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Mid-Career Transition to Artificial Intelligence

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REGIONAL SCRUM GATHERING℠

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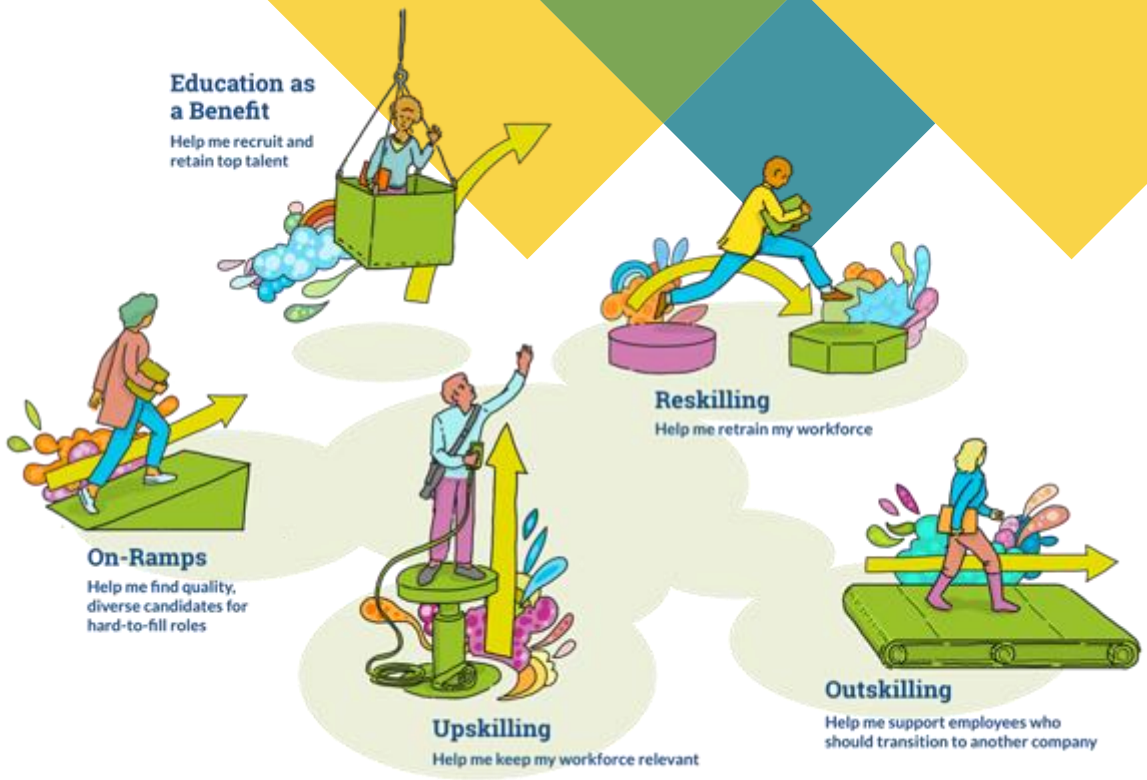
Current State

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



"As Pressure To Upskill Grows, 5 Models Emerge" – Forbs.com

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Examples

Less mechanical, automatable

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

More Cognitive, Creative, Human

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

Changes

Technological

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

Social

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

Financial

- Widening gap
- Flatter world
- Gigs over jobs

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

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Data Science | Artificial Intelligence is critical in bringing intelligent automation

What is Data Science?
What is Artificial Intelligence
What is Machine Learning?
What is Deep Learning?

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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“Houston, we have a problem!!”

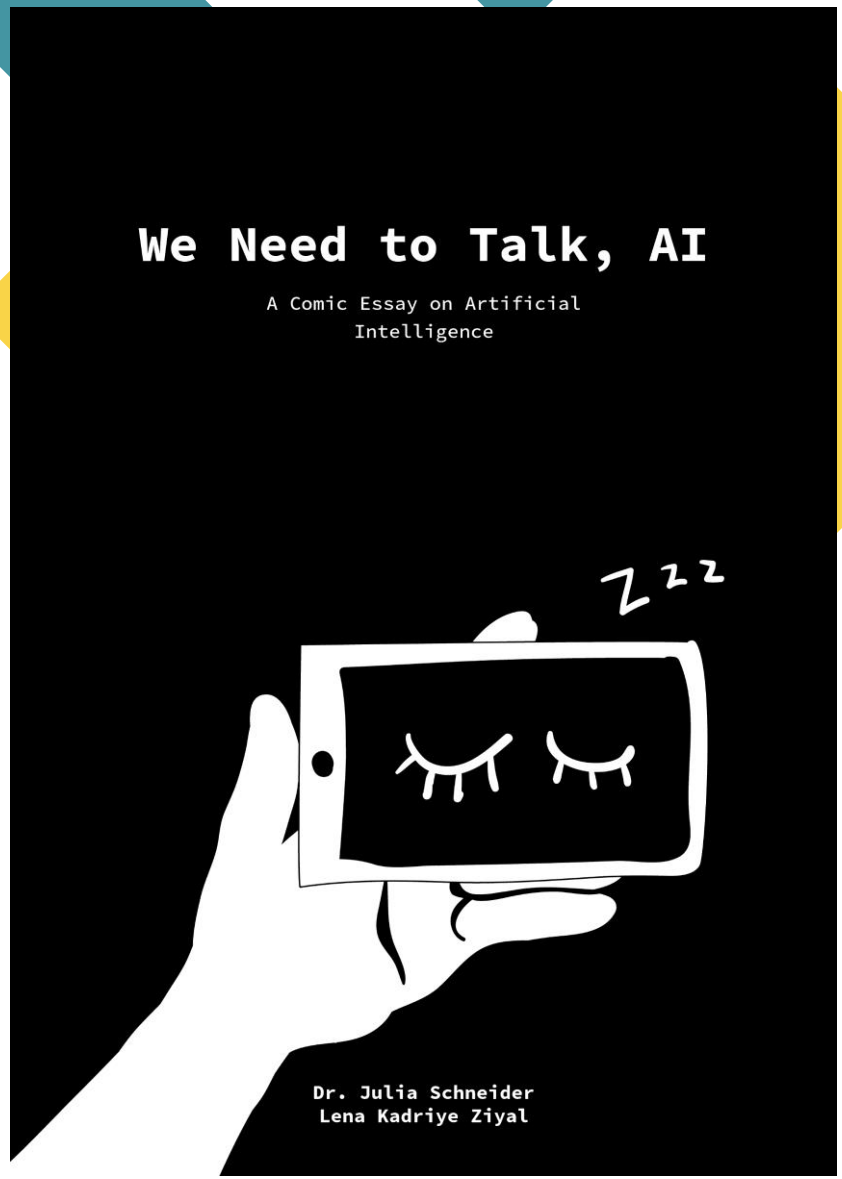
50 Years Ago: “Houston, We’ve Had a Problem” – John Uri

The Problem

Every company is claiming to be working in AI-ML

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

Or is it just a plain BIG hype?



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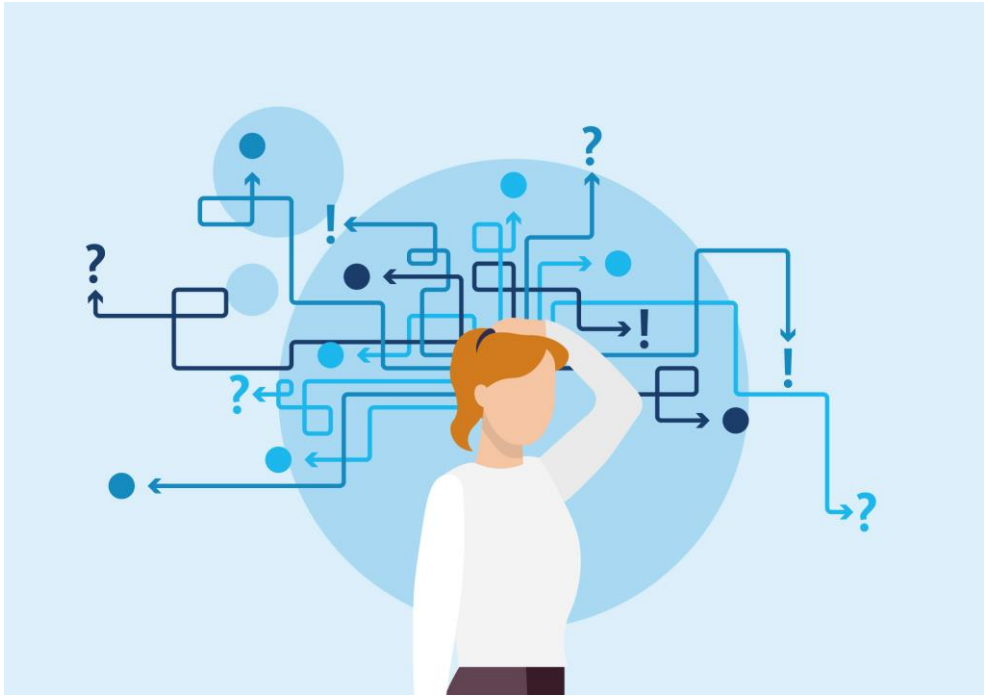
What's the core idea?

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



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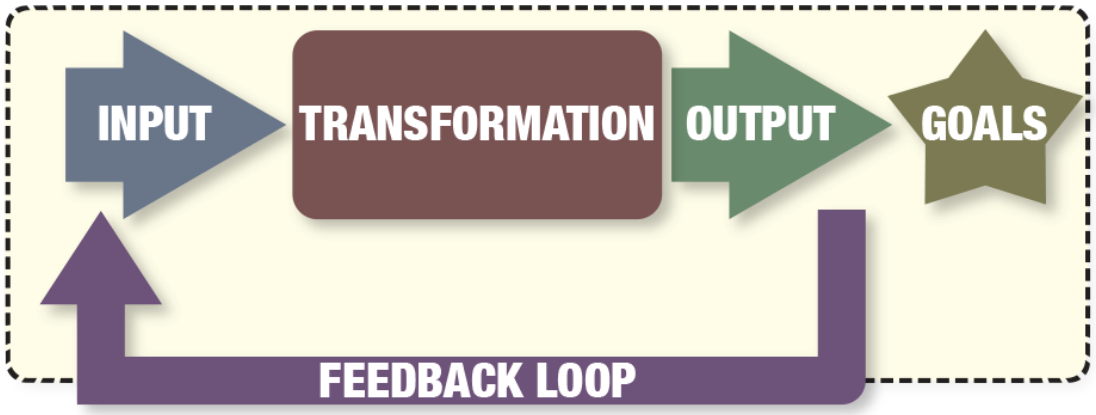
Desire

- 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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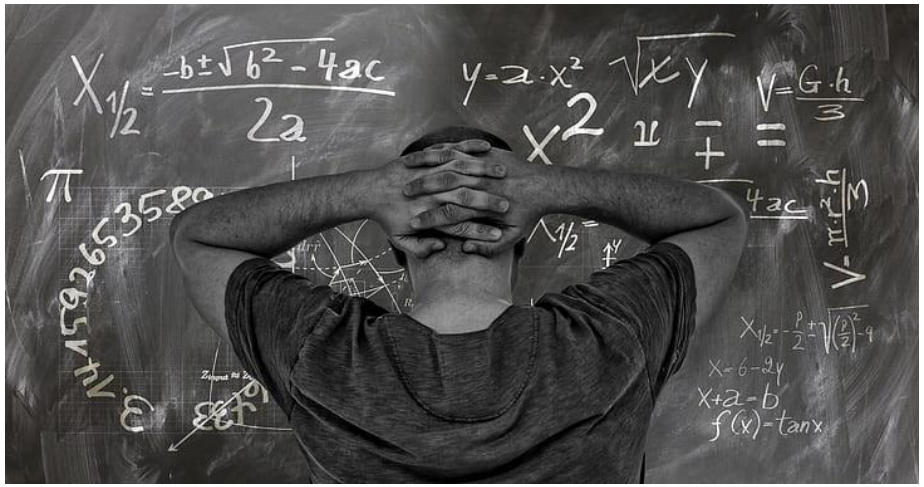
Functions

- 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.



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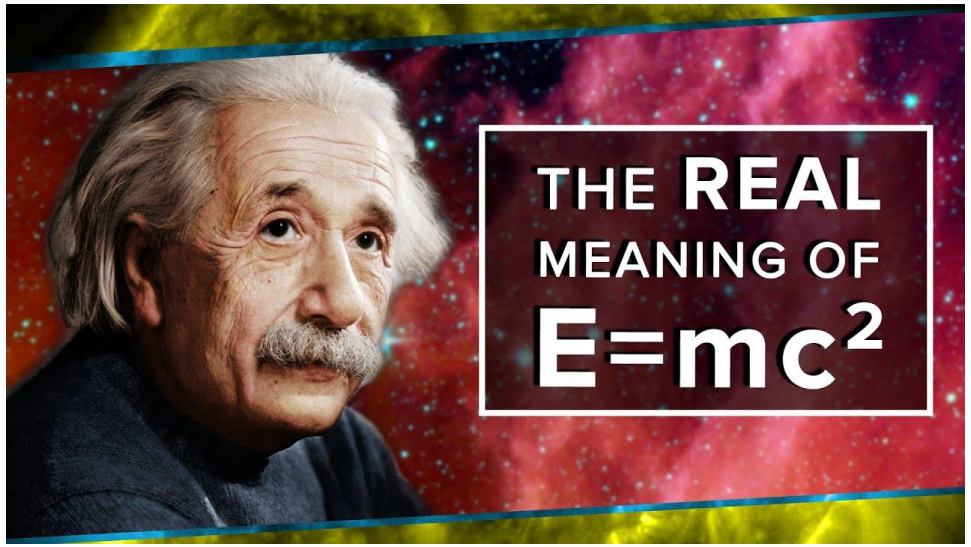
Functions

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



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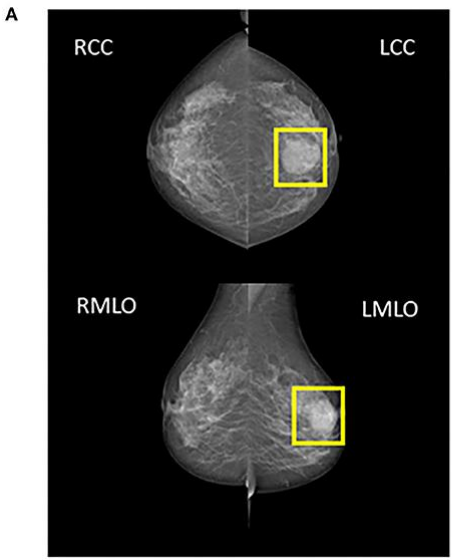
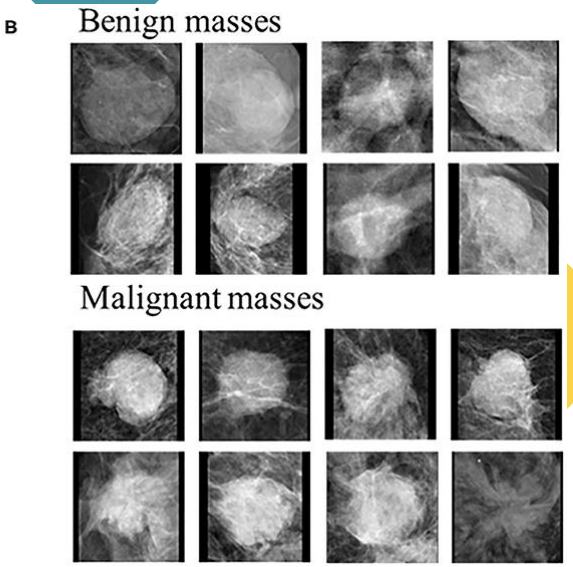
Functions

- 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?*





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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)
- By studying lots of past games.
- 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
- Ability produce something new
- Learning how to drive our cars
- Writing poems, assignments and even coding!!

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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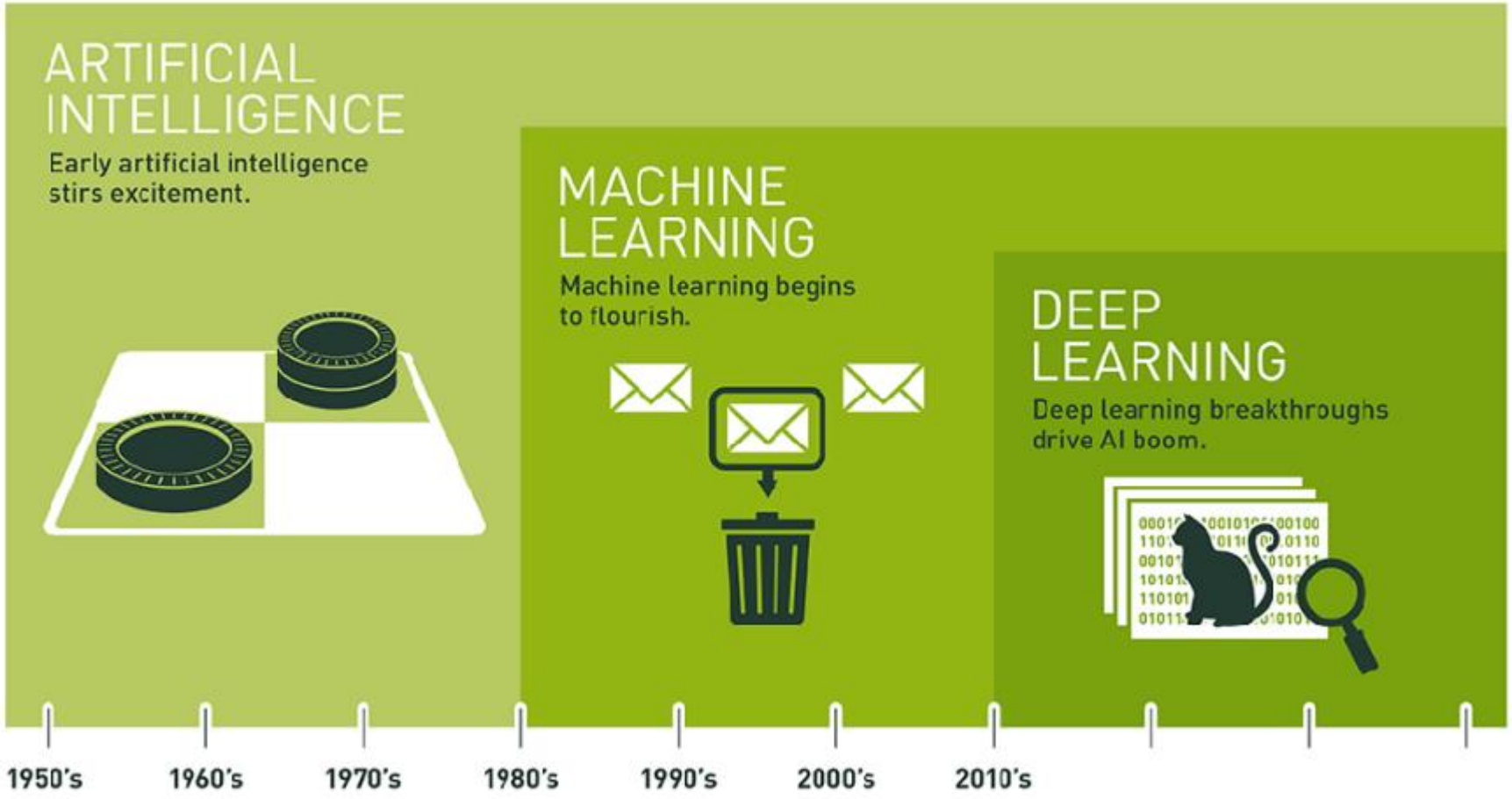
AI, ML, DL … Same

Or relationship between them



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

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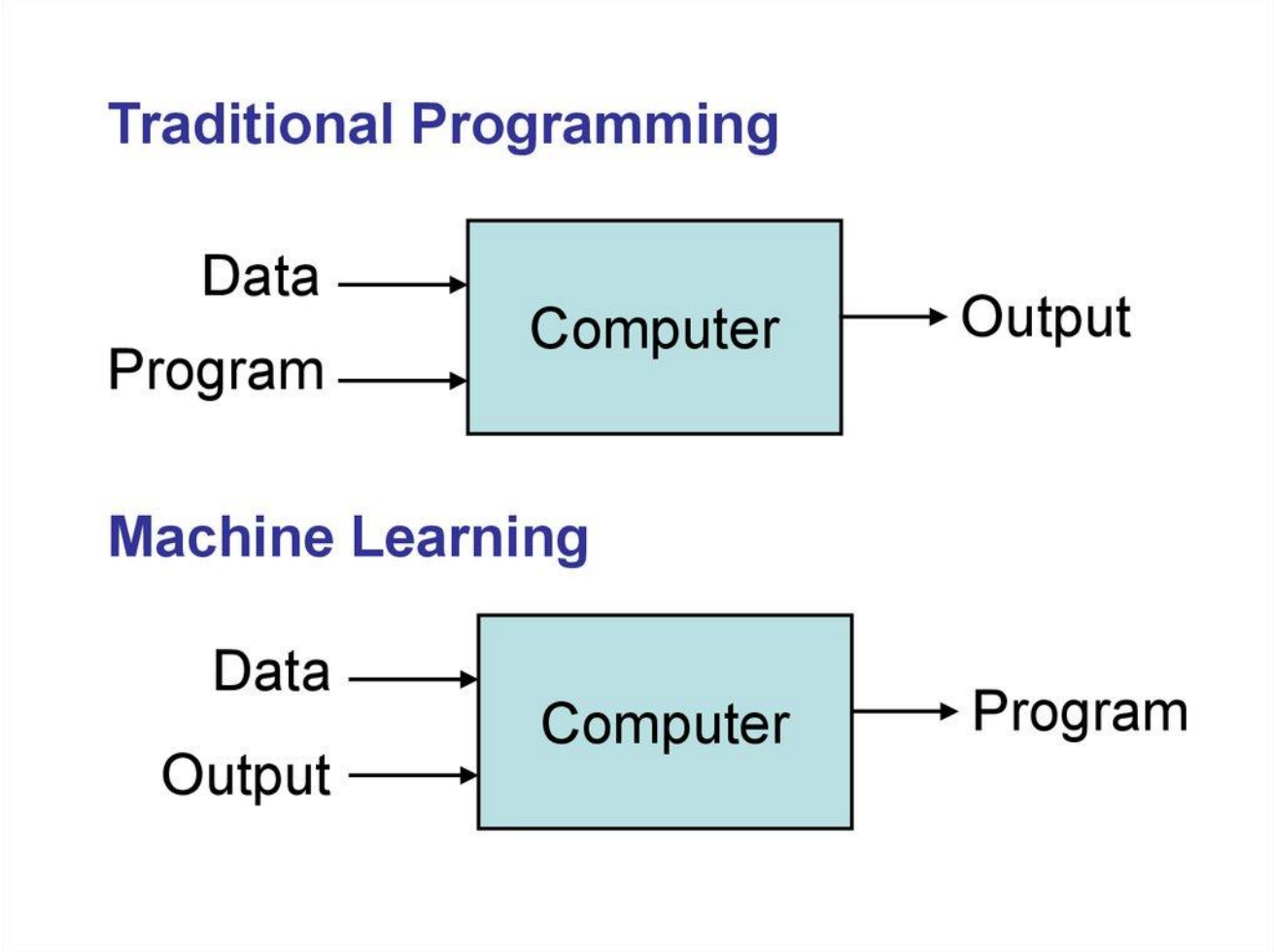
Traditional vs. Machine Learning?



Why Machine Learning?

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

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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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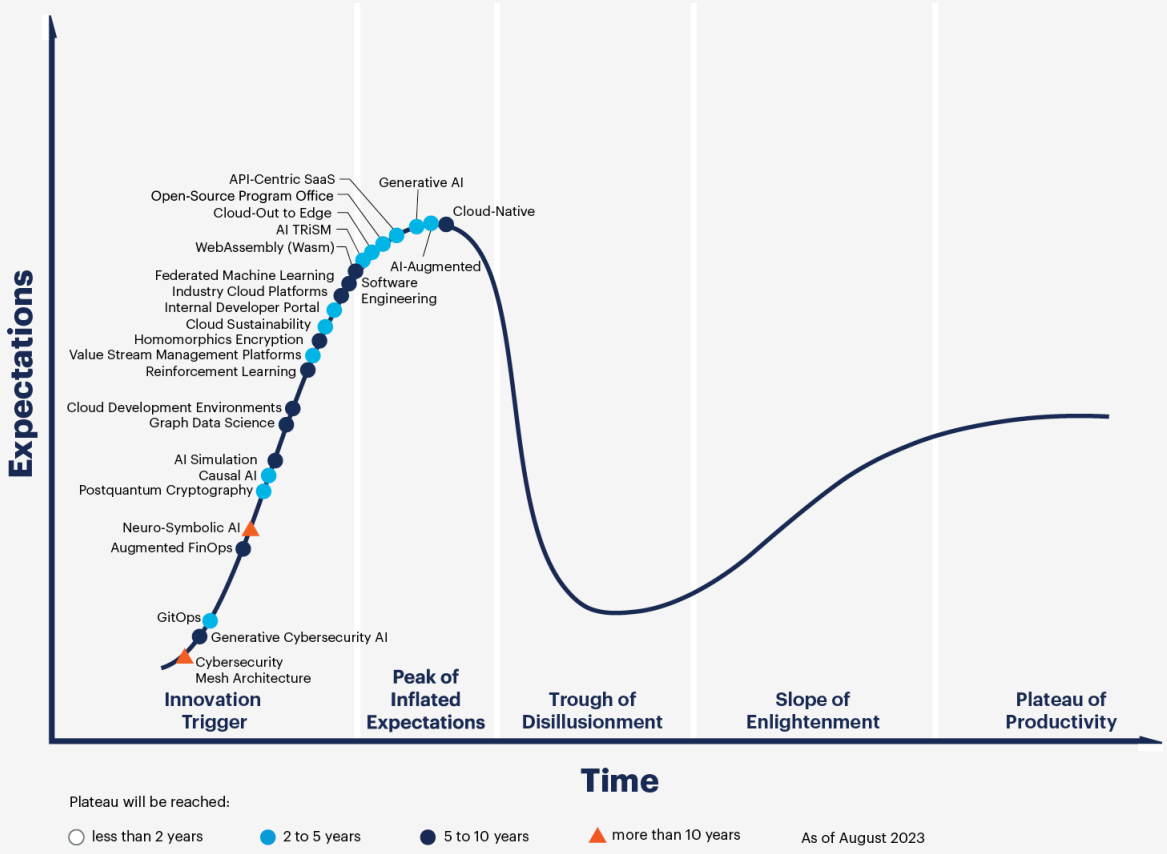
Gartner Hype Cycle

Emerging Technologies 2023



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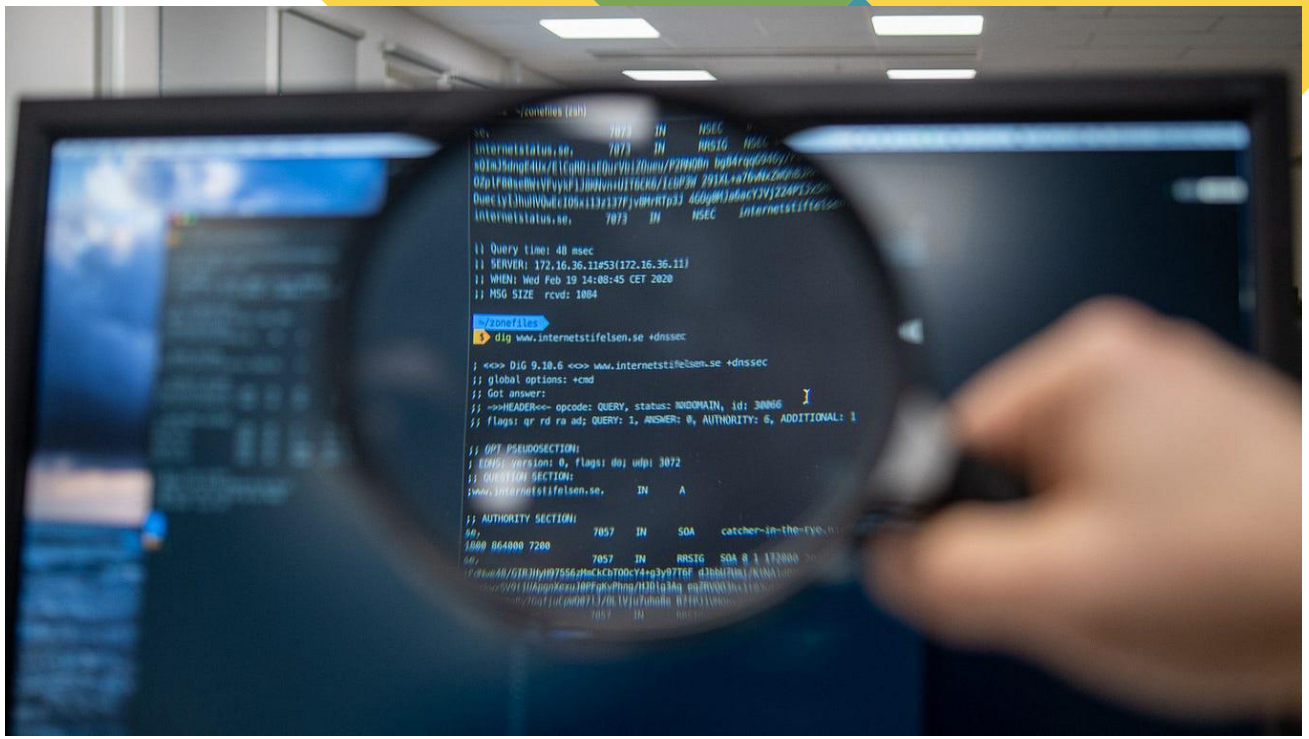
Which Roles?

So, who is a Data Scientist?

- Software + Mathematics + ML/DL specific technique
- Discovers patterns and trends in datasets to get insights.
- Creates forecasting algorithms like Classification, Clustering, etc



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Which Personas?

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

Russ Salakhutdinov (the new head of AI at Apple), Rich Sutton (Univ. of Alberta, author of Reinforcement Learning), Geoff Hinton (Univ. of Toronto, Google, DL patron saint), and Yoshua Bengio (Univ. of Montreal and head of MILA), moderator Steve Jurvetson

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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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Are you suitable? at Mid-career

Advantages

- Domain Expertise
- Maturity, Communication, Soft Skills
- Problem Solving

Dis-advantages

- Lost touch with Mathematics
- Un-Learning and Re-Learning inertia
- Starting from scratch? Seniority?

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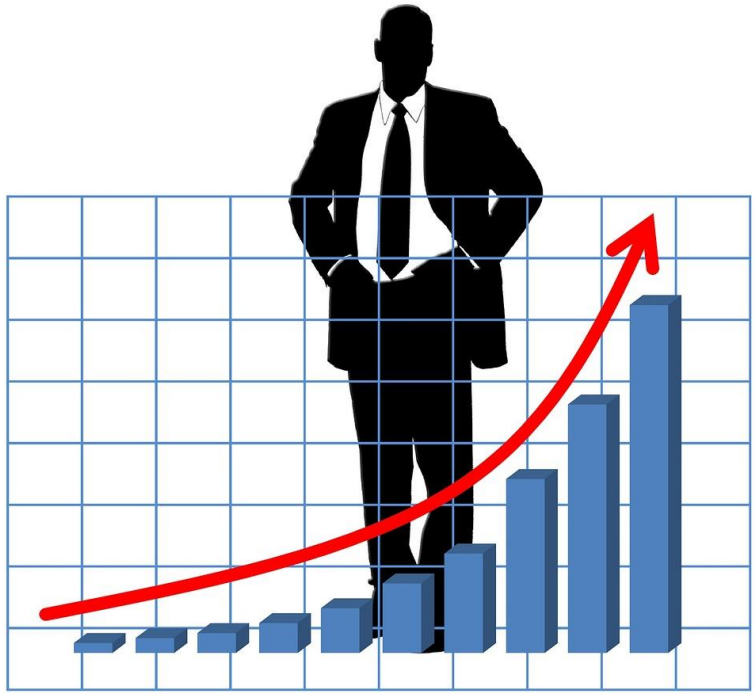
Why do you want to Switch?

- $$$?
- Hate my current job?
- Growth/Future-proofing
- Will it remain in fashion forever?



What's in it for me?

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Current + ML combo?

- First : DON'T QUIT!!!
- Don't lose advantage due to domain expertise
- ML just another problem-solving technique, IF DATA IS AVAILABLE
- Can you leverage domain expertise and apply ML there, a good/smooth transition?

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Learning Path, Roadmap

- 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.
- Start Playing the Role, in current role
- Build Foundation, based on PERSONA
- Kaggle Competitions
- Specialize and GitHub portfolio

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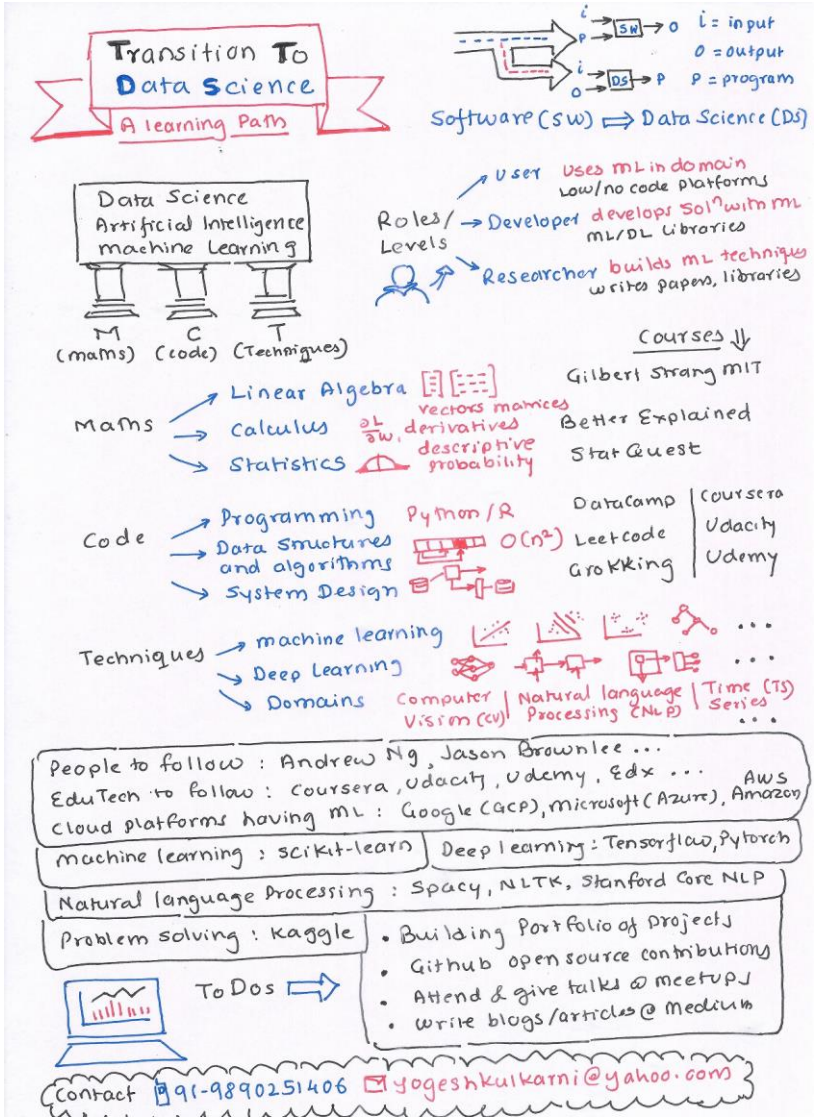
My Sketchnote



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Summary Steps

- 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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Thank you

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