BEGINNING WITH AI

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This article is based on course "AI for everyone" by Andrew NG (Coursera – deeplearning.ai).

I am summarizing my views, learnings and opinions in addition with some other points.

I recommend going through the course for detail understanding.

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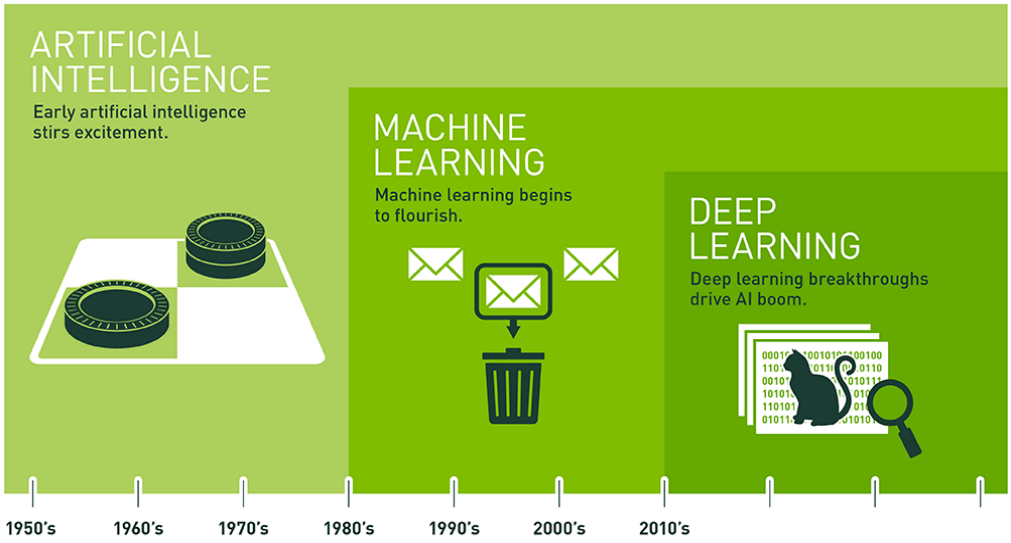
ARTIFICIAL INTELLIGENCE – MACHINE LEARNING- DEEP LEARNING

"AI is new electricity" – Andrew NG

"Artificial intelligence would be the ultimate version of Google. The ultimate search engine that would understand everything on the web. It would understand exactly what you wanted, and it would give you the right thing. We're nowhere near doing that now. However, we can get incrementally closer to that, and that is basically what we work on." —Larry Page

"The pace of progress in artificial intelligence (I'm not referring to narrow AI) is incredibly fast. Unless you have direct exposure to groups like Deepmind, you have no idea how fast—it is growing at a pace close to exponential. The risk of something seriously dangerous happening is in the five-year timeframe. 10 years at most." —Elon Musk wrote in a comment on Edge.org



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

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

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Beginning with AI – Based on AI for everyone by Andrew Ng (coursera)

Artificial Intelligence

Ability of systems to think like humans do.

Machine learning

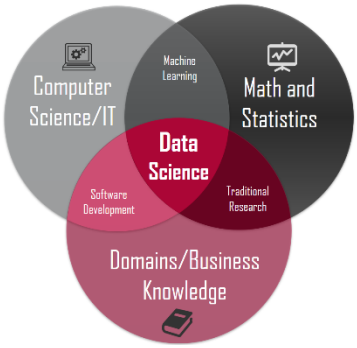
Subfield of AI giving machines a skill to learn from examples without explicitly being programmed

Deep Learning

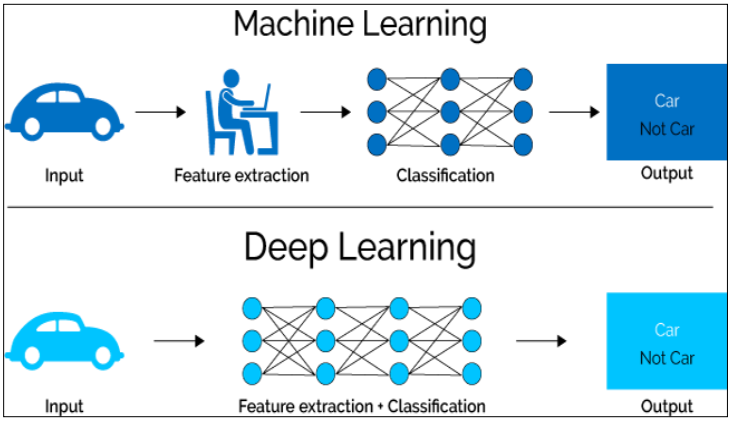
- Specialized ML techniques enabling machines to train themselves to perform tasks
- Deep learning is a methodology that **mimics the network of neurons in a human brain** and it makes use of deep **neural networks.**
    - The learning occurs in two phases.
        - The first phase consists of applying a nonlinear transformation of the input and create a statistical model as output.
        - The second phase aims at improving the model with a mathematical method known as derivative.

Data science

Data science is a multi-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data. Wikipedia



Machine Learning vs Deep Learning



http://aimagnifi.com/blog/index.php/2017/10/13/what-is-the-difference-between-machine-learning-and-deep-learning/

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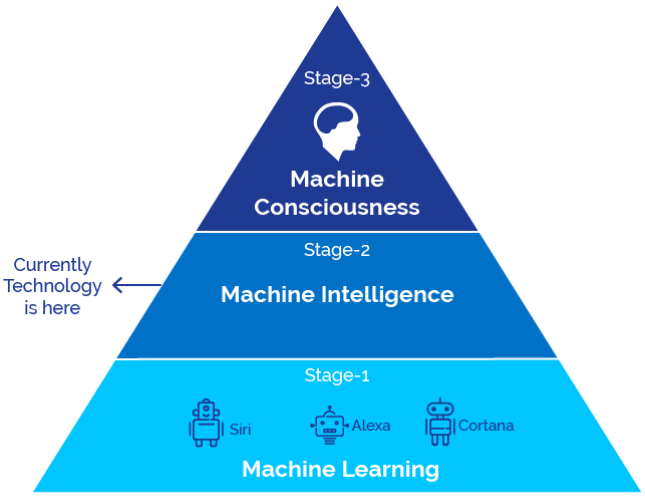
DEMYSTIFYING AI

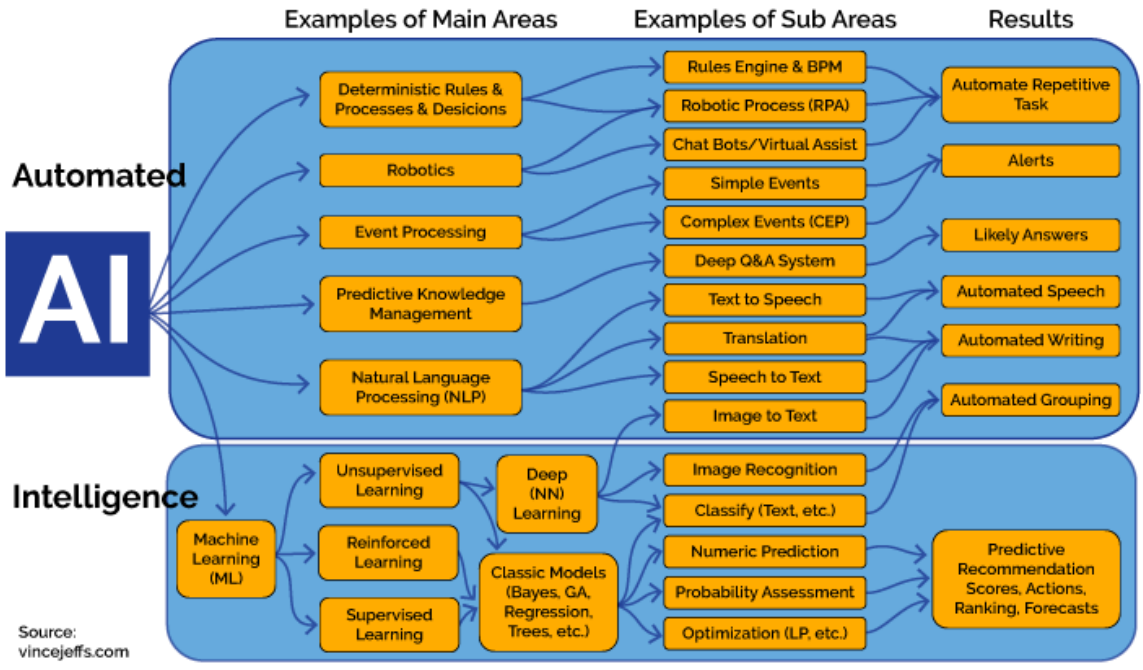
Artificial Narrow Intelligence. Ex: - Smart speaker, Web search, Self-driving cars etc.

Artificial General Intelligence. Ex: - Do anything a human can do.



Stages of Artificial Intelligence

Fig: https://content-static.upwork.com/blog/uploads/sites/3/2017/07/09113710/Stages-of-Artificial-Intelligence.png



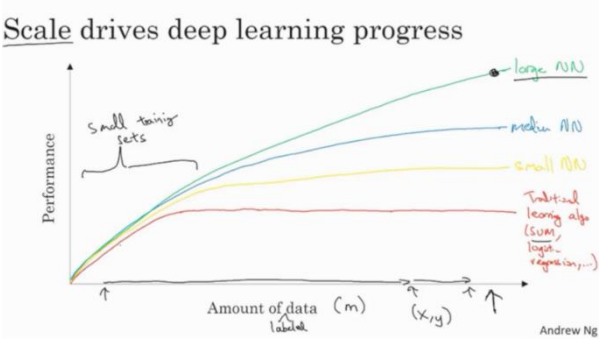
Ref : https://cdn-images-1.medium.com/max/1200/1*lTdghG_6biVitkg-txtMSA.png

Goldilocks rule for AI

Too optimistic	• Sentient or super intelligent AI robots coming soon
Too pessimistic	• AI cannot do everything. So an AI winter is coming.
Just Right	• AI can't do everything, but will transform industry.

Why ML now?

- Data is growing exponentially
- Larger NN can be built with rise in technology



1: Refer AI for everyone course

DATA - Google Search : Data defnition

- Facts and statistics collected together for reference or analysis.
- The quantities, characters, or symbols on which operations are performed by a computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media.

Don't throw data at an AI team and assume it will be valuable.

Challenges involved

- Acquiring data: Manual labeling, Observing behaviors, websites, etc.
- Data is messy: Missing values, incorrect data, different types, volume of data etc.

ML works well when	ML works poorly when
Learning a simple concept. (Humans do in <= 1 sec)	Learning complex concepts from small data
Lots of data available	Asked to perform on new type of data

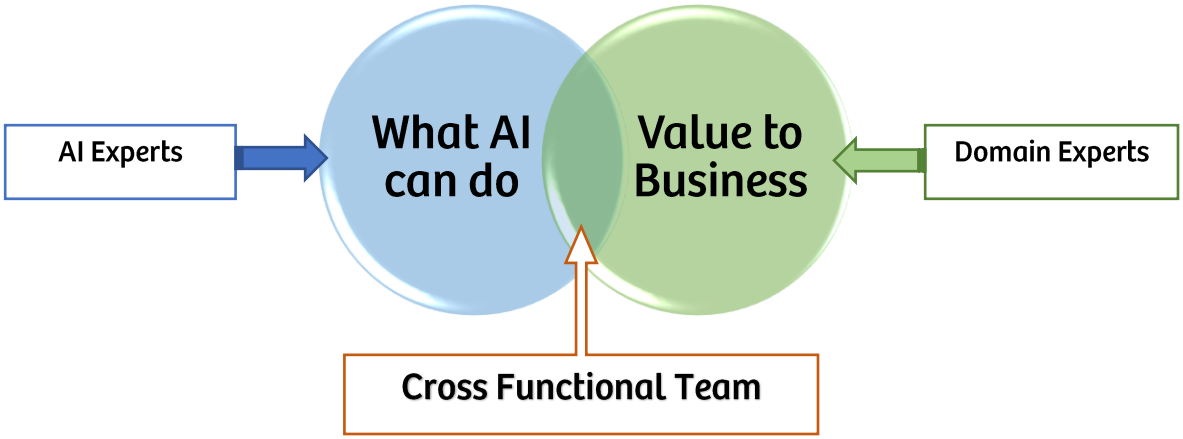
BUILDING AI PROJECTS

How to structure Machine learning projects?

https://www.deeplearning.ai/machine-learning-yearning/

Free download by filling details. Recommend reading after this article/ original course.

AI Team



Key points

- Automate tasks, not jobs.
- Identify Main drivers of business value?
- Identify Main pain points in business.
- "You can make progress even without BIGDATA"

Due diligence on project

Ethical:

- ***Make society better***

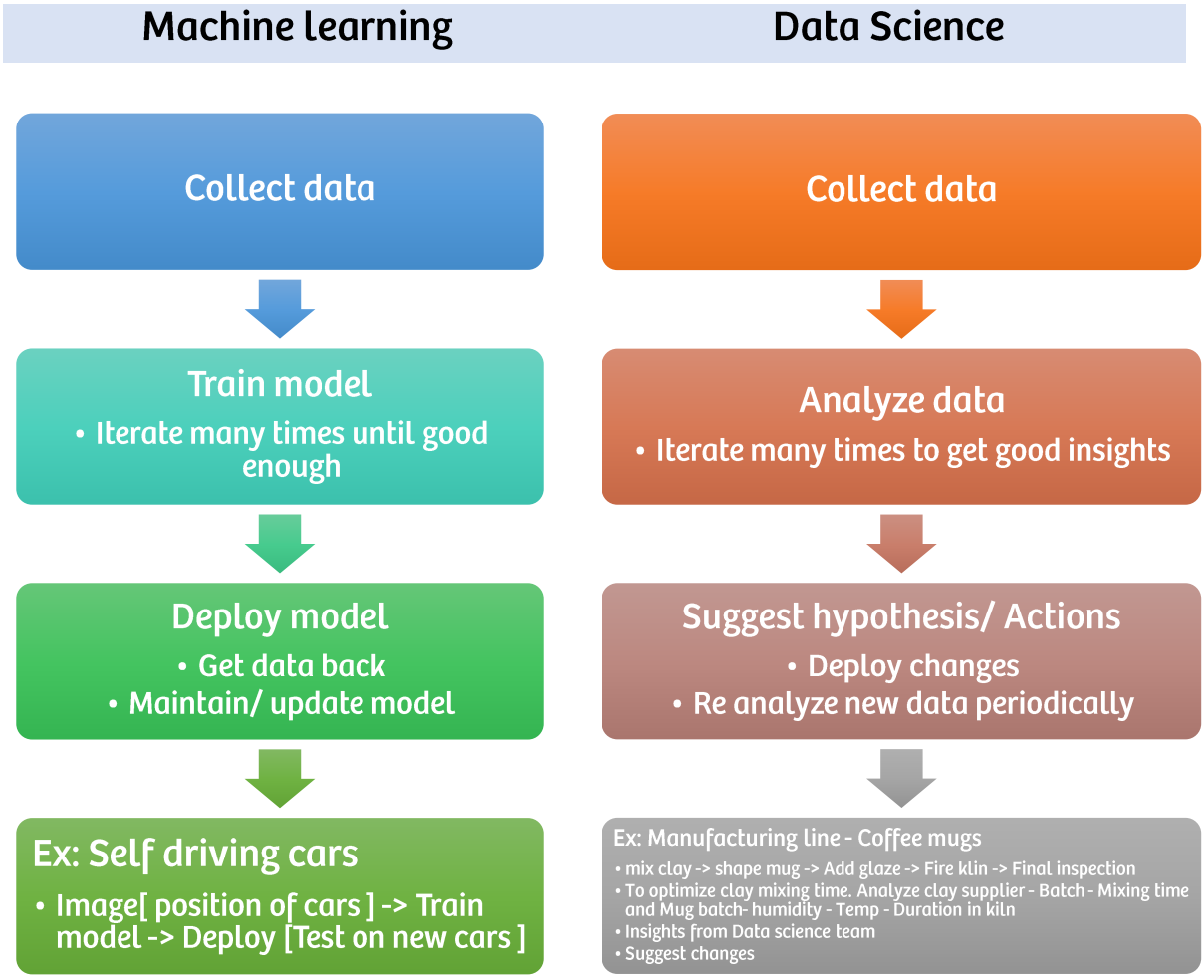
Technical:

- Can AI system meet desired performance?
- How much data is needed?
- Engineering timeline

Business:

- Lower costs
- Increase revenue
- Launch new product/Business

Workflow of projects



Various examples of DS vs. ML

Dept	Data science	Machine learning
Sales	Mug process	Visual defect mug
Recruiting	Optimize process	Automate resume screening
Marketing	A/B testing on which website version is good	Personalized recommendations in website
Agriculture	Crop analysis	Look for weed and spray at specific point

AI IN YOUR COMPANY

AI transformation playbook

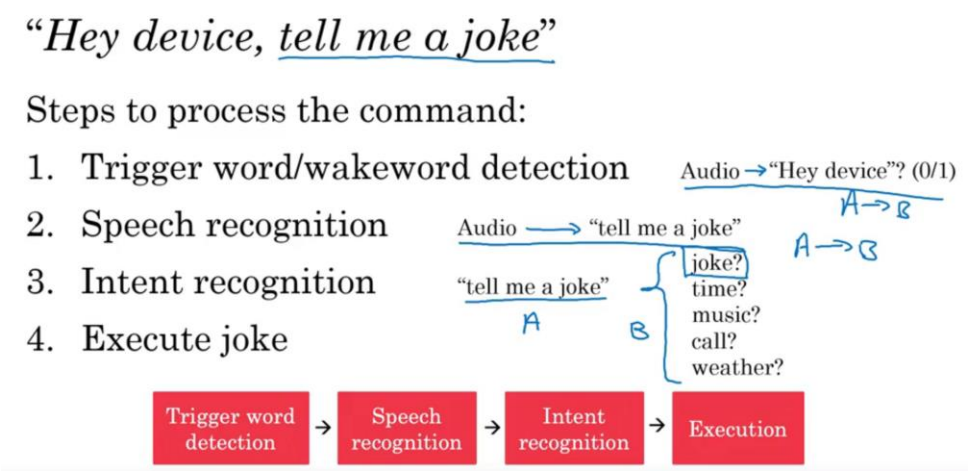
Go through link and download PDF for detailed understanding: https://landing.ai/ai-transformation-playbook/

1. **Execute pilot projects to gain momentum**
2. **Build an in-house AI team**
3. **Provide broad AI training**
4. **Develop an AI strategy**
5. **Develop internal and external communications**

Taking your first step in AI

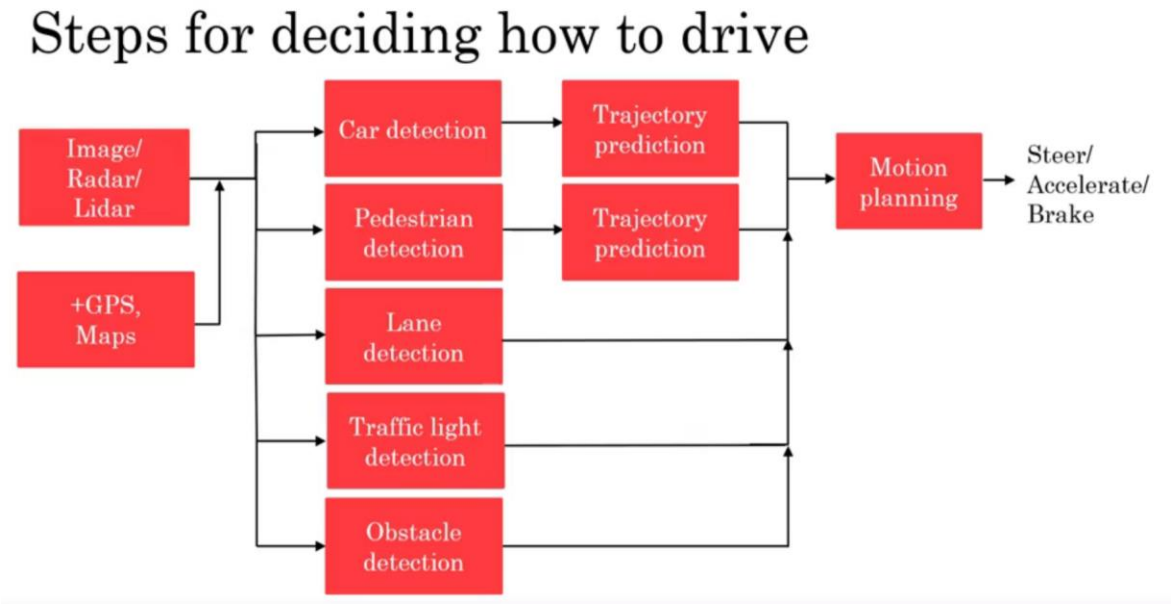
- Get friends to learn about AI
    - AI for everyone – Coursera – Deeplearning.ai by Andrew ng
    - Reading group
    - Intro to Data science etc. from top universities etc.
- Start brainstorming projects: No project is too small.
- Hire a few ML/DS people to help
- Hire/Appoint an AI leader
- Discuss with CEO/Board possibilities of AI transformation
    - Will company be more valuable and/or effective if it is good at AI?

Case Study 1: Smart speaker



2. Refer AI for everyone course

Case study 2: Self driving cars



3. Refer AI for everyone course

Various roles of AI team

Software Engineer	Ex: Joke execution, ensure self driving cars reliability etc.
Machine learning engineer	A -> B Modeling/Learning
ML researcher	Extend state of the art in ML
Data scientist	• Examine data and provide insights • Make presentation to team/ executive
Data engineer	• Organize data • Make sure data is saved in an easily accessible, secure and cost effective way
AI product manager	• Help decide what to build • What's feasible and valuable

AI KEY TAKEAWAYS

AI pitfalls

Don't	Do
Expect AI to solve everything	Be realistic about what AI can and cannot do given limitations of technology, data and engineering resources
Hire 2-3 ML engineers and count solely on them to come up with use cases.	Pair engineering talent with business talent and work cross functionally to find feasible and valuable projects.
Expect the AI project to work for first time	Plan for AI development to be an iterative process with multiple attempts needed to succeed.
Expect traditional planning process to apply without changes	Work with AI team to establish timeline estimates, milestones, KPIs etc.
Think you need superstar AI engineers before you can do anything.	Keep building team but get going with the team you have.

Limitations of AI

- Performance limitations
- Explainability is hard (sometimes doable)
- Biased AI through biased data
    - Unhealthy stereotypes
        - Man : Woman -> Father : Mother ✓
        - Man : Programmer -> Woman : Home maker ✗
    - Why bias matters?
        - Hiring tool can discriminate against women/Handicapped/LGBT
        - Facial recognition works better for light skinned than dark skinned people
        - Bank loan approvals/Rejections
    - Bias should be addressed properly before testing or deploying a solution.
- Adversarial attacks on AI
    - Attempt to make an AI system do something else other than what it is intended to do.

Adverse usage of AI (To be avoided/ Not ethical AI tasks)

- Synthesize video of people doing things they never did.
- Undermining of democracy and privacy
- Generating fake news/ comments

AI in developing economies

- Leap frog – Jump to ladder by skipping one or two steps.
- Focus on AI to strengthen a country's vertical industries
- Public-private partnerships to accelerate development