The AI Career Pivot: Strategies to Move from Legacy Skills to Emerging Roles

Yogesh Haribhau Kulkarni

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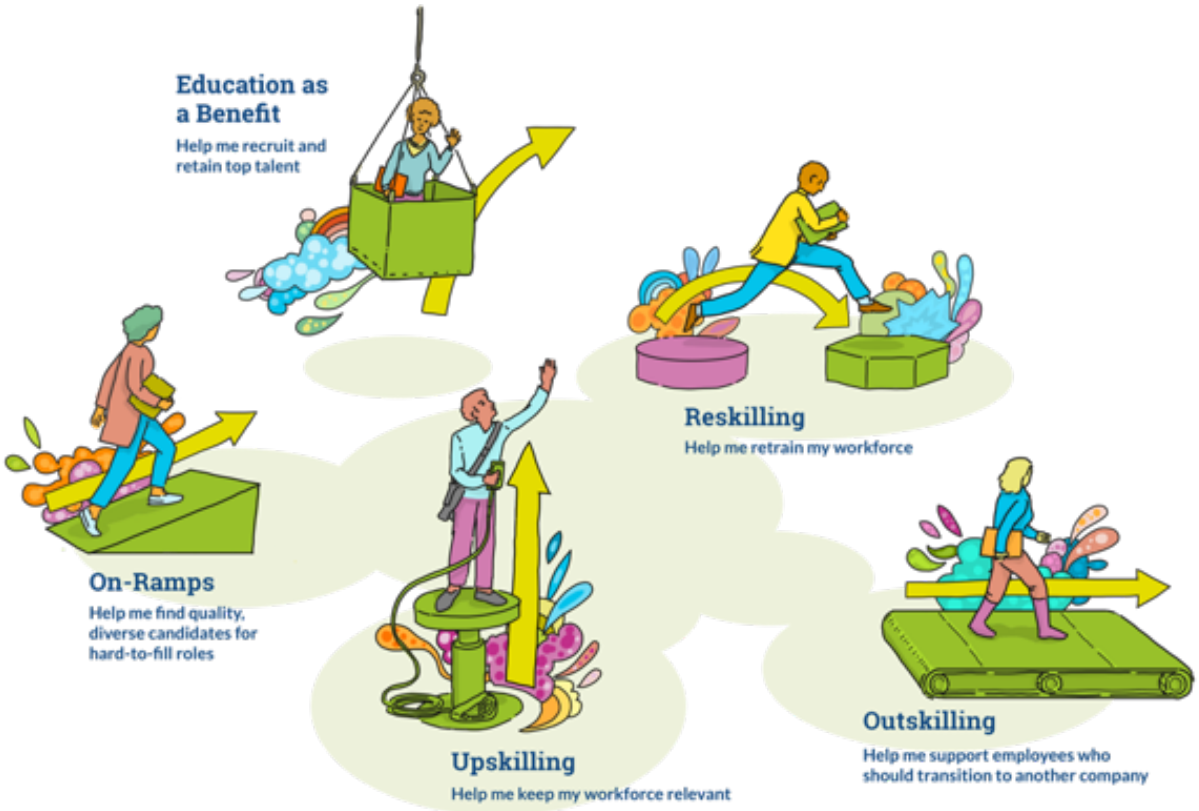
Outline

Career in AI: Background

Current State

- 44% of US workforce $<$ \$18K/yr ($<$ poverty line), works 80-100 hrs/week
- Automation CAGR 7% (as per BCG), to reach \$114B by 2025

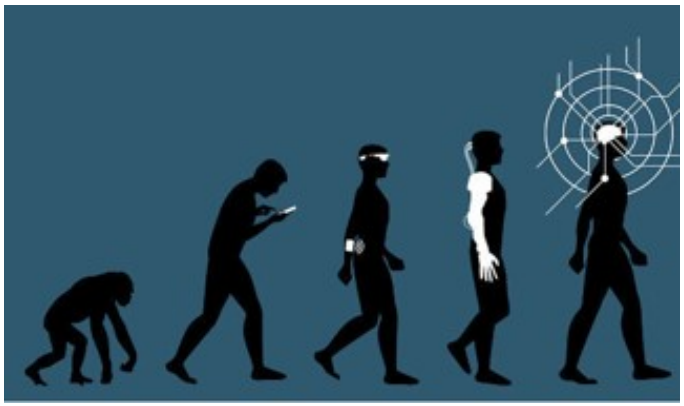


(Ref: As Pressure To Upskill Grows, 5 Models Emerge – Forbs.com)

Examples

Less mechanical, automatable

- Bill and account collectors
- Data entry operators
- Computer network support
- Administrative assistants
- Insurance sales agents



(Source: The Simplistic Debate Over Artificial Intelligence – Preston Estep)

More Cognitive, Creative, Human

- Software developers
- Human resources managers
- Psychologists
- Sportsman
- Nurses, care

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Changes

Technological

- AI deluge
- Digitization → Data + APIs
- Remote *

Social

- Over interaction + isolation
- Obsolete roles, emergence of new
- Lifelong re-skilling

(Source: Rise of the Chatbots: How AI Changed Customer Service – Salesforce.com)

Financial

- Widening gap
- Flatter world
- Gigs over jobs

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Data Science — Artificial Intelligence is critical in bringing intelligent automation

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What are Data Sciences?
What is Artificial Intelligence?
What is Machine Learning?
What is Deep Learning?

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What is Data Science?

- Science of Data (obviously)
- Use of Data for Applications
- Some parts of AI uses Data to find patterns and insights which are helpful in multiple applications
- Machine and Deep Learning that part of AI that leverages data.

So, more on AI-ML soon ...

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Introduction to Artificial Intelligence

“Houston, we have a problem!!”

50 Years Ago: “Houston, We’ve Had a Problem” – John Uri

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Whats the Problem?

- Along with some softer words like “disruption”, “passionate”, “excited” . . .
- If you don’t have word “innovation” in your talk/speech/conversation it’s BIG problem.
- Irrespective of fields. You can be Corporate, Political, Social, etc.

And there is an addition of one more word, which is a must in every talk...and that is?

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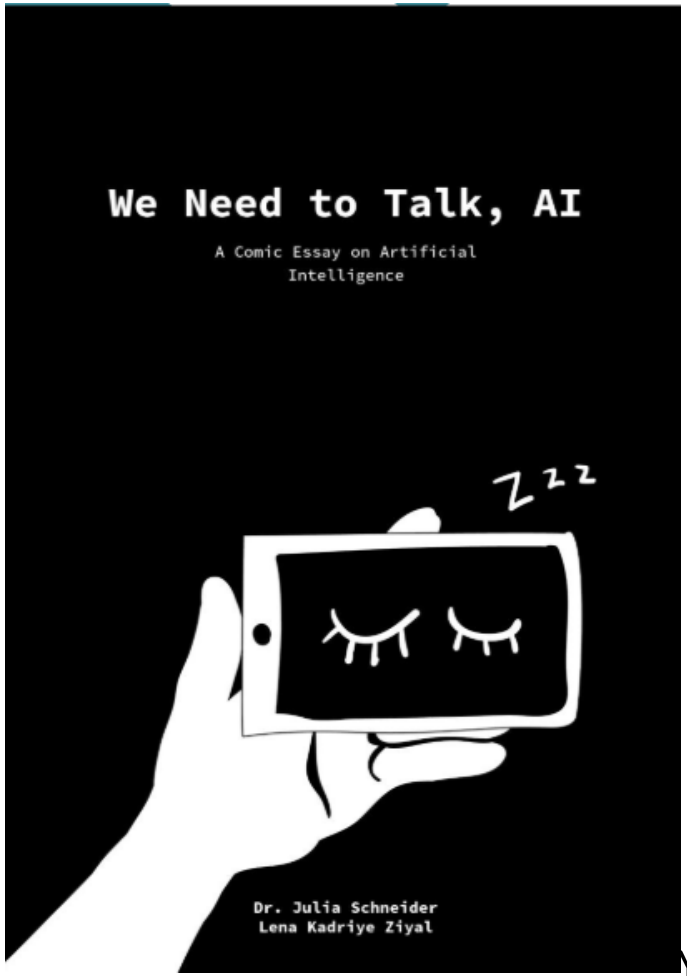
The Problem

Every company is claiming to be working in AI-ML

- Is it really so?
- What exactly is AI (ML)?
- What is not AI?



Or is it just a plain BIG hype?

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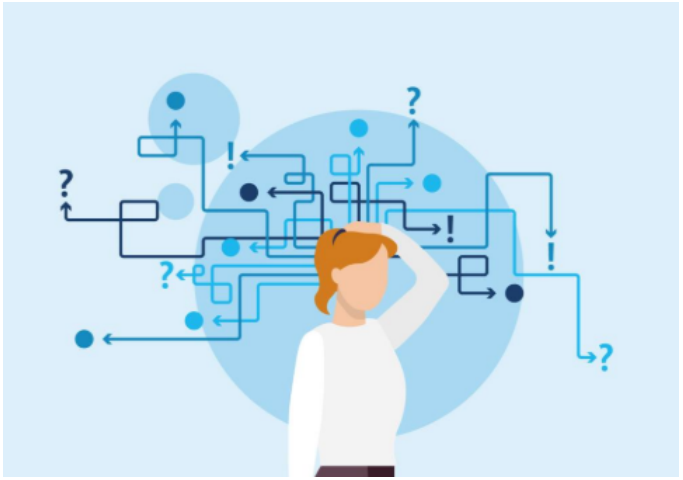
What is the Core Idea?

What's the core idea?'

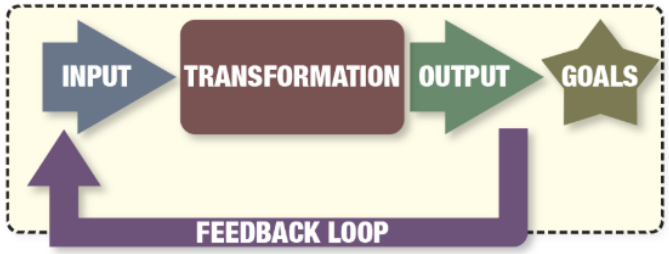
- behind problem solving?
- behind writing software algorithms?
- solving research problems?



Desire

- To find a “function”
- To find a relation
- To find a transformation
- To build a model
- From given inputs to desired outputs.

That’s it.



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Functions

- Some functions are straight forward
- *"In summer, ice-cream sale goes up"*
- Cause and effect
- Relation (function, Mathematical model) is found out
- Here, simple rule based programming suffices

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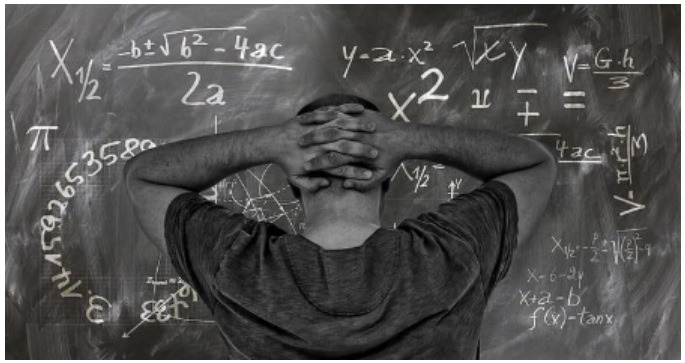
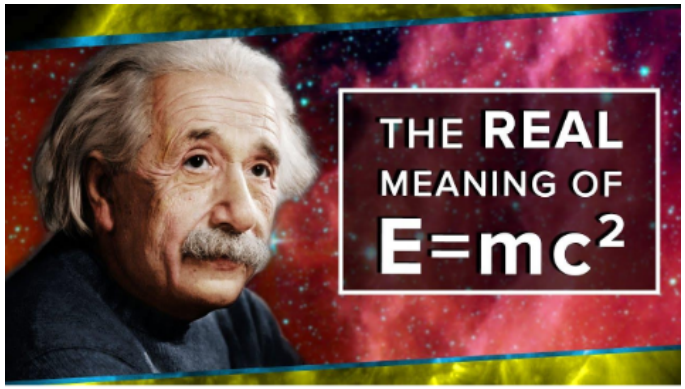
Functions

- But some functions are complex
- *"More you put efforts, your business flourishes."*
- Cause and effect again, but the relation is far to complex
- Too many variables
- Here, simple rule based programming not humanly possible.
- Lots of research needed to come up with equations.



Functions

- $E = mc^2$
- What's this? a function?
- Input variable(s)?
- Output variable(s)?
- Parameters?
- How's the relation? linear?



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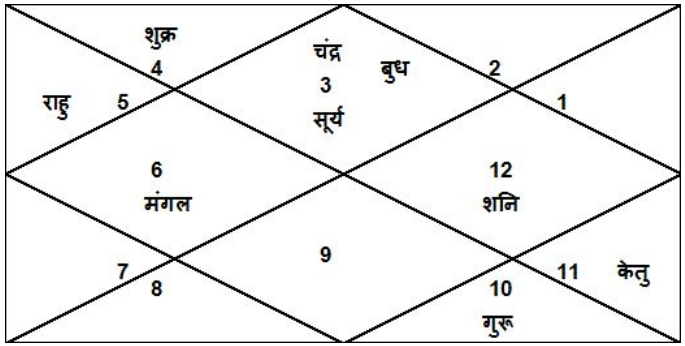
Controversial Example

- Even astrology is a model, based on the past cases.
- Could claim empirical evidence.
- Given this planetary position, it predicts.
- Represented by “Horoscope”
- Got weights for each planets (real or ficticous)
- Reliable??



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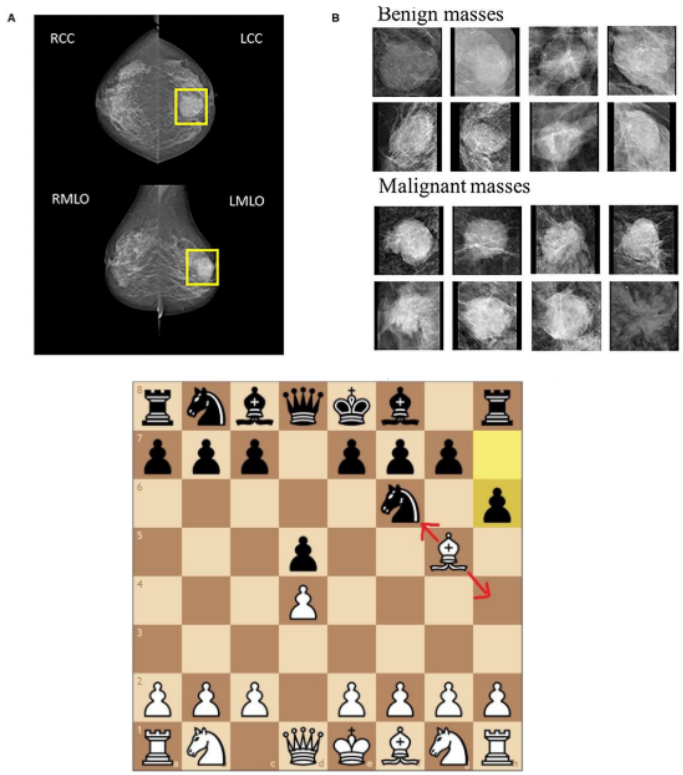
Functions

- But most real-life functions are not deterministic
- Some are probabilistic, some non-linear.
- *"Detecting if the tumor is benign or malignant"*
- *"At any state in the game of chess, whats the next move?"*



Chess: next move?

- Needs extreme expertise
- Needs “intelligence”
- How do you get that?
  - Built by lots of training.
  - By studying lots of past games.
- This is how Humans build intelligence

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Intelligence

- Can machine (software/program) also do the same?
- Can it play chess?
- Can it build intelligence?
- By looking at past experiences (data),
- Training Data: games played, moves used, etc.

Yes, it can!! That's Artificial Intelligence.

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What is Artificial Intelligence?

My definition

"If machines (or computer programs) start doing some/all of these "intelligent" tasks, then that's Artificial Intelligence"

Intelligence: the differentiation

- Ability to think various domains
- Ability produce something new
- Ability to detect the unseen
- Ability to enhance knowledge (rules, patterns)

All these, AI has started doing. The AI era has arrived!!

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Everyday usage

Artificial intelligence seems to have become ubiquitous.

- Replying to our emails on Gmail
- Learning how to drive our cars,
- Sorting our holiday photos.
- etc.

Too good to be true, isn't it, sort of Magical !!

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But then ...

- When its too good, you start suspecting
- Is it for real!!
- How can such thing happen?
- How far will it go?

The next thing you know, people are worrying about exactly how and when AI is going to doom humanity.

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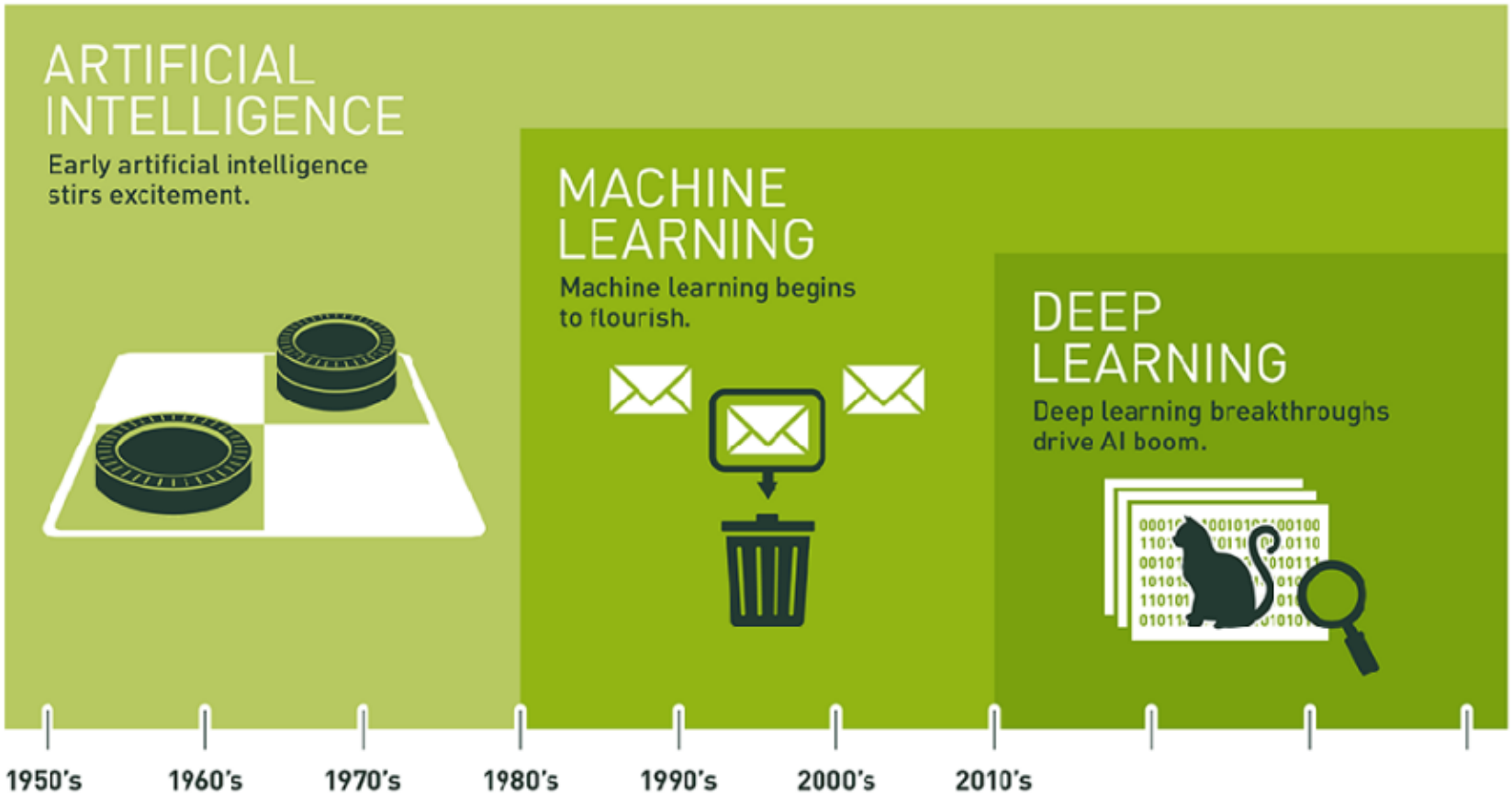
AI, ML, DL . . . Same?

Or Relationship between them ?



(Ref: https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/)

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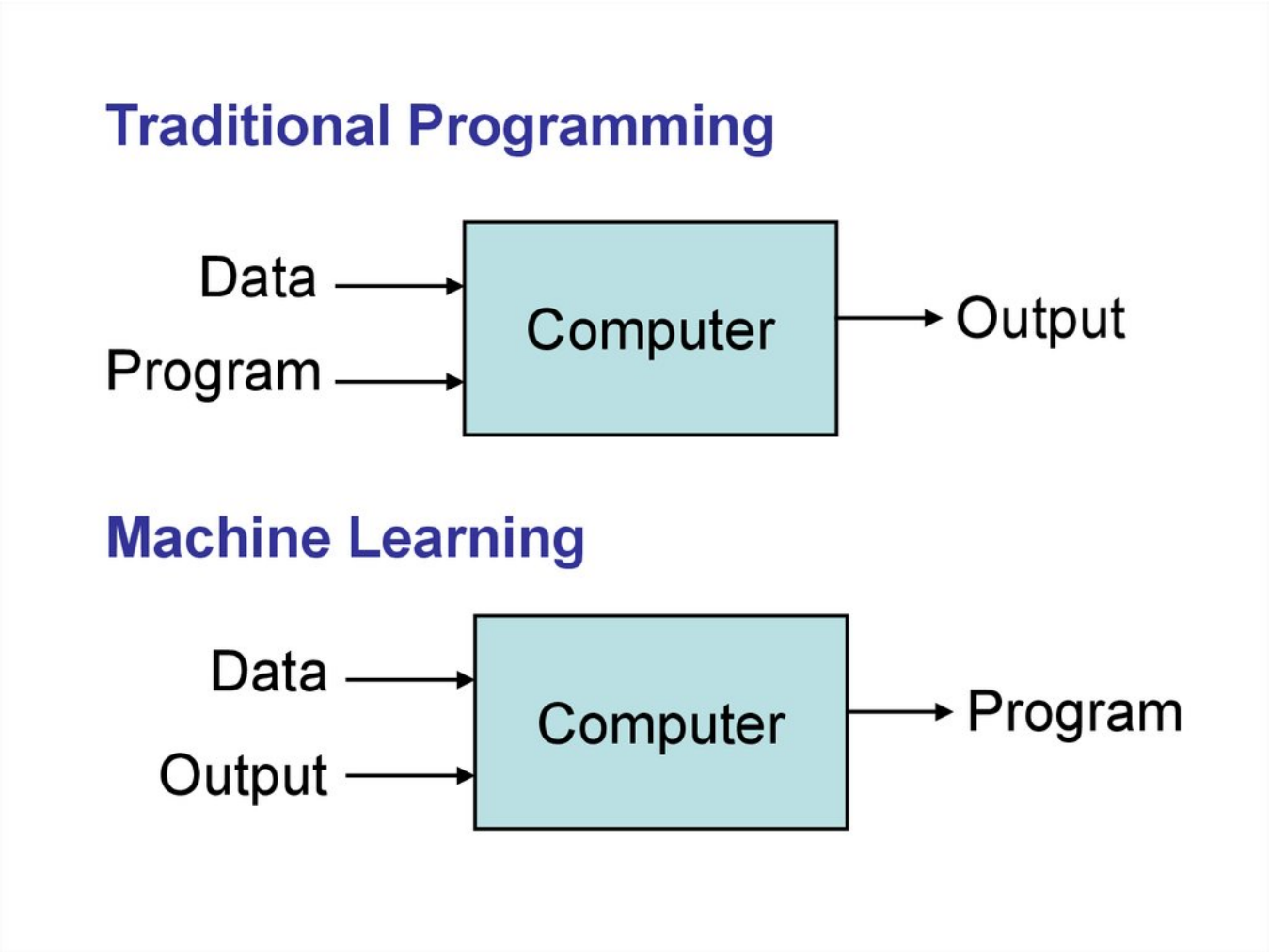
Traditional vs. Machine Learning?



Why Machine/Deep Learning?

- Problems with High Dimensionality
- Hard/Expensive to program manually
- Techniques to model 'ANY' function given 'ENOUGH' data.
- Job $$$

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Why now?

- Flood of data (Internet, IoT)
- Increasing computational power
- Easy/free availability of algorithms
- Increasing support from industries

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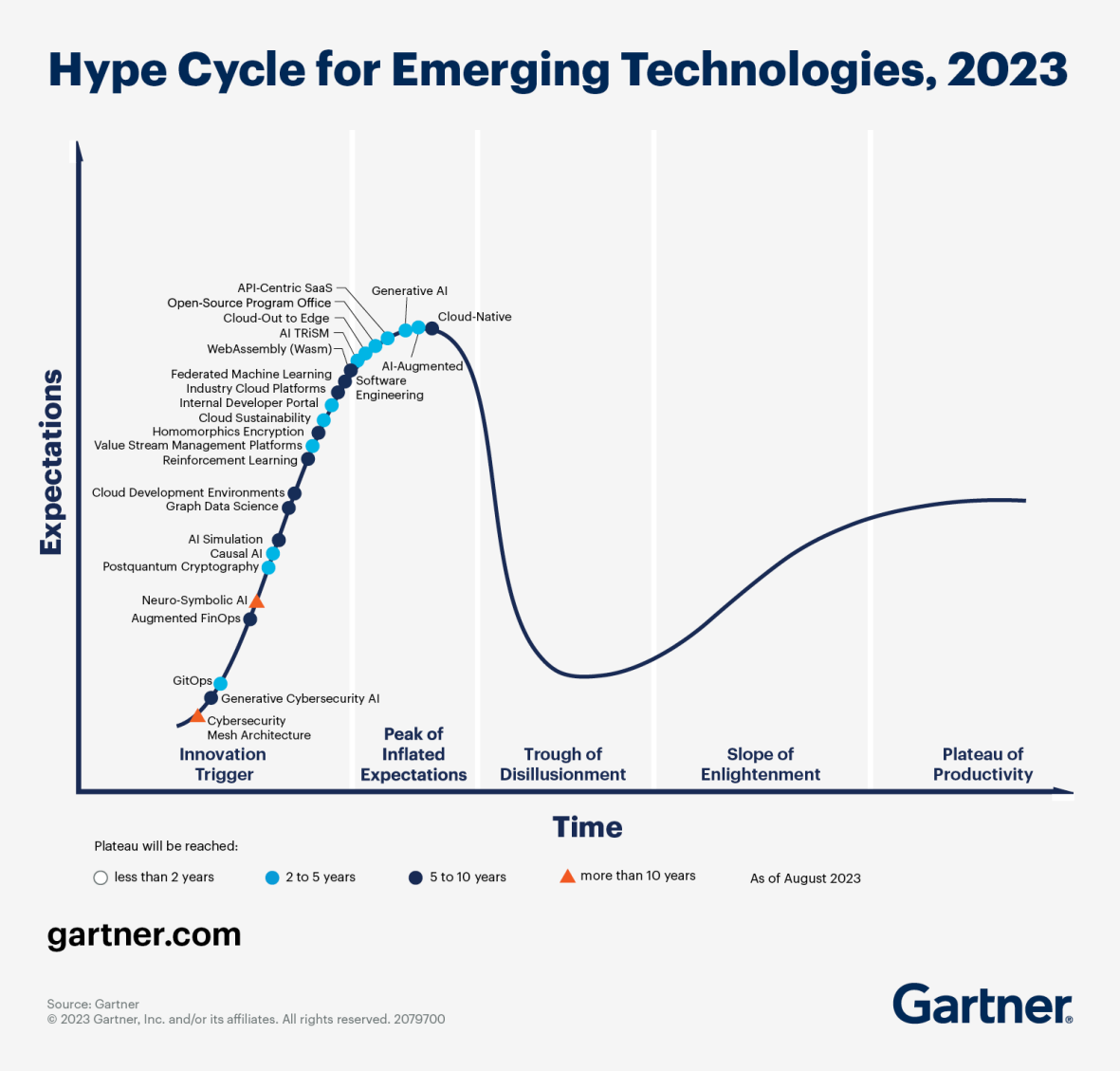
Gartner Hype Cycle Emerging Technologies 2023



Is AI a threat?

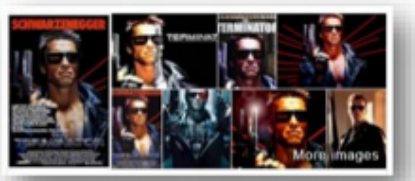
Is AI a threat?

If you believe in what Elon Musk says, then YES.

(Ref: What is Artificial Intelligence — Artificial Intelligence Tutorial For Beginners — Edureka)

Is AI a threat?

If you believe in these movies, then YES.



The Terminator

I, Robot

The Matrix

Tron: Legacy

War Games

Ex Machina

Well, AI based War robots are not impossible anymore.

(Ref: What is Artificial Intelligence — Artificial Intelligence Tutorial For Beginners — Edureka)

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Fear: Are we being replaced?

- Yes. in tasks that are repetitive
- But not which require complex thinking and creativity

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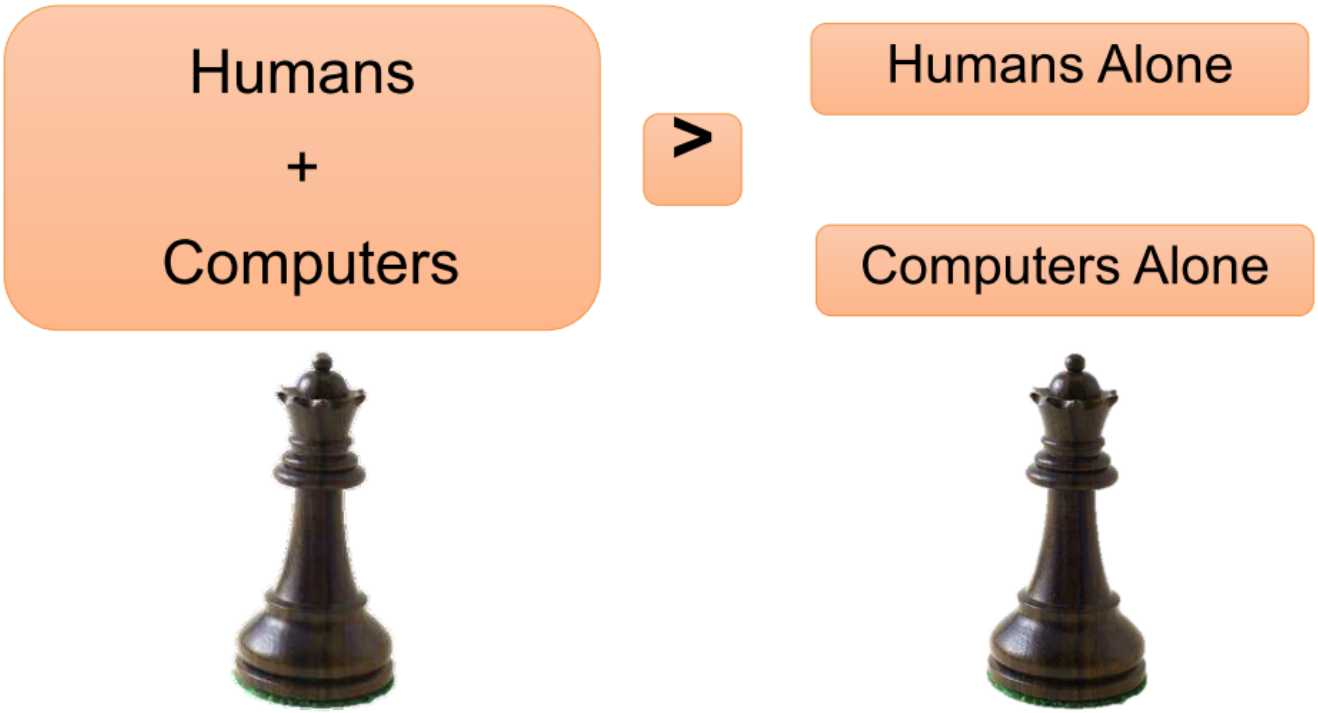
Mostly

Technology Enhancing (Not Replacing) Humans



(Ref: "Artificial Intelligence Overview" - Harry Surden)

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Limits on Artificial Intelligence

- Many things still beyond the realm of AI
- No thinking computers
- No Abstract Reasoning
- Often AI systems Have Accuracy Limits
- Many things difficult to capture in data
- Sometimes Hard to interpret Systems

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Career in AI: Roles

Data Science Roles

- Data Scientist
- Data Analyst
- Data Architect
- Data Engineer
- Statistician
- Database Administrator
- Business Analyst
- Data and Analytics Manager

(Ref: The different data science roles in the industry - Martijn Theuwissen, DataCamp)

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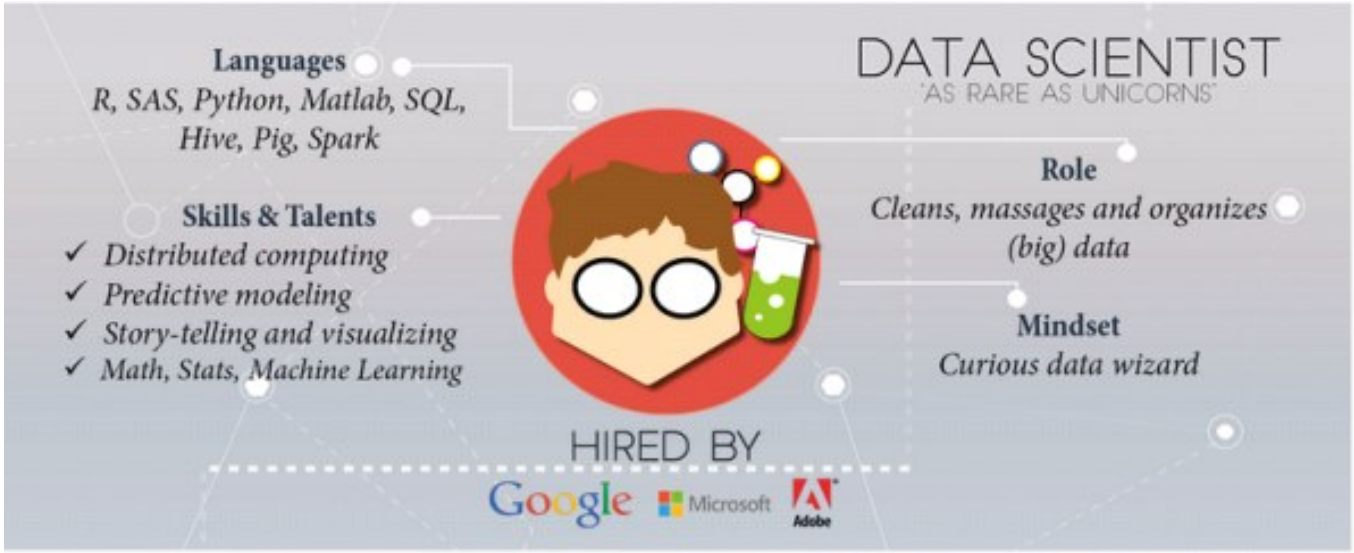
Data Scientist Role

Able to handle the raw data, analyzing that data with the help of statistical techniques, to sharing his/her insights with his peers in a compelling way



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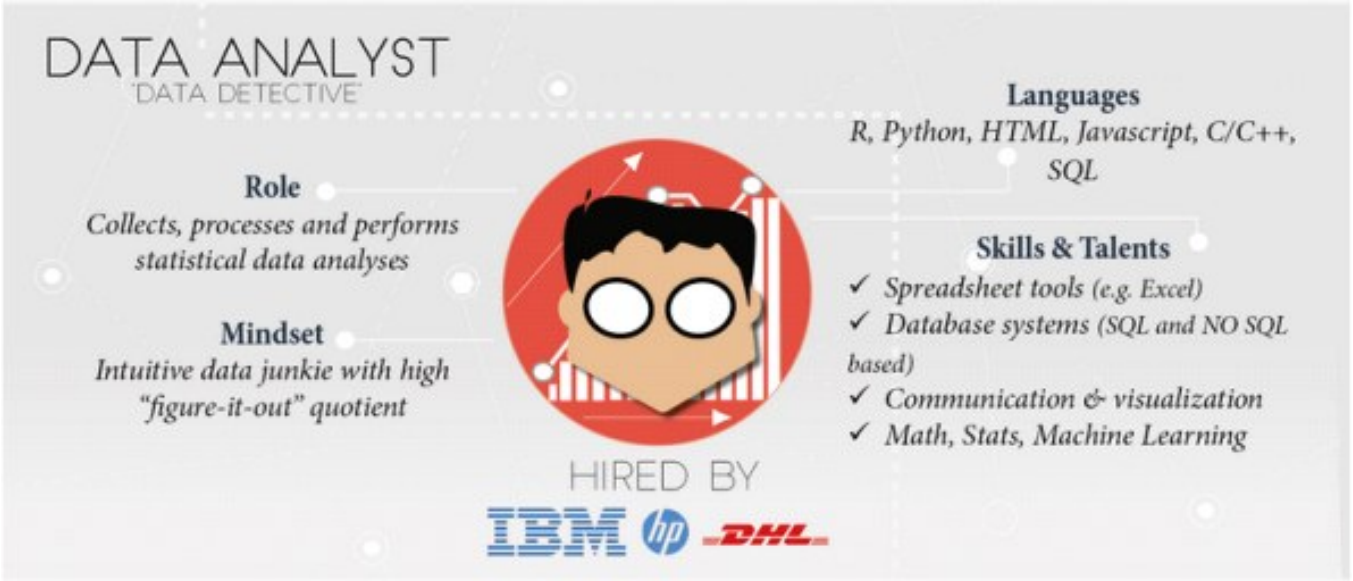
Data Analyst Role

The data analyst is the Sherlock Holmes of the data science team.



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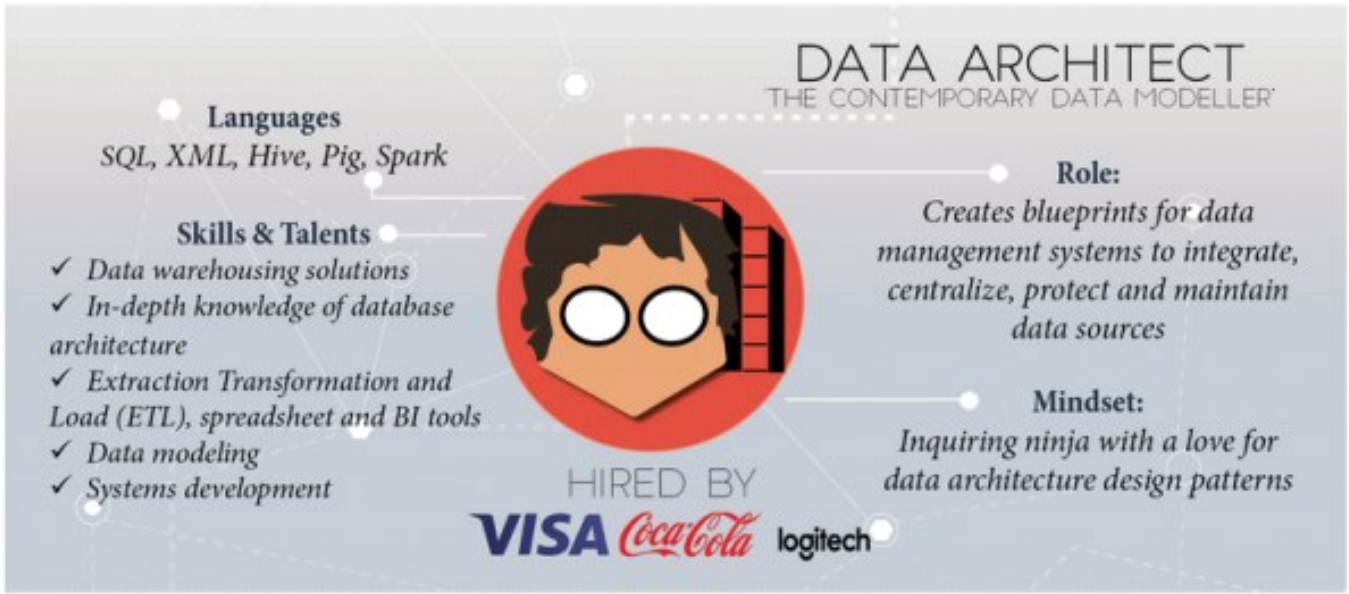
Data Architect Role

Creates the blueprints for data management systems to integrate, centralize, protect and maintain the data sources.



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Data Engineer Role

Has a background in software engineering and loves to play around with databases and large –scale processing systems.

(Ref: The different data science roles in the industry - Martijn Theuwissen, DataCamp)

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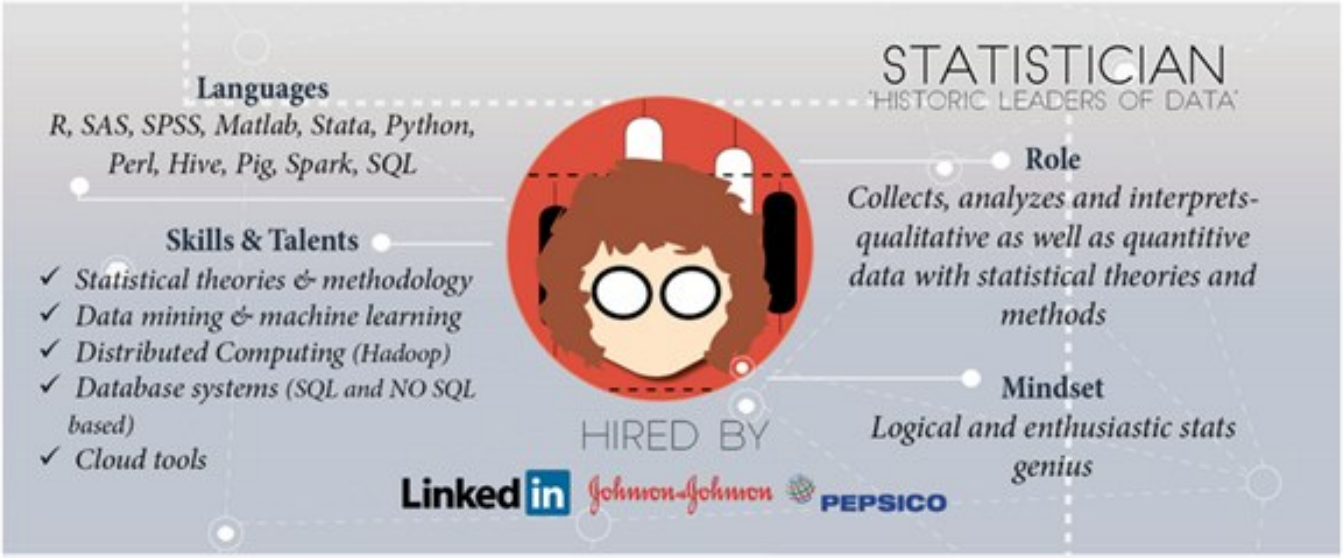
Statistician Role

Harvests the data and turns it into information and knowledge.



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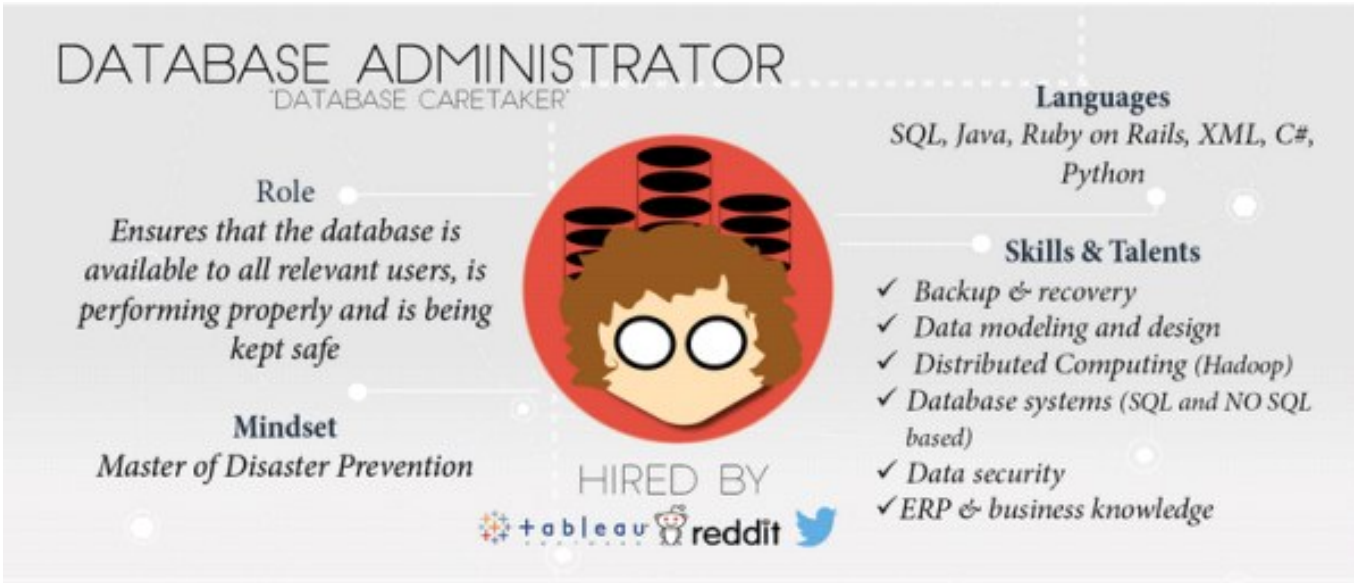
Database Administrator Role



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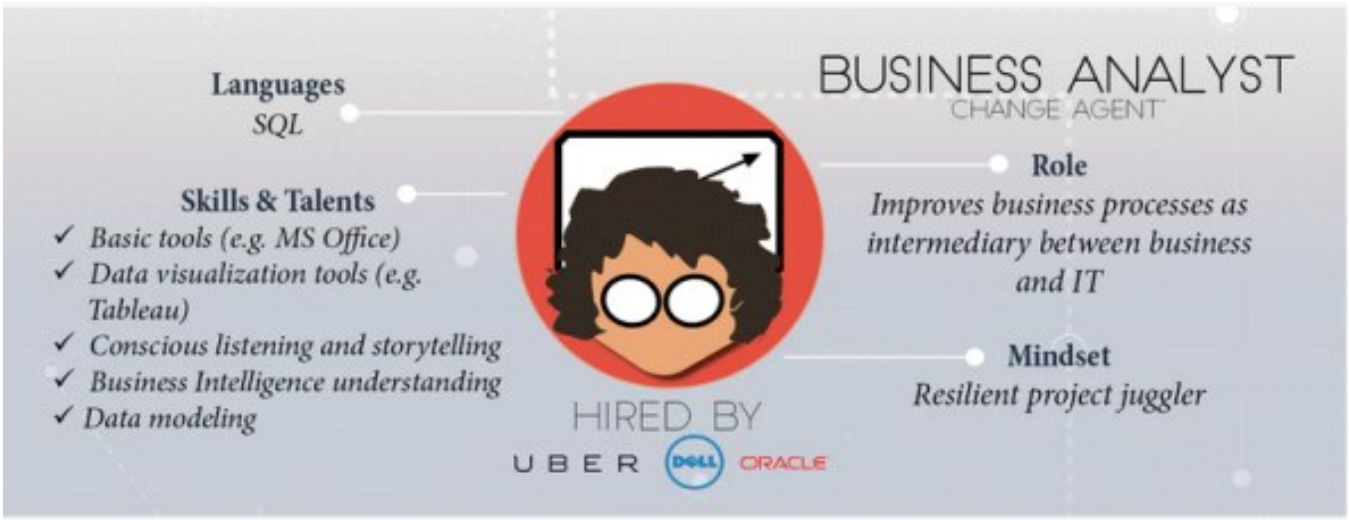
Business Analyst Role



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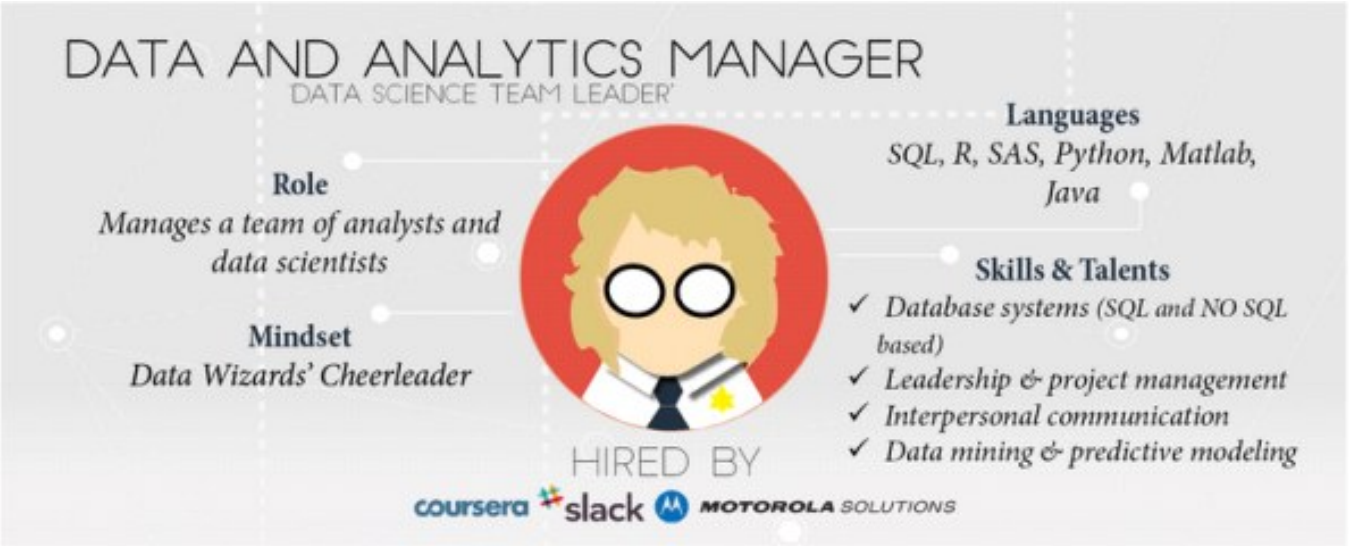
Data and Analytics Manager Role



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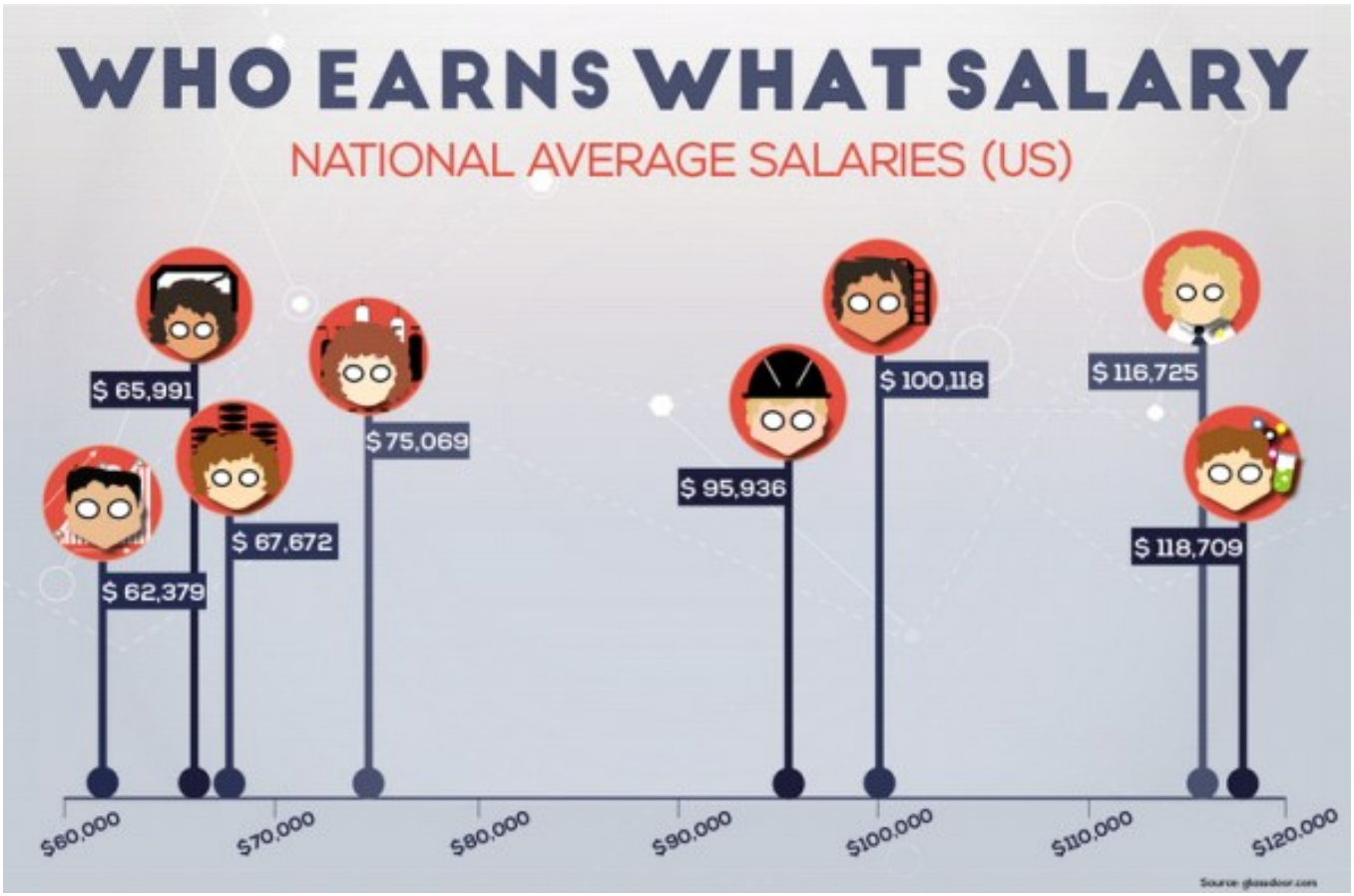
Salary (US - 2015, minimal inflation)



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What are Skills Needed?

- Problem Solving
- Statistics Mathematics
- Programming
- Data bases/storages
- Business

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Finding Your Persona . . .
Choosing Your Persona for Transition to Data Science

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The USER Persona

- Leverage domain expertise.
- Utilize low/no code platforms like Weka or Knime.
- Build machine learning workflows easily.
- Ideal for managers, marketing professionals.
- Make data-driven decisions without extensive coding.

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The DEVELOPER Persona

- Technical enthusiast with a programming flair.
- Expertise in scikit-learn, TensorFlow, PyTorch.
- Develop robust data science applications.
- Dive deep into machine learning techniques.
- Transform ideas into impact-ful solutions.

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The RESEARCHER Persona

- Passionate about mathematics and innovation.
- Invent new techniques, contribute to research.
- Caters to deep R&D professionals, PhD holders.
- Shape the data science landscape with created libraries.
- Be at the forefront of groundbreaking discoveries.

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Choosing a Persona

- Select a persona based on skills and interests.
- Allow projects and interests to guide your journey.
- Explore new areas of expertise.
- Expand your skill set accordingly.
- The right persona empowers excellence and lasting impact.

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Learning Path, Roadmap

Resources

- First : try Free Online resources, see how much you grasp
- No expensive (read, fees in lakhs) certification courses, to start with
- Test waters, gain some understanding of yourself then decide.

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Start Playing the Role

- Wish to be a Data Scientist? Start playing that role today.
- Take specific actions to embody the desired role.
- Tone of the suggestion: Begin playing the coveted role immediately.

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Build Foundation

- Take courses in necessary mathematics, programming, ML, and DL.
- Engage in assignments to solidify foundational knowledge.
- Lay the groundwork for a strong understanding of key concepts.

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Kaggle Competitions

- Participate in Kaggle competitions across various domains.
- Explore NLP, Image Processing, Time-Series, and more.
- Gain practical experience and exposure to diverse challenges.

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Specialize and Apply

- Choose a specific area, e.g., NLP, and go deep into it.
- Apply your expertise to problems from different domains (legal, medical, etc.).
- Develop a comprehensive and specialized skill set.

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Build a GitHub Portfolio

- Showcase your work, courses, and projects on GitHub.
- Portfolio serves as a self-assessment tool and demonstrates your grasp.
- Discuss it during interviews, providing concrete evidence of your skills.
- Your GitHub repo is your real resume – proxies like education and gender matter less.

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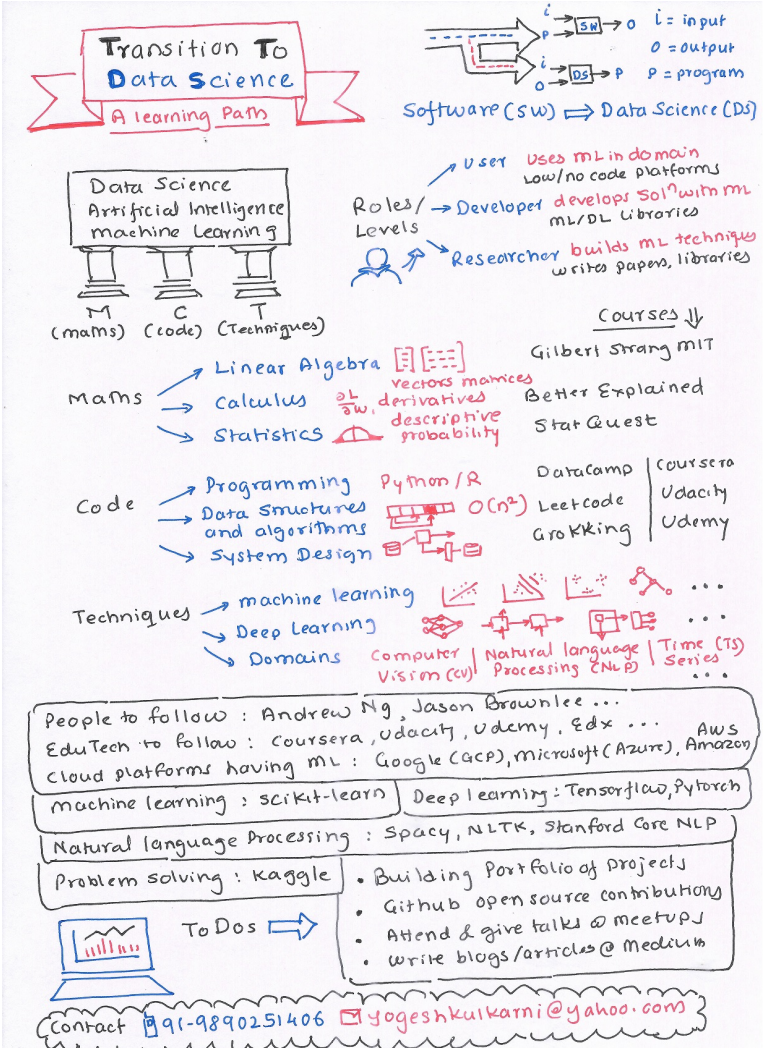
My Sketchnote

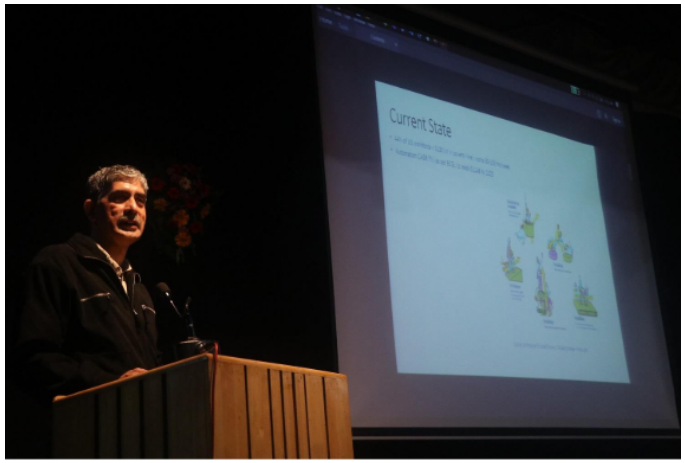


(Ref: How to become a Data Scientist? - Yogesh Kulkarni)

Summary Steps

Prep:

- Mathematics: Statistics, Calculus, Linear Algebra
- Programming: Python, Data Structure & Algorithms, Tools
- ML/DL: algorithms & frameworks
- Practice: Kaggle, Hackathons, projects on Github, blogs, Meetups-talks, etc.



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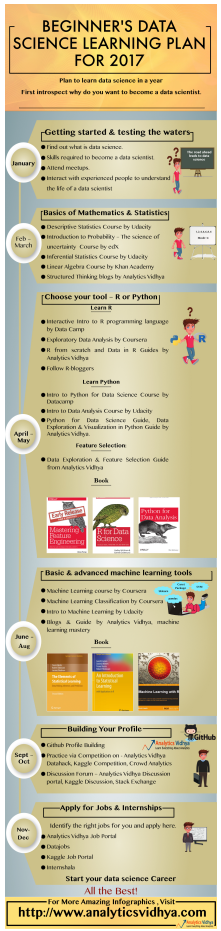
Analytics Vidhya Learning Path 2017

- An year long schedule
- Mostly free resources
- Followed it myself
- Separate paths for:
  - Beginner: Not much experience in programming but just college maths
  - Transitioner: Decent experience programming, but no ML and just college maths
  - Intermediate: Knows ML, comfortable with programming and maths.

https://www.analyticsvidhya.com/blog/2017/01/the-most-comprehensive-data-science-learning-plan-for-2017/



Career in AI: References

References

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- Mid-Career Transitions into ML-AI, with Yogesh Kulkarni - Choose To Thinq https://www.youtube.com/watch?v=IQzWosVzkM4
- What is Data Science? - SimpliLearn
- Roadmap: How to Learn Machine Learning in 6 Months - Zach Miller, Senior Data Scientist at Metis
- Tetiana Ivanova: How to become a Data Scientist in 6 months
- How to switch career to data science from non computer science background - Codebasics
- Step by step roadmap for machine learning engineer - Codebasics

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Thanks . . .

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