



Intro to Neural Nets

Session 8: Delivering on AI

What is an AI-Mature Company?

Company + Deep Learning != AI Maturity

Has AI delivered **new business value**? **Start with the business first**, understanding the relationship between the core demands of the business and the data.

1. Is AI being deployed in **tasks that AI is suited for**?
2. Have you **strategically mapped data needs** and an acquisition (and expansion) plan?

Dedicated **roles for machine learning and data scientists**.

Strengths & Weaknesses of AI

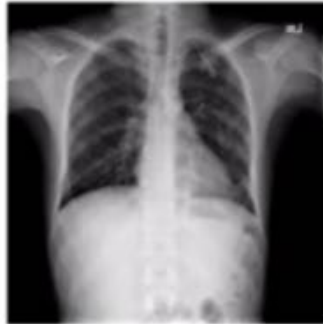
AI for Automation

Any task a human can perform in a few seconds is a candidate for automation via supervised ML, e.g., Deep Learning.

Input (A)	Output (B)	Application
email	spam? (0/1)	spam filtering
audio	text transcripts	speech recognition
English	Chinese	machine translation
ad, user info	click? (0/1)	online advertising

Strengths & Weaknesses of AI

- X-ray Diagnosis



What AI can do?

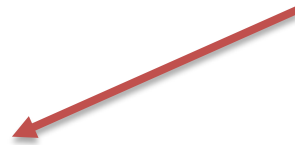
Diagnose pneumonia from 10,000 labeled images

What AI can NOT do?

- (1) Diagnose pneumonia from 10 images from a textbook
- (2) Diagnose a rare pneumonia
- (3) Help explain to patients the reason for getting pneumonia and the severity

AI as a Complementary Technology

The toy arrived two days late, so I was not able to give it to my daughter for her birthday



AI: generate a refund request



Human: I am so sorry to hear that. I sincerely hope your daughter had a good birthday.
May I kindly ask if the packaging bag has been opened?
Would you rather get your money back or back to your membership card?

Email: auto-reply

<u>Input (A)</u>		<u>Output (B)</u>
User email	→	2-3 paragraph response
<u>1000 examples</u>		
"My box was damaged."	→	Thank you for your email.
"Where do I write a review?"	→	Thank you for your email.
"What's the return policy?"	→	Thank you for your email.
"When is my box arriving?"	→	Thank yes now your....

Strengths & Weaknesses of AI

- AI tends to do well when
 - Learning a “simple” concept
 - There is a large amount of similar data available
- AI tends to do poorly when
 - Learning complex concepts and providing reasoning
 - Only small amounts of data available (e.g., rare disease)
 - performing on new types of data (generalization is hard!)

Landing AI

Execute a pilot project

- **Decompose AI tasks**: from simple to complex (with technical feasibility)
- **Building an in-house AI and Data team** or outsourced
 - Clear goal and quantifiable KPI (key performance indicator)
 - Complete within 6-12 months
- **Deploy and iterate AI strategies**
 - Being successful is more important than being perfect!

AI: Decompose tasks

Example: AI assistant



Amazon
Echo / Alexa



Google
Home



Apple
Siri



Baidu
DuerOS

“Hey device, tell me a joke”

AI: Break down tasks

“Hey device, tell me a joke”

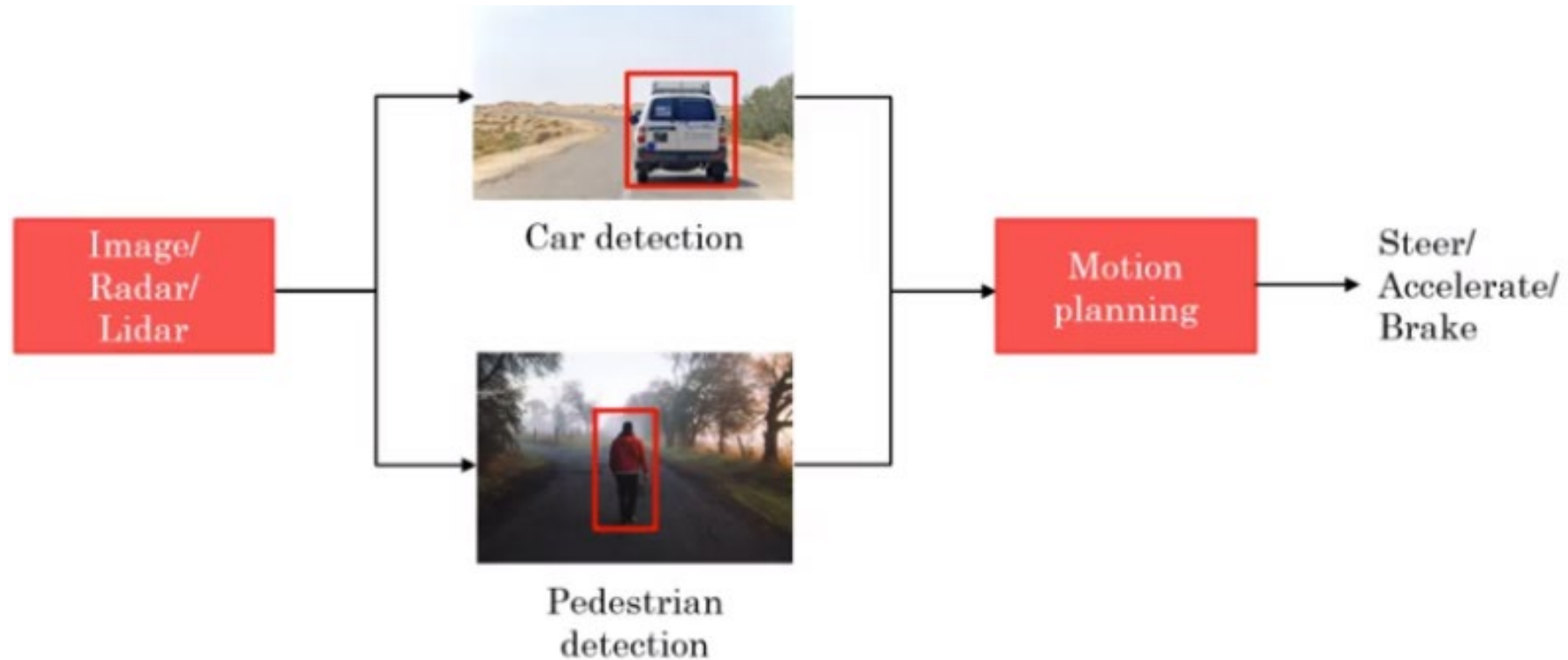
Steps to process the command:

1. Trigger word/wakeword detection Audio → “Hey device”? (0/1)
2. Speech recognition Audio → “tell me a joke”
3. Intent recognition “tell me a joke” { joke?
time?
music?
call?
weather?
4. Execute joke



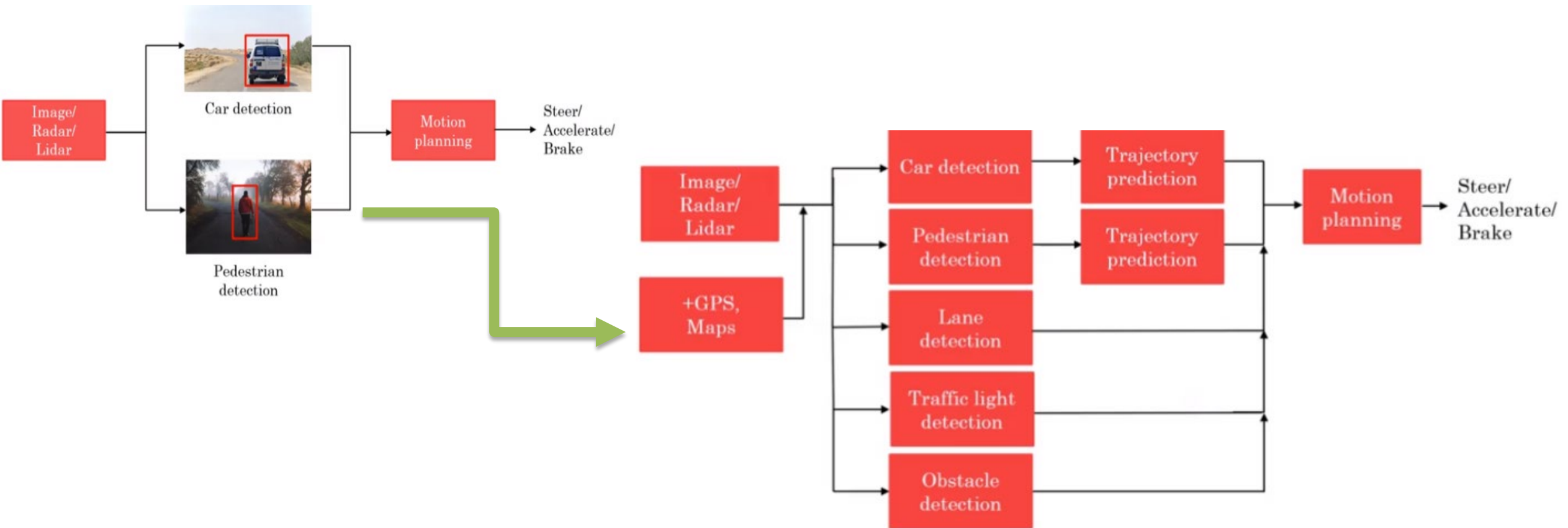
AI: Decompose tasks

- Self-driving Car

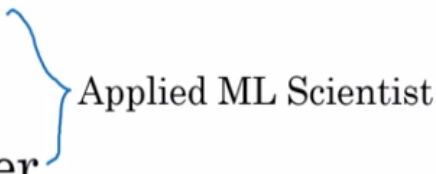
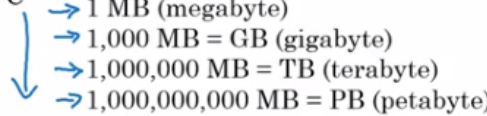


AI: from simple to complex

- Self-driving Car

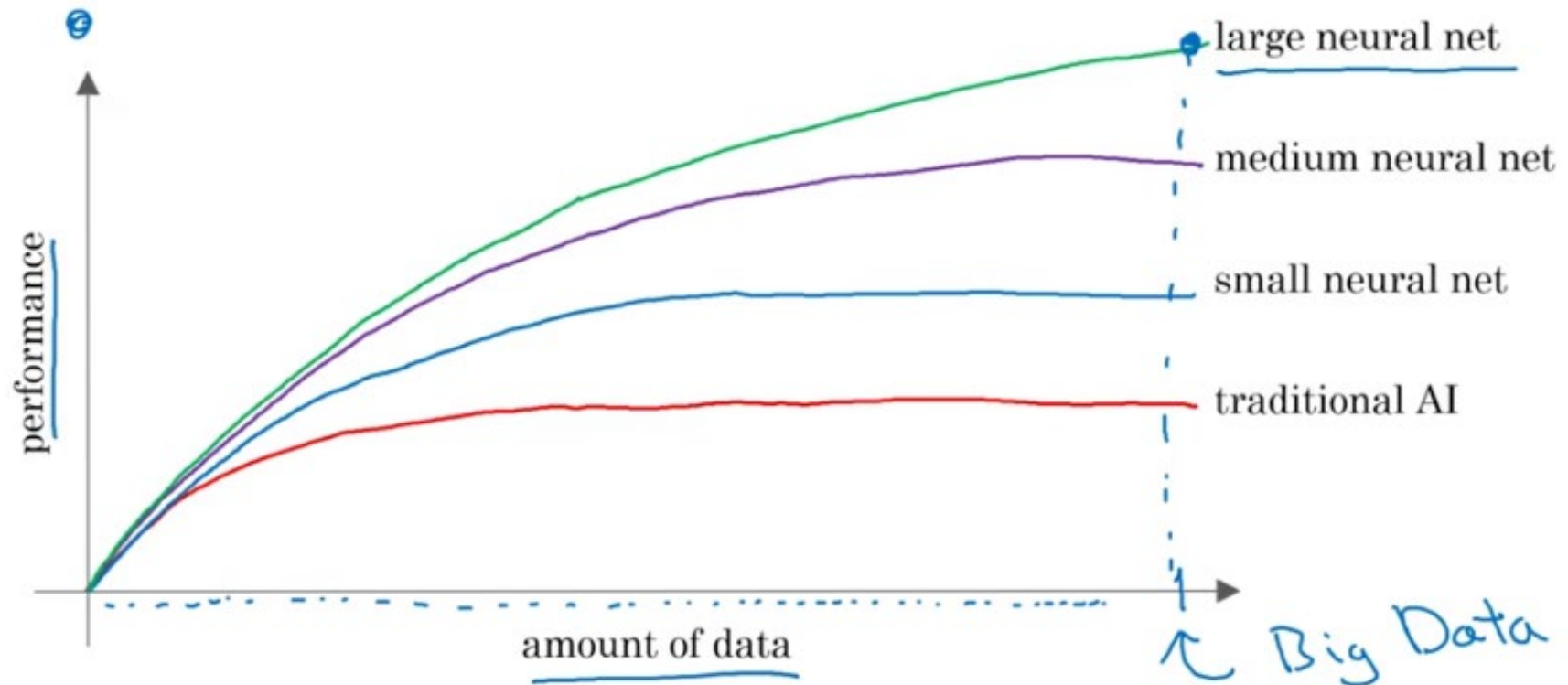


Landing AI: building AI Team

- A large AI Team with more than 100 people
 - Software Engineer
 - E.g., joke execution, ensure self-driving reliability, ...
 - Machine Learning Engineer
 - Machine Learning Researcher
 - Extend state-of-the-art in ML
-  Applied ML Scientist
- 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
- 
- A small AI team
 - One software engineer
 - One machine learning engineer/data engineer
 - *Advisor or consultant might be helpful!*

Data Team

- The importance of big data
 - collect or purchase big data



Data Cleaning

- Garbage in, garbage out

- Data problems
 - Incorrect labels
 - Missing values

- Multiple types of data

images, audio, text

unstructured

size of house (square feet)	# of bedrooms	price (1000\$)
523	1	115
645	1	0.001
708	unknown	210
1034	3	unknown
unknown	4	355
2545	unknown	440

↑
structured

Landing AI: team growth

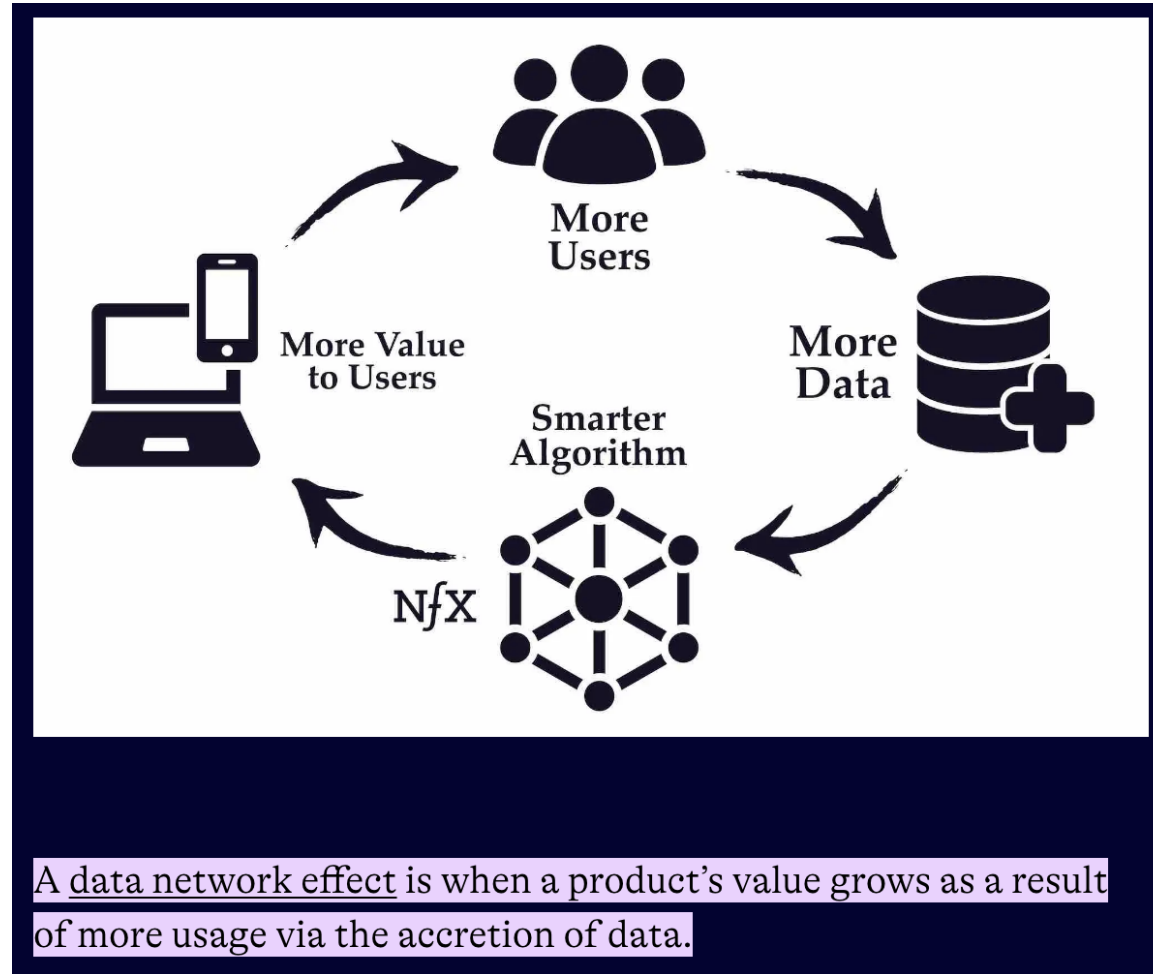
- Provide training to ensure understanding of AI

Position	Goal	What they should learn
Senior leadership positions	<ol style="list-style-type: none">1. Understand the value of AI and what they can do for your business2. formulate strategies and allocate resources rationally3. Communicate effectively with the AI team	<p>The advantages and disadvantages of AI, how to empower?</p> <p>The impact and benefits of AI on company core businesses.</p> <p>What new business opportunities can AI bring?</p>
Leaders in AI Positions	<ol style="list-style-type: none">1. Determine the direction and general technology of the project2. Set expectations and timelines3. Allocate resources4. Monitor progress and set KPI	<p>Learn about business logic, data, and what AI can and cannot do.</p> <p>Understand AI technology, algorithm types and requirements.</p> <p>Understand the workflow of AI and the management of AI employees.</p>
AI engineer, data engineer	<ol style="list-style-type: none">1. Gather data2. Train AI models3. Submit specific AI projects	<p>Deeply understand machine learning and deep learning technologies.</p> <p>Be familiar with open-source tools and third-party tools.</p> <p>Learn new AI technologies through continuing education.</p>

Landing AI: Deploy and iterate AI strategies

- Management Team needs to make decisions
 - collect or buy data?
 - How to build data warehouse and infrastructure platform?
 - In-house AI team or outsourced?
 - Time limit and KPI?
 - How to verticalize to your business and avoid competing with large tech companies?

Data Network Effects



Getting Started

- Learn basics of AI
 - This course
 - More online resource
- Brainstorming projects
 - Post-module assignment: remember that no project is too small
- Work with/hire a few AI/machine learning people for a prototype
- Consult with experienced AI/machine learning leaders
- Discuss with top managers the possibilities of AI transformation
 - Convince that your company will be more valuable/effective with good AI strategies implemented

Thank You!
Good Luck on Your AI Journey!