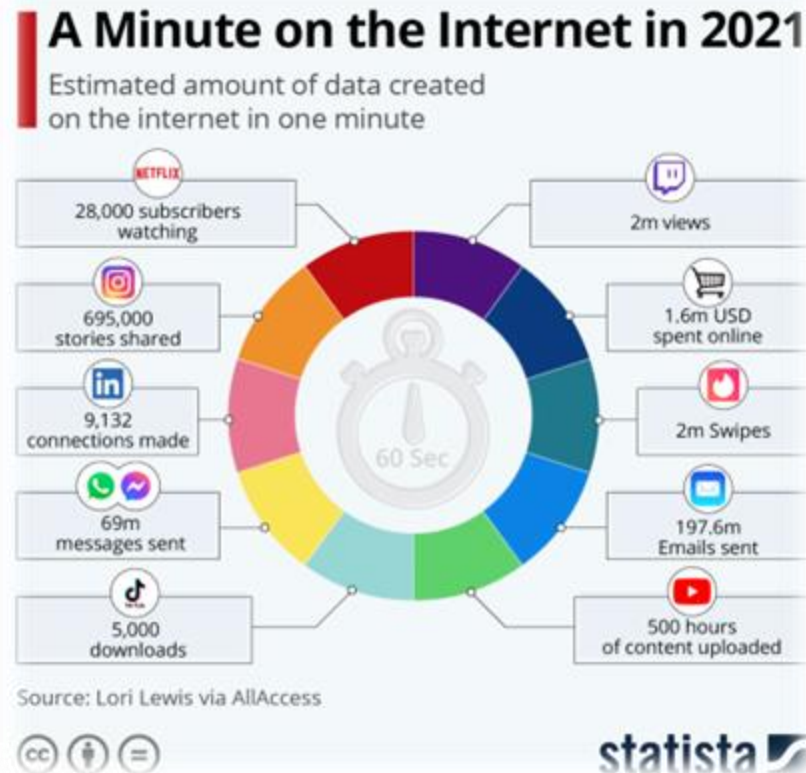
# Understanding ML, AI & DS

“Data, Data, Everywhere

# Data Everywhere

## Data

- something raw, meaningless,
- structured, unstructured
- numbers, text, symbols, pixels, voxels, audio, video, etc

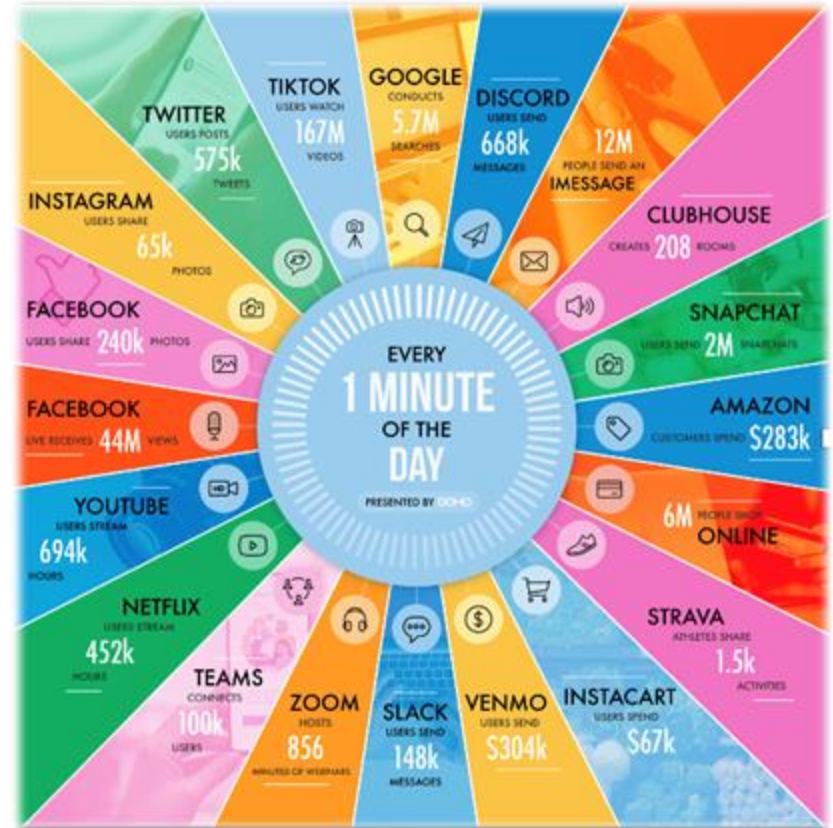




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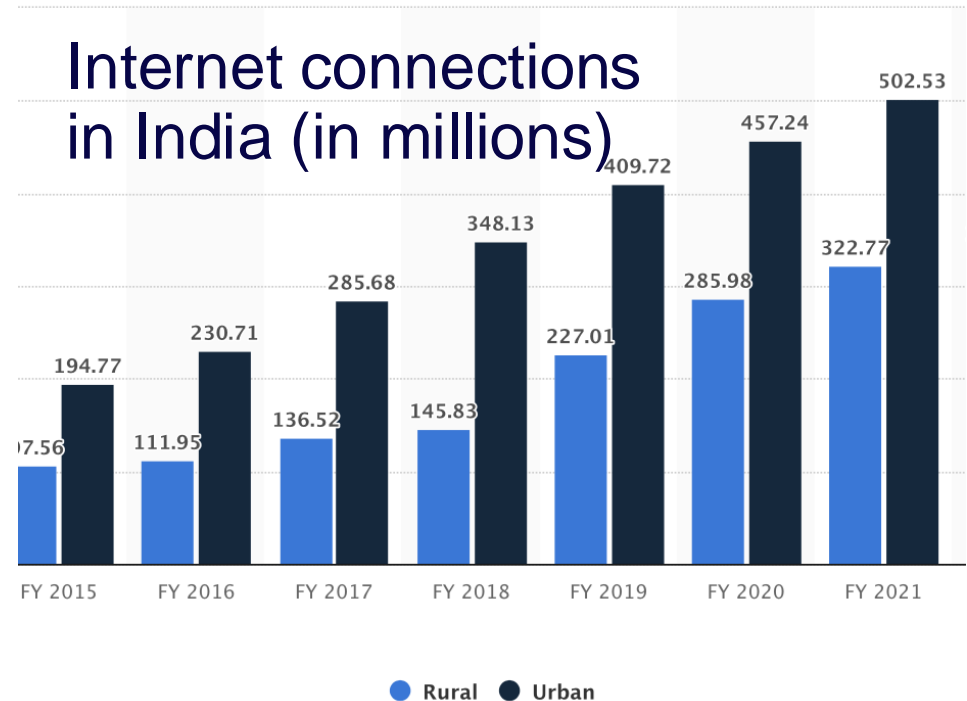


# Data Everywhere

finance public  
driving healthcare  
science politics  
sports policies media  
e-commerce  
autonomous  
social



Data to grow ...



## Data

- becomes information when converted into a useful form (pre-processing, cleaning, transformation, reduction, discretization, storage: csv, tsv, XML, RSS, JSON),
- Eg.: 1964, 2056, 5898, MFF, 36, 40, 23, 8575, 10500, 2520



Cust. Id	Gender	age	Monthly Income (\$)
1964	M	36	8575
2056	F	40	10500
5898	F	23	2520

## Analysis

- analysis refers to hands-on data exploration and evaluation
- looks backward, providing a historical view
- Explains how? why? in the past

## Analytics

- explores potential future events, predictions
- qualitative analytics = analysis + intuition
- quantitative analytics = models build from analysis + algorithms



Analysis **≠** Analytics

Data Analysis **≠** Data Analytics

Business Analysis **≠** Business Analytics

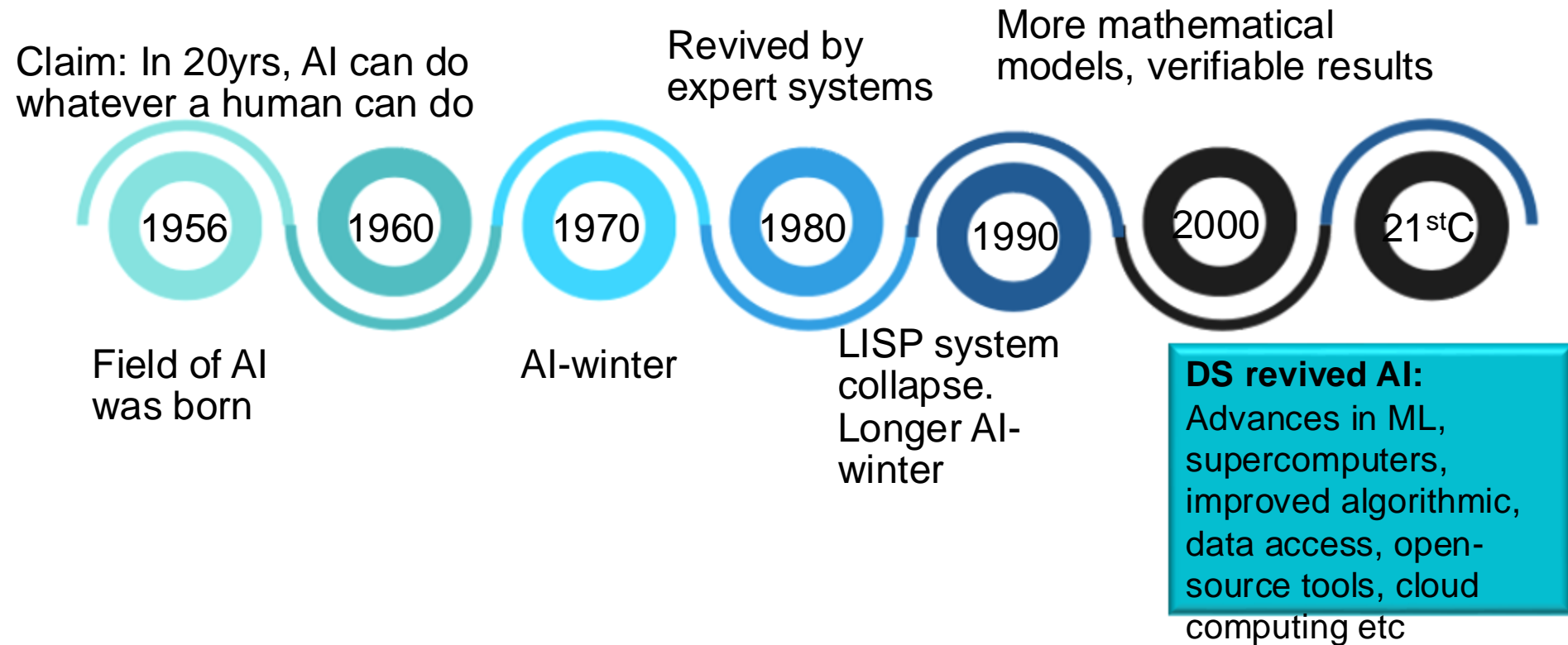
# Artificial Intelligence

- Simulating human knowledge and decision-making with computers, e.g, self-driving cars.
- AI but not ML?
  - E.g., line follower robot, symbolic reasoning: high-level human-readable representation of problems and logic (rarely used?)
- Today, ML is the only form of ~~general AI~~ that is being applied.

Simple AI:

```
if b > 39:  
    print("Pass")  
else:  
    print("fail")
```

# A Brief History of AI





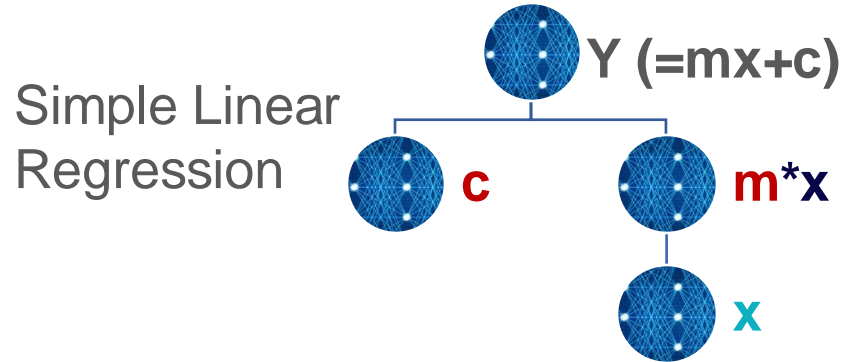
# A Brief History of AI

## From Logic to Learning

- The evolution of AI: From rule-based systems to learning algorithms.
- How AI has transformed industries and daily life.
- The rise of Machine Learning: AI that improves with data.

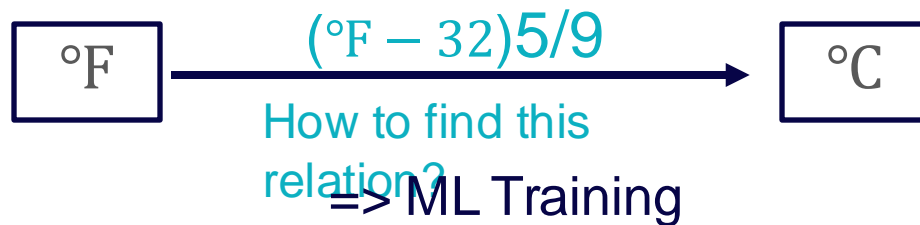
# Machine Learning

- The ability of machine to make predictions without being explicitly programmed
- Creating and implementing algorithms to receive data and process it to
  - make predictions
  - analyse patterns
  - provide recommendations

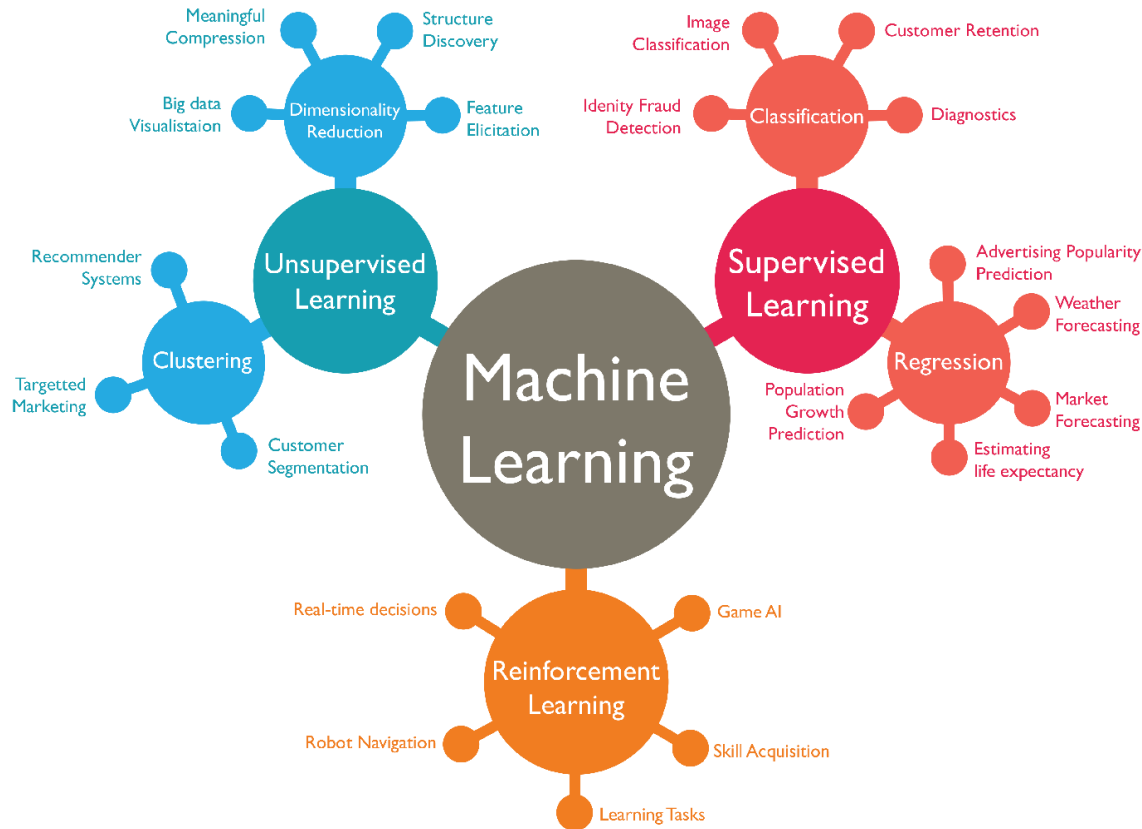


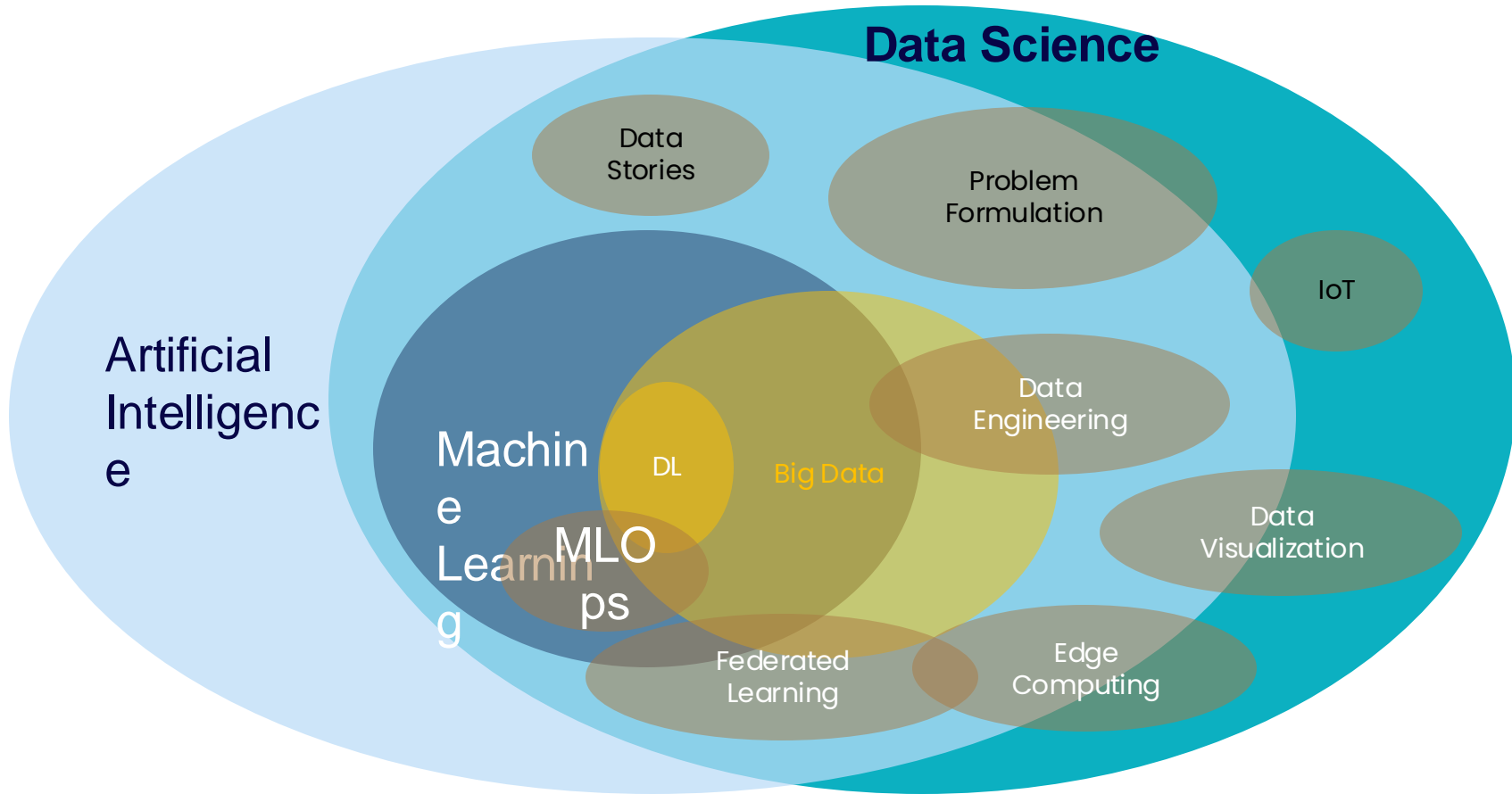
# Machine Learning

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# Machine Learning





# Career Paths

AI, ML and Data Science

# AI Systems

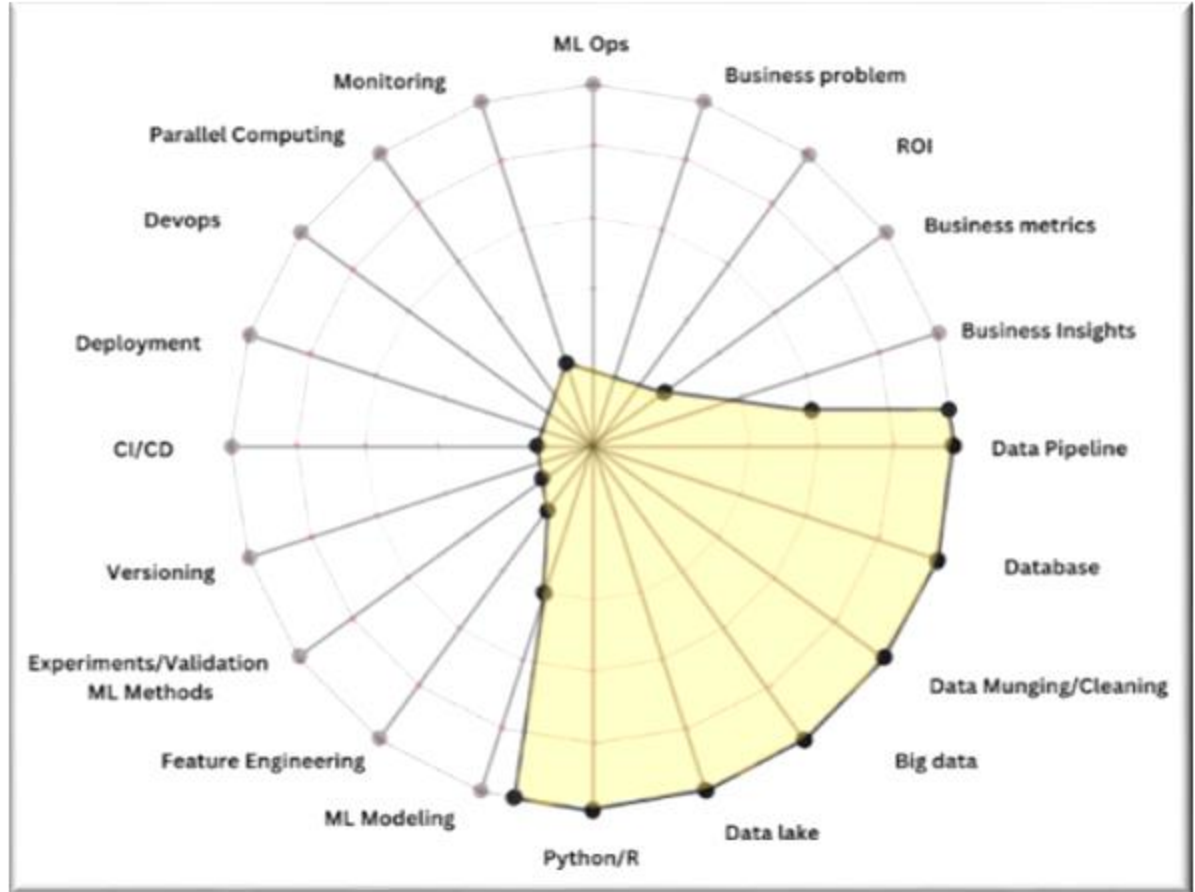
## Domain Experts





# AI Systems

## Data Engineers



# Career Paths

## Data Engineer



### Data Capture

transforms data into a useful format for analysis

Collection, cleaning



### Software solutions

advanced programming and system creation

creating software solutions around big data



### Big Data

creating software solutions around big data

create data pipelines

understand the right tool



### Skills

MySQL, MongoDB, Scala, Dask, Apache Spark, Hadoop

Hadoop, MapReduce, Hive, Pig, Data streaming, NoSQL, SQL,

# Career Paths

## Data Engineer

### Senior Data Engineer Salaries in Bangalore

Updated 4 Mar 2024

 Very High Confidence

Base Pay Range

**₹13L - ₹25L**/yr

Average Base Pay

779 salaries



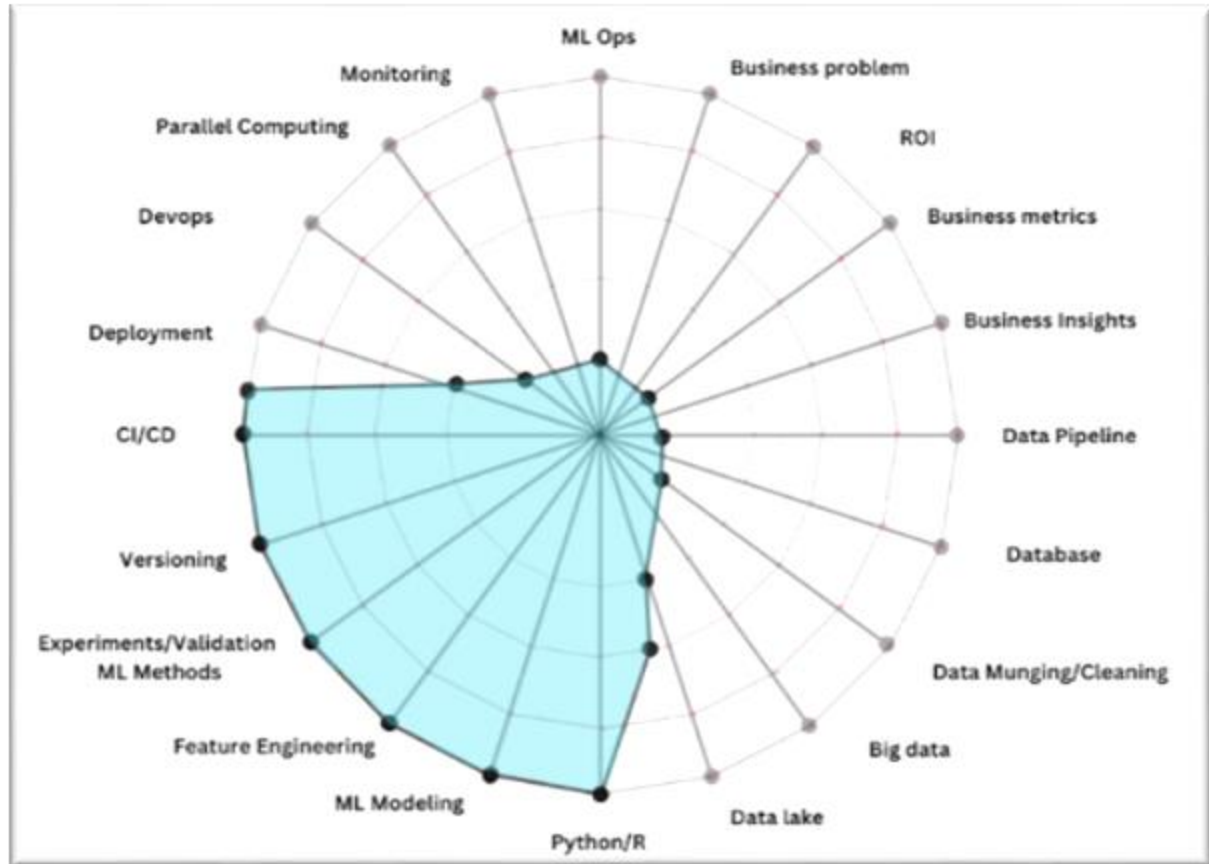
Additional Cash Compensation ⓘ

Average: **₹1,11,20,407** Range: ₹28,80,000 - ₹1,93,60,814

The average salary for Senior Data Engineer is ₹1,29,57,747 per year in the Bangalore. The average additional cash compensation for a Senior Data Engineer in the Bangalore is ₹1,11,20,407, with a range from ₹28,80,000 - ₹1,93,60,814. Salaries estimates are based on 779 salaries submitted anonymously to Glassdoor by Senior Data Engineer employees in Bangalore.

# AI Systems

## Data Scientists



# Career Paths

## Data Scientist



### ML Expert

Data analyst who applies ML/AI  
picked up programming out of necessity



### Domain Expert

Interact with business side  
understand the domain enough to make insights



### Data Story

Verbally and visually communicate complex results in a way that the business can understand and act on them



### Skills

Math, statistics and basic programming to analyse data  
R, create ML models  
Jupyter, TensorFlow, PyTorch, RStudio. etc

# Career Paths

## Data Scientist

### Senior Data Scientist Salaries in Bangalore

Updated 4 Mar 2024



Very High Confidence

Base Pay Range

**₹18L - ₹31L**/yr

**Average Base Pay**

1,010 salaries

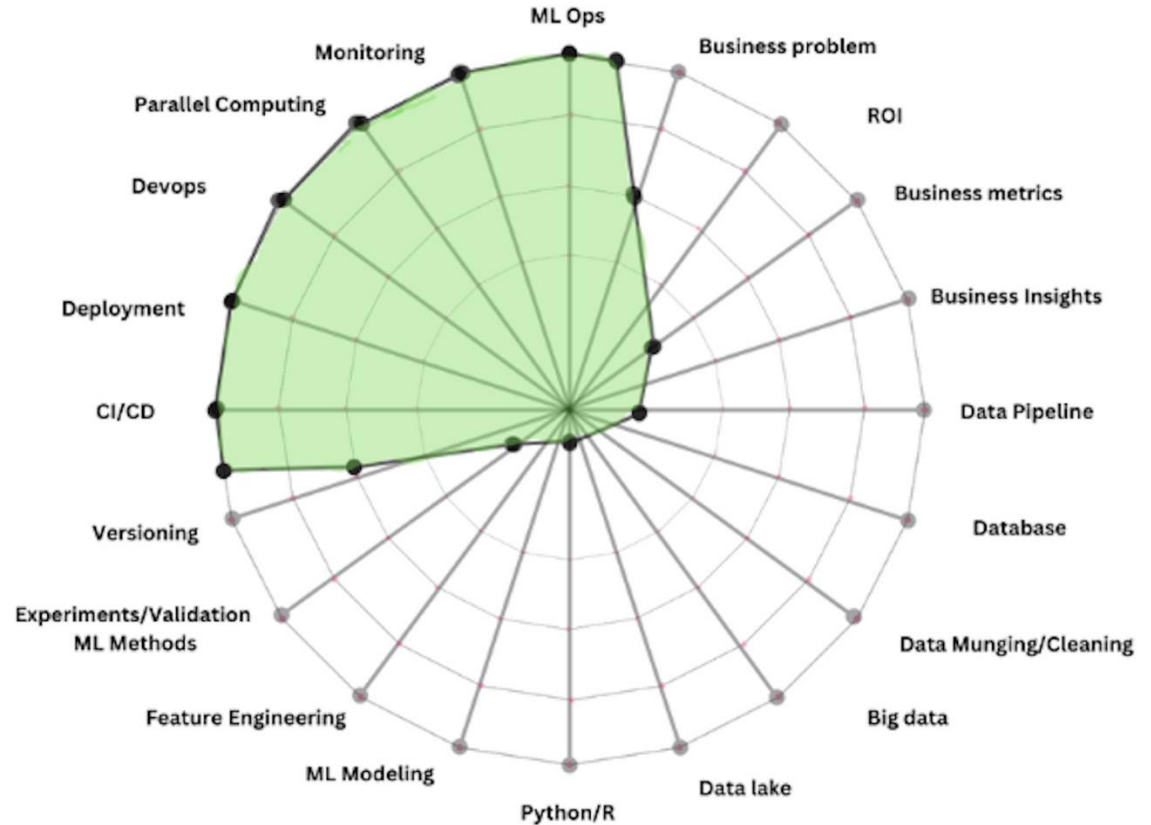


No additional cash compensation has been reported for this role

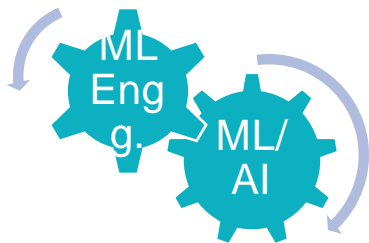
**How much does a Senior data scientist make in Bangalore, India?** The average salary for a Senior data scientist is ₹25,00,000 in Bangalore, India. Salaries estimates are based on 1,010 salaries submitted anonymously to Glassdoor by Senior data scientist employees in Bangalore, India.

# AI Systems

## ML Engineers







# Career Paths

## ML Engineer

- **Cloud Native ML Platform** : AWS SageMaker, Azure ML Studio, GCP AI Platform
- **Containerized Workflow**: Docker, Kubernetes, public and private containers
- **Serverless technology**: AWS Lambda, AWS Athena, Google Cloud Foundation, Azure Functions
- **Special hardware for ML**: GPUs, TPUs, A14, AWS Inferentia Elastic inference
- **Big data platforms**: Databricks, Hadoop/Spark, snowflake, Amazon

## ML Engineer Salaries in Bangalore

Updated 1 Mar 2024

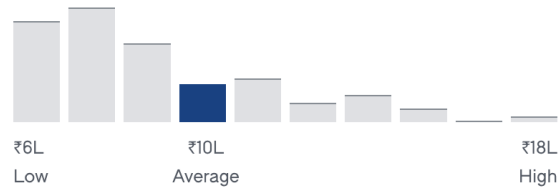
 Very High Confidence

Base Pay Range

**₹6L - ₹18L**<sub>/yr</sub>

**Average Base Pay**

132 salaries



No additional cash compensation has been reported for this role

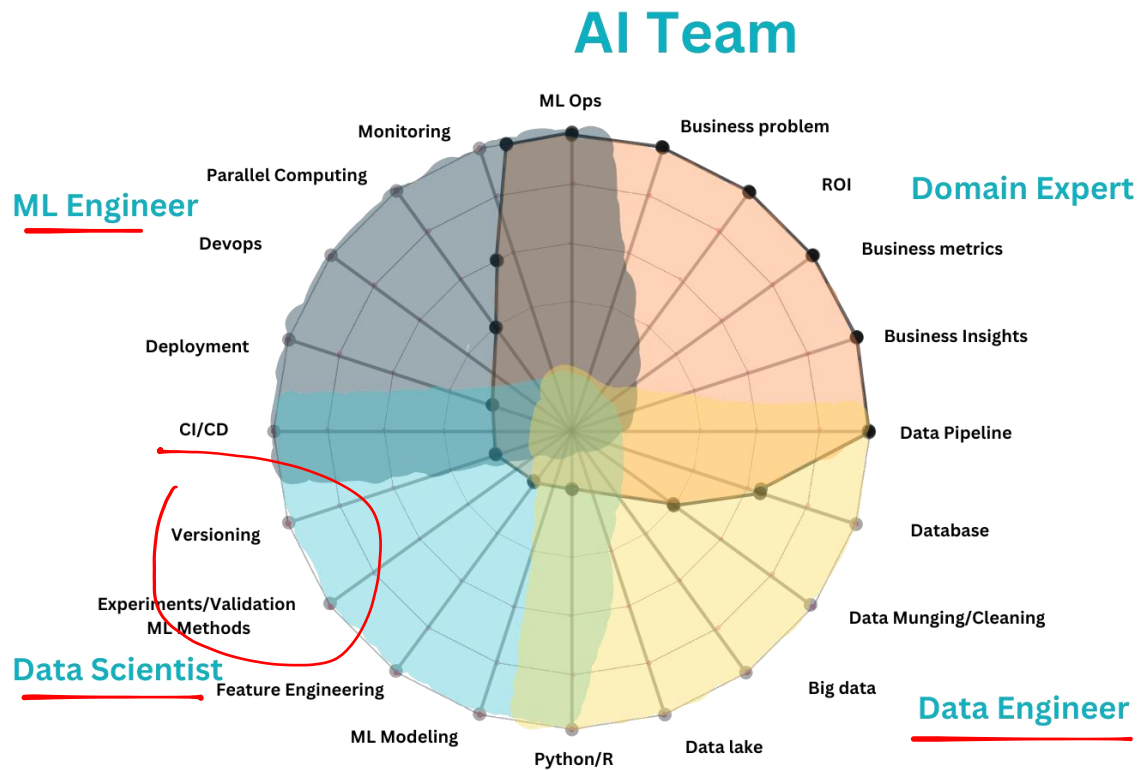
**How much does a ML engineer make in Bangalore, India?**

**How much does a ML engineer make in Bangalore, India?** The average salary for a ML engineer is ₹10,00,000 in Bangalore, India. Salaries estimates are based on 132 salaries submitted anonymously to Glassdoor by ML engineer employees in Bangalore, India.

# Career Paths

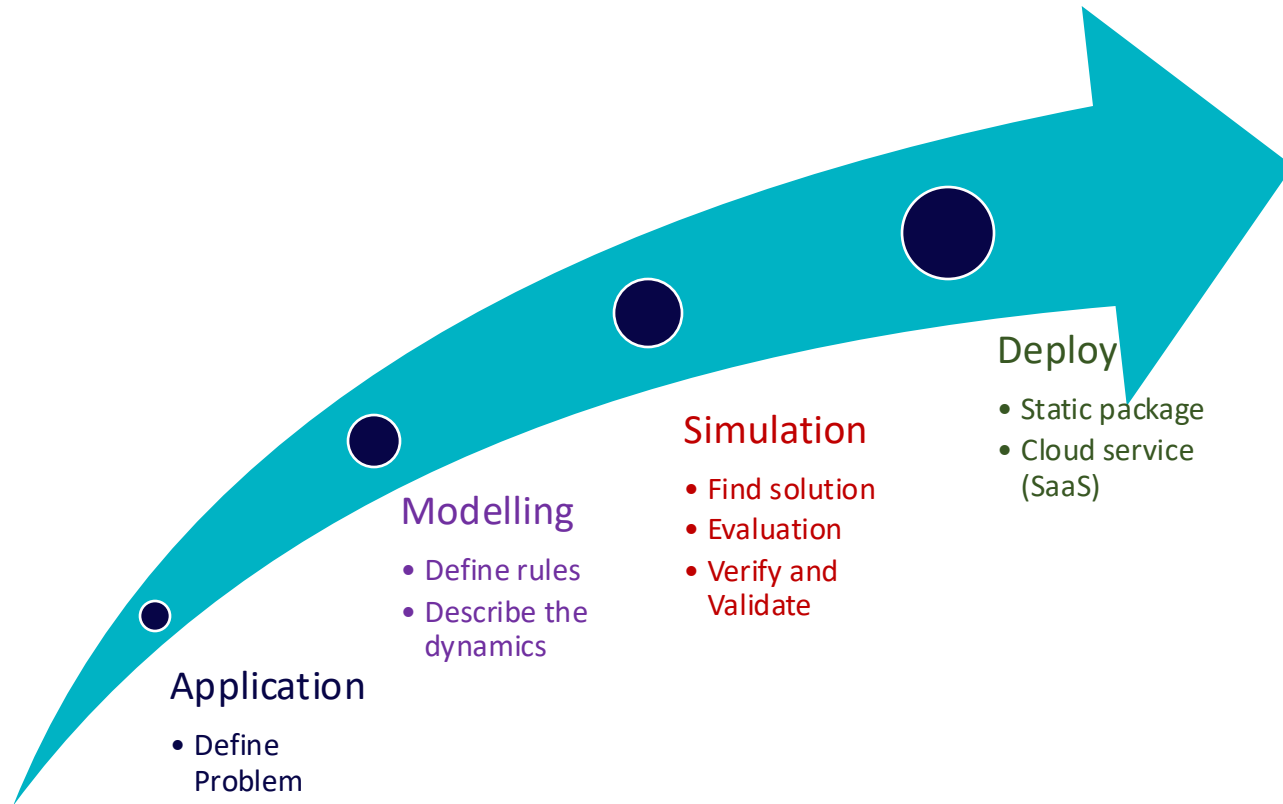
ML Engineer

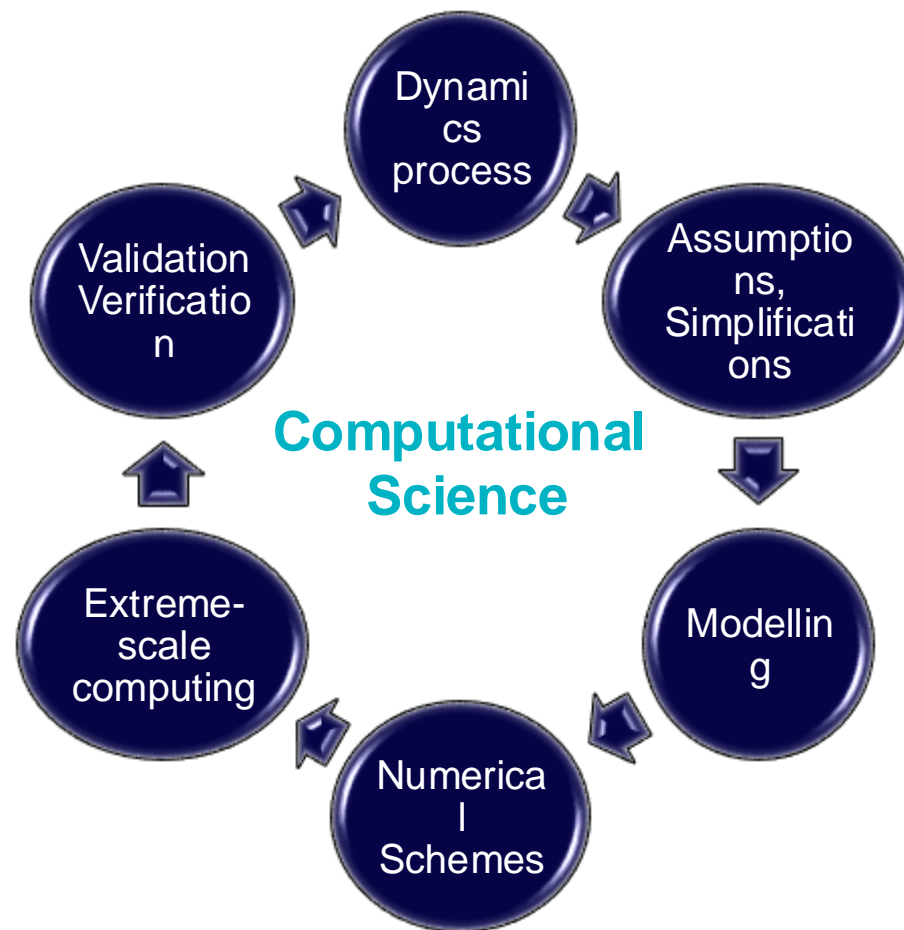
# Not only AI/ML/GenAI

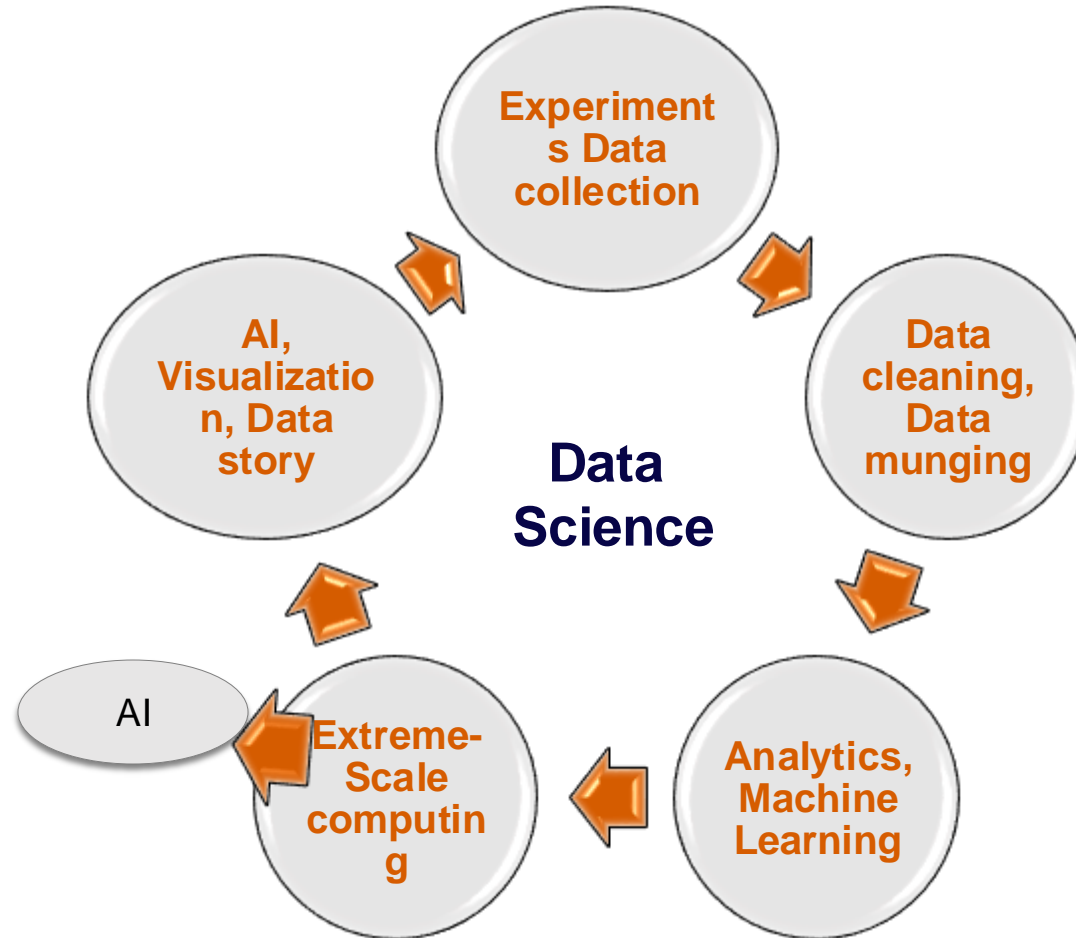


# Computational Science Vs. Data Science

I am not a Software Engineer;  
Can I become an ML Engineer?





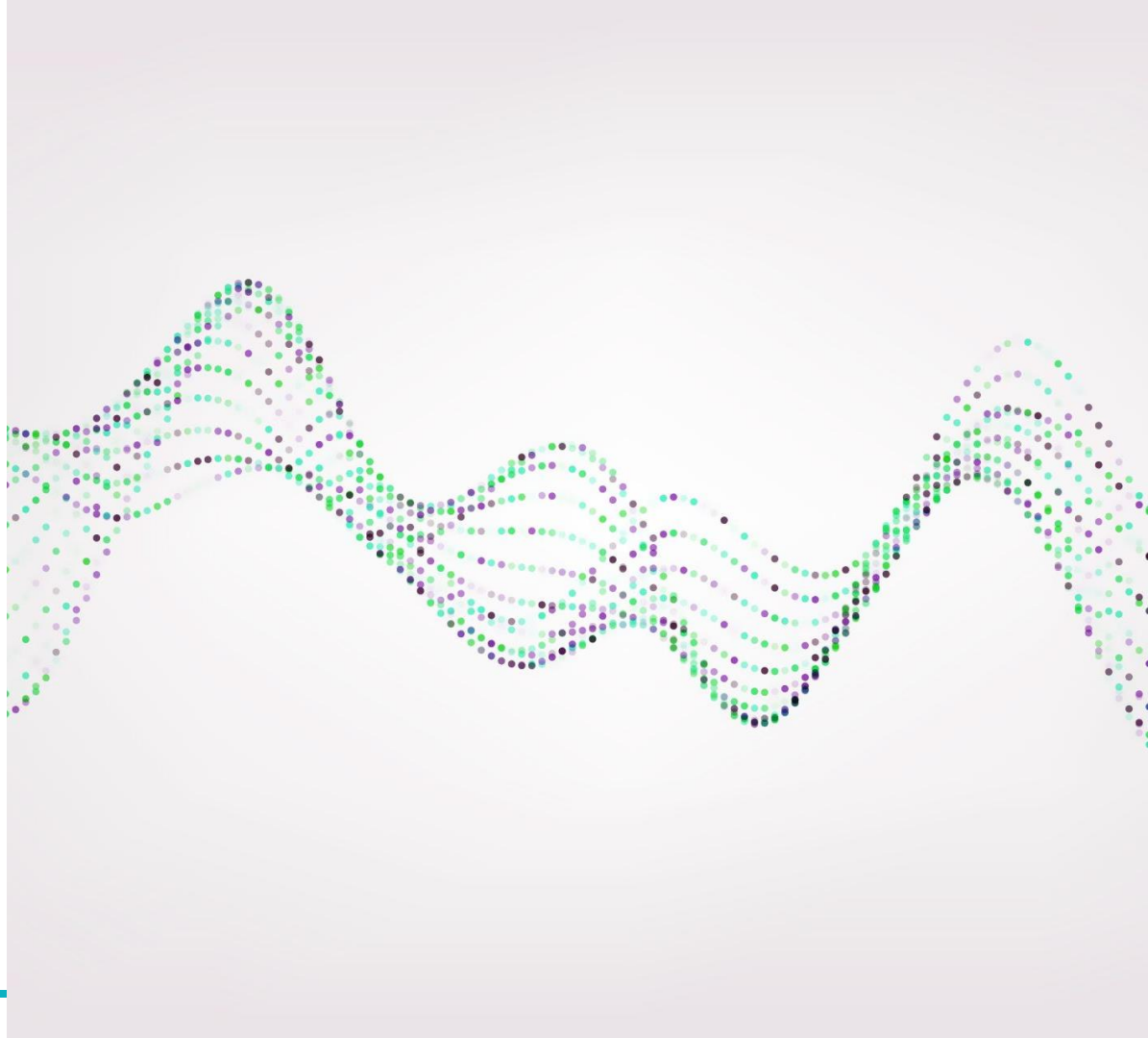






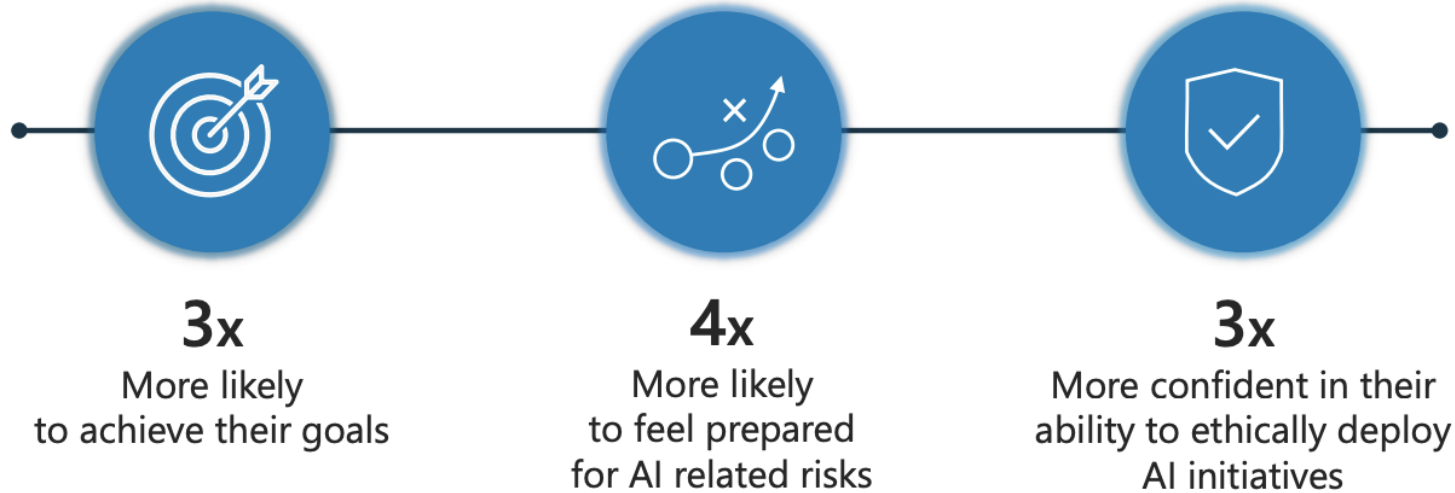
What areas of expertise should I  
focus on as an ML Engineer?

# MLOps



# MLOps

In one survey, Deloitte found that organizations that strongly followed an MLOps methodology were...





# MLOps

- McKinsey found that companies without a formalized MLOps process often took 9 months to implement a model.
- In comparison, companies applying MLOps could deploy models in 2 to 12



Don't ask data scientists or IT to drive your AI strategy.



Senior business leaders should drive it based on the core business strategy in partnership with data scientists.



Don't over-index on efficiency goals. Balance efficiency targets with growth- and innovation-oriented goals.



- MLOps is a core function of Machine Learning engineering, focused on streamlining the process of taking machine learning models to production, and then maintaining and monitoring them.
- MLOps is a collaborative function, often comprising data scientists, devops engineers, and IT.



- MLOps, are best practices for businesses to run AI successfully with help from an expanding smorgasbord of software products and cloud services.



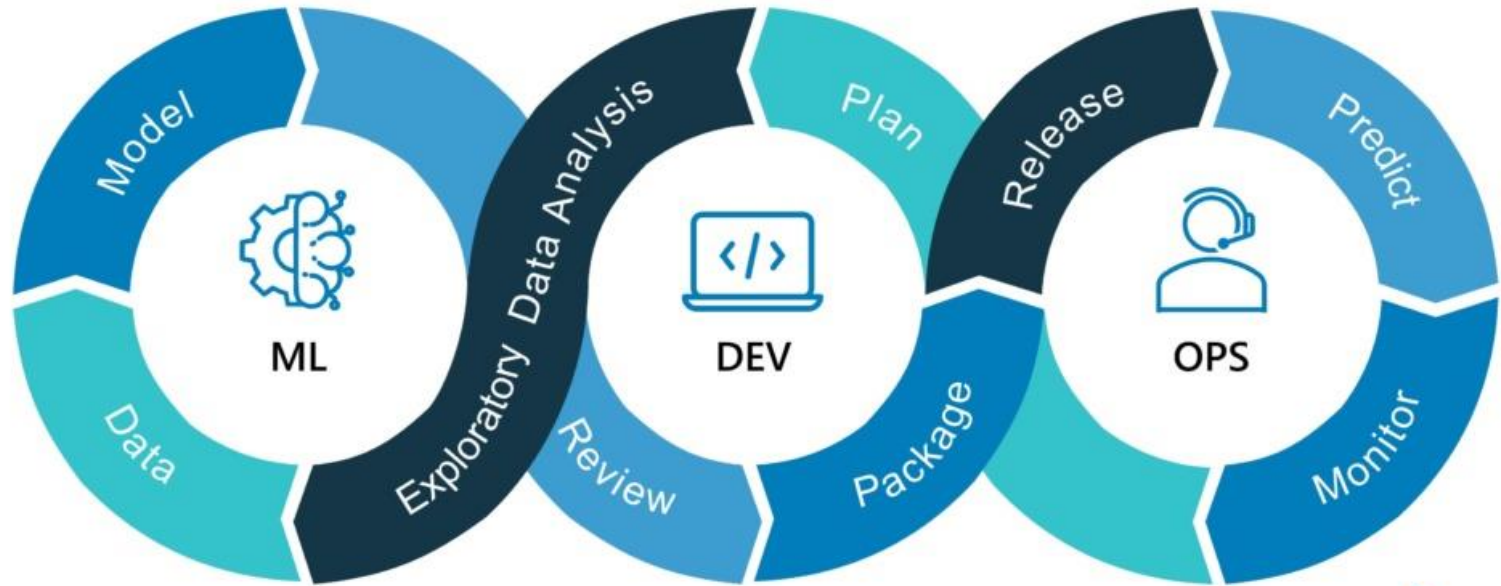
- Machine Learning Operations (MLOps) is a set of policies, practices, and governance that are put in place for managing machine learning and artificial intelligence solutions throughout their lifecycle.
- MLOps is an ML engineering culture and practice that aims at unifying ML system development (Dev) and ML system operation (Ops).
- Practicing MLOps means that you advocate for automation and monitoring at all steps of ML system construction, including integration, testing, releasing, deployment and infrastructure management.



- MLOps is based on DevOps principles and practices that increase the efficiency of workflows. Examples include continuous integration, delivery, and deployment. MLOps applies these principles to the machine learning process, with the goal of:
  - Faster experimentation and development of models.
  - Faster deployment of models into production.
  - Quality assurance and end-to-end lineage tracking.
- MLOps is a set of practices and tools that automate, manage, and scale the entire lifecycle of machine learning models, combining principles from DevOps and data engineering to streamline development, deployment, and maintenance.







# Welcome to AI & MLOps !