MACHINE LEARNING

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Instructor Information

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Let's Start .....

Lecture #0 and 1

PREREQUISITE(S)

- There is no prerequisite for this course.
- However, having good programming skills will be an added benefit especially with one of the following tools:
  - Programming Skills
  - Python or C++
  - Scikit-Learn
  - Keras or Tensorflow or PyTorch
  - Or any other framework related Machine Learning

GOALS OF THIS COURSE

➢ This course is designed for students to gain theoretical and practical knowledge of Machine Learning.

➢ Course will cover from basics of Machine Learning to advanced level algorithms.

➢ It will covers algorithms, theory and practical applications

COURSE LEARNING OUTCOMES

➢ Understanding various algorithms of Machine Learning.

➢ Given a real work problem, analyze the problem and design a machine learning pipeline to address the problem.

➢ Be able to implement the algorithms in any programming language.

ATTENDANCE POLICY

- Students are supposed to have 100% attendance.
- The minimum attendance requirement at all levels and in all courses is 80%.
- The relaxation of 20% attendance has been given only to cover any planned events or unforeseen situations.
- I will take attendance at the any time of lecture
- Anyone reaching after 10 minutes will be marked as Absent.

COURSE PLAGIARISM POLICY

- Plagiarism in any kind of assessment including project or sessional/ final exam, assignments quizzes, will result in F grade in the course.

- So what is it?

Plagiarism is **presenting someone else's work or ideas as your own, with or without their consent**, by incorporating it into your work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition.

Course Plagiarism Policy

- Plagiarism in any kind of assessment including sessional/ final exam, assignments quizzes, will result in F grade in the course.
- Plagiarism is copying the work of others and present it as yours.
- Properly cite the work of others

Use ChatGPT

DISHONESTY, PLAGIARISM

You can fool some of the people all of the time,
and all of the people some of the time,

but you can not fool all of the people all of the time.

Abraham Lincoln,
16th president of US (1809 - 1865)

MISSED ASSESSMENT

- Retake of missed assessment items (other than sessional/ final exam) is NOT allowed.
- Missed assessment item (other than sessional / final exam) will earn zero marks
- Late submission will NOT be accepted .
- For missed sessional/ final exam due procedure will be followed.
- No change is any deadline

EXPLANATION OF ASSESSMENT

- All assignments and Quizzes carry equal weightage

- Enough Time will be given for Assignments for their implementation

- Quizzes can be announced or surprise

TEXT BOOK

- *No Text Book*

REFERENCE BOOK(S)

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 2nd Edition by Aurélien Géron

2. Neural Networks and Learning Machines 3rd Edition by Simon Haykin

3. The Elements of Statistical Learning by Jerome H. Friedman, Robert Tibshirani, and Trevor Hastie

4. Deep Learning (Adaptive Computation and Machine Learning series) Illustrated Edition by Ian Goodfellow (Author), Yoshua Bengio (Author), Aaron Courville

5. Pattern Recognition and Machine Learning (Information Science and Statistics) by Christopher M. Bishop

https://libgen.is/

GRADING

MID	12
FINAL PRECTICAL	10
FINAL THEORY	24
PROJECT	
ASSIGNMENTS	14
QUIZ	

TENTATIVE SCHEDULE

Week	List of Topics
1	Introduction to course and Fundamentals of Machine Learning
2	Introduction to Linear classifier: Linear Regression
3	Logistic regression
4	Introduction to Neural Networks
5	Multi-Layer Perceptron

TENTATIVE SCHEDULE

6	Support Vector Machines
7	Decision Trees
8	Ensemble Learning and Random Forests
9	Unsupervised Learning: Clustering
10	Unsupervised Learning: Dimensionality Reduction

TENTATIVE SCHEDULE

11	Introduction to Deep neural networks
12	Reinforcement Learning
13	Deploying Machine learning Models
14	Presentations and Discussions
15	Presentations and Discussions

Course Materials

- Will be shared via Google Class Room

Class Code

3sgiunc3

https://classroom.google.com/c/ODA3NjQ4MDQ1Mjgz?cjc=3sgiunc3

IT'S YOUR TURN

- To Introduce Yourself
  - Your Name
  - Your Experience So Far At Fast?
  - Your Suggestions/Expectations?

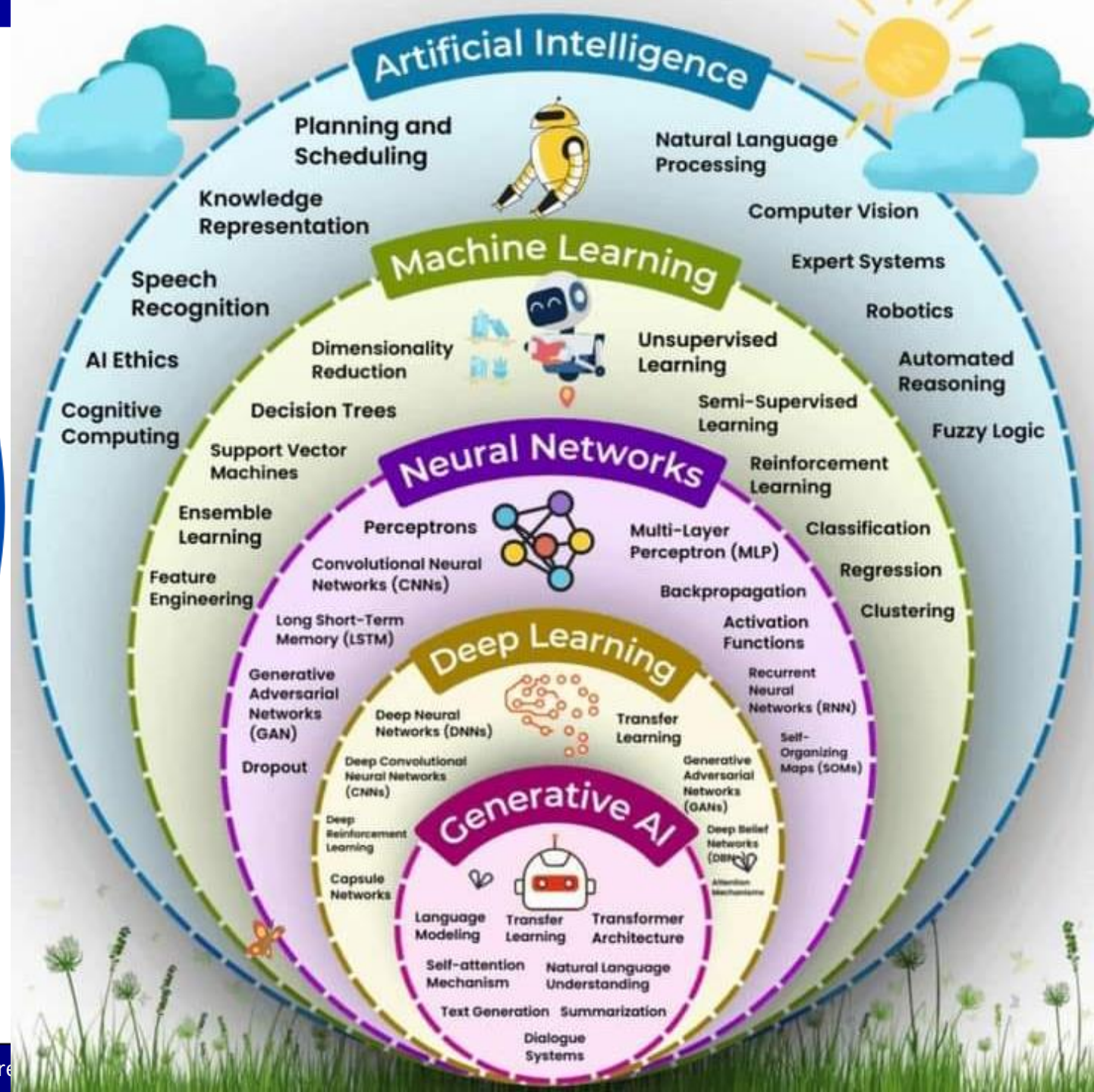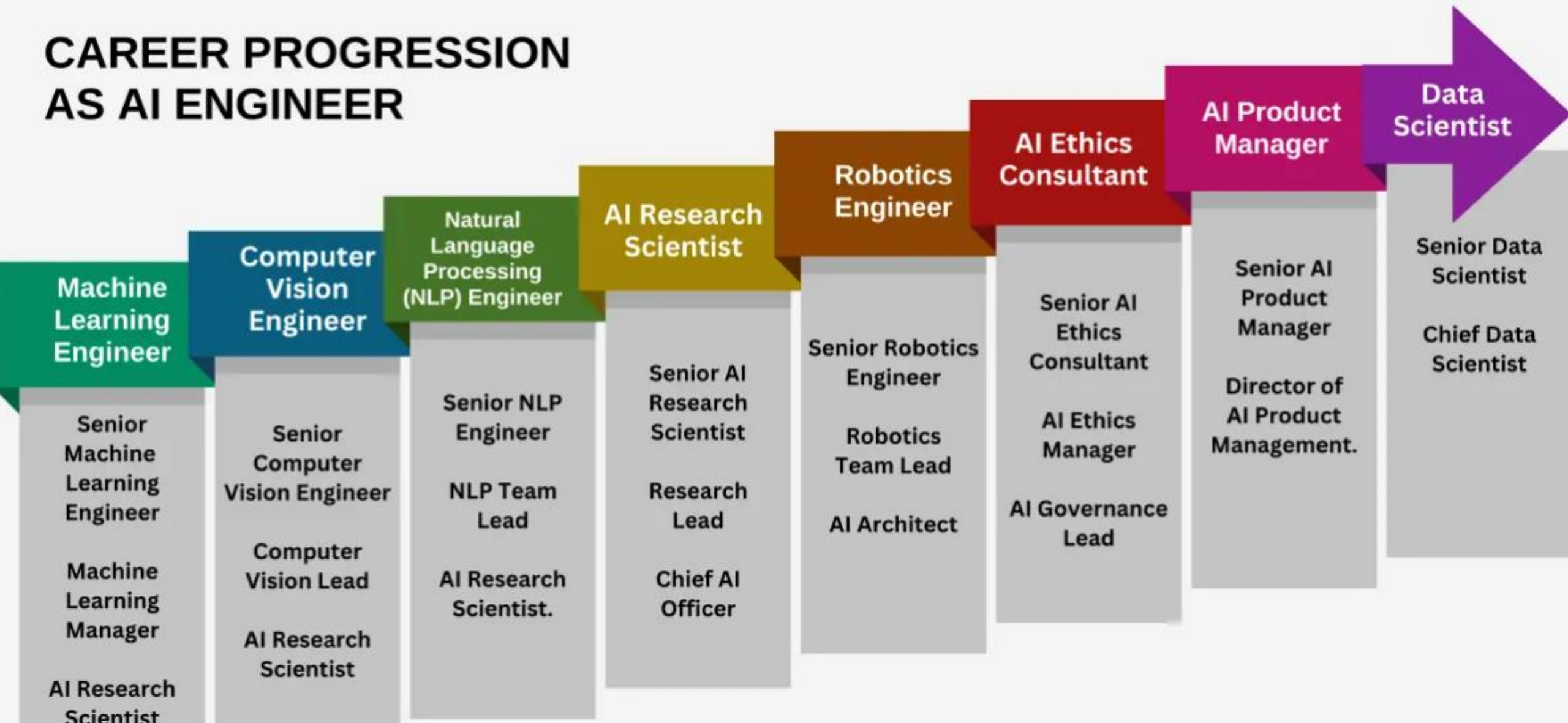netiquette – Brown Car Guy
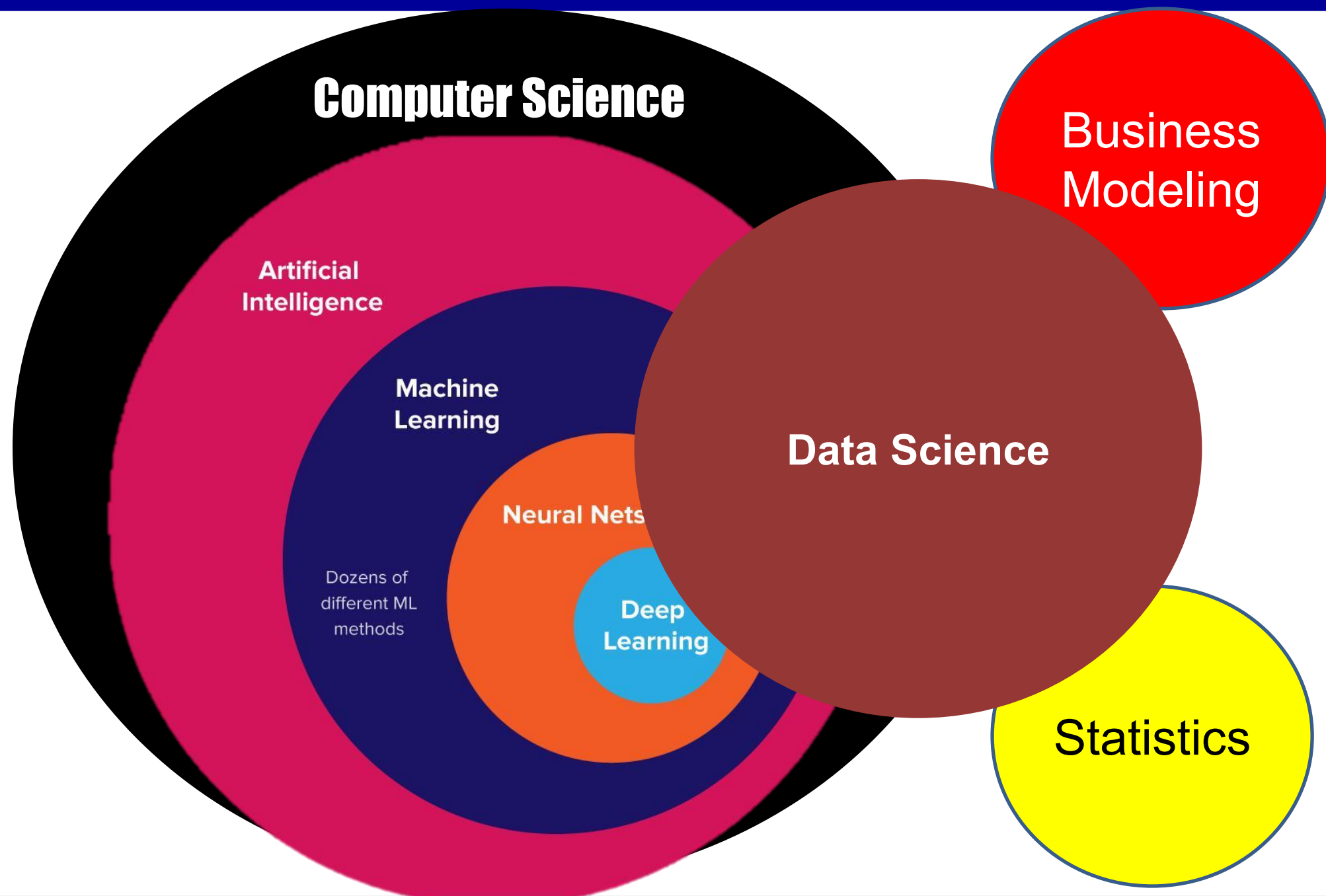
CAREER PROGRESSION AS AI ENGINEER

Machine Learning Engineer
- Senior Machine Learning Engineer
- Machine Learning Manager
- AI Research Scientist

Computer Vision Engineer
- Senior Computer Vision Engineer
- Computer Vision Lead
- AI Research Scientist

Natural Language Processing (NLP) Engineer
- Senior NLP Engineer
- NLP Team Lead
- AI Research Scientist.

AI Research Scientist
- Senior AI Research Scientist
- Research Lead
- Chief AI Officer

Robotics Engineer
- Senior Robotics Engineer
- Robotics Team Lead
- AI Architect

AI Ethics Consultant
- Senior AI Ethics Consultant
- AI Ethics Manager
- AI Governance Lead

AI Product Manager
- Senior AI Product Manager
- Director of AI Product Management.

Data Scientist
- Senior Data Scientist
- Chief Data Scientist

WHERE ARE WE GOING?

Job Title

#1   Enterprise Architect

#2   Full Stack Engineer

#3   Data Scientist

#4   Devops Engineer

#5   Strategy Manager

#6   Machine Learning Engineer

#7   Data Engineer

#8   Software Engineer

#9   Java Developer

#10 Product Manager

#11 Back End Engineer

#12 Cloud Engineer

#13 HR Manager

#14 Business Development Manager

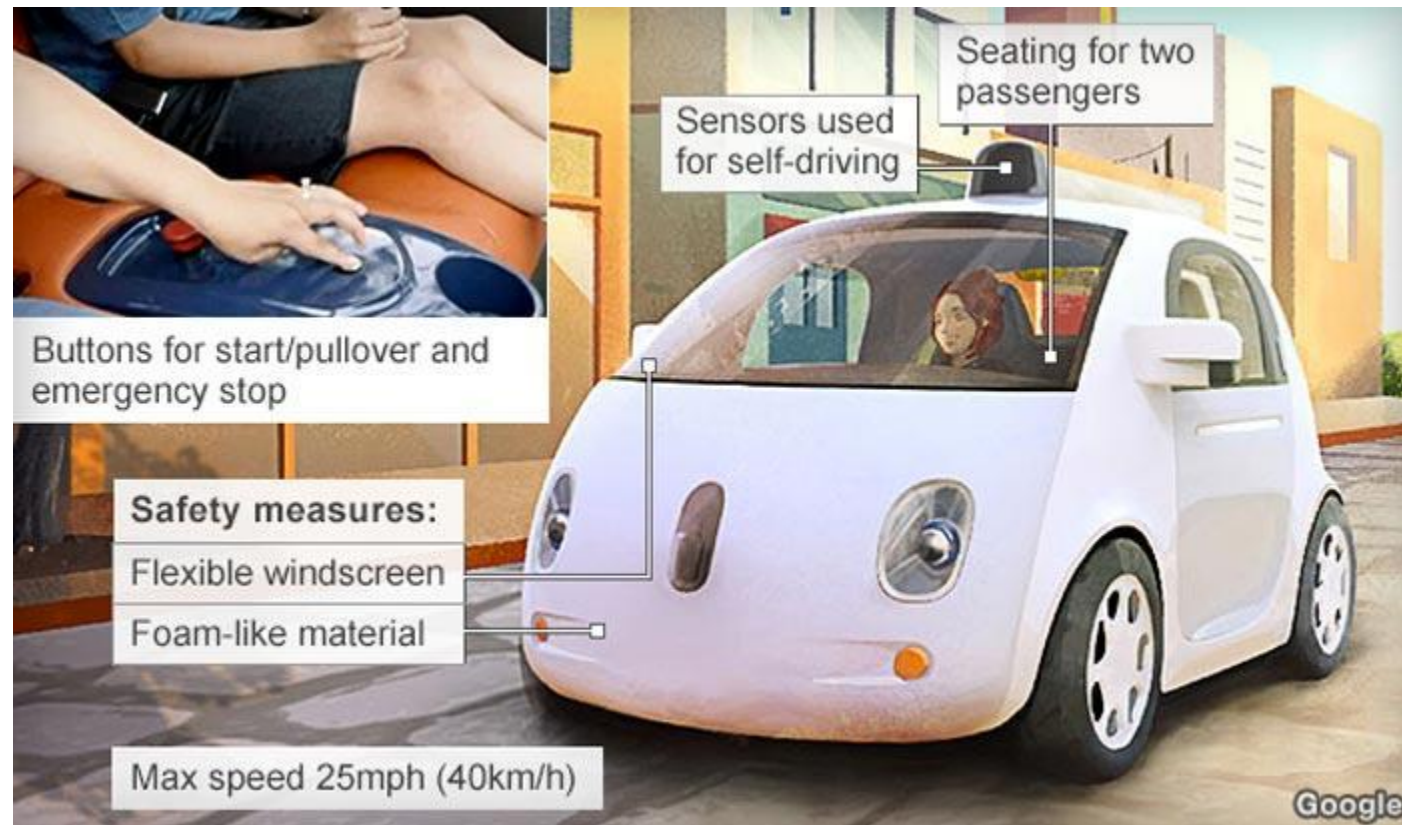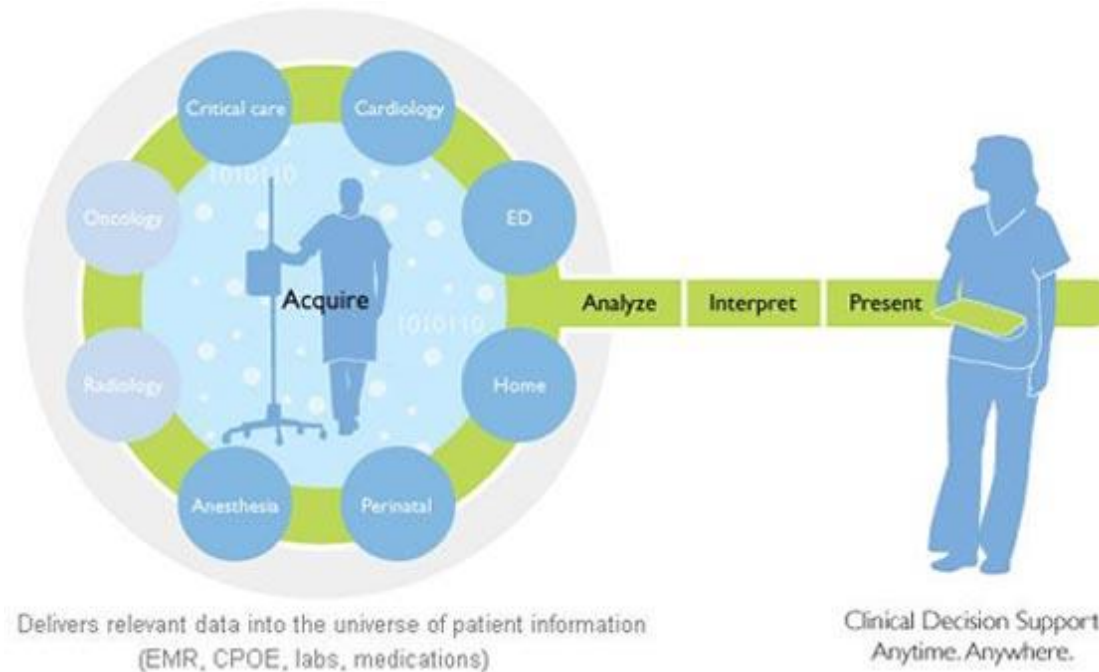#15 Information Security Engineer

#16 Physician

MACHINE LEARNING IN ACTION

MACHINE LEARNING IN ACTION

- Computers learning from medical records which treatments are most effective for new diseases

Delivers relevant data into the universe of patient information
(EMR, CPOE, labs, medications)

Clinical Decision Support
Anytime. Anywhere.

http://www.healthcare.philips.com/main/products/hi_pm/products/clinical_support.wpd

MACHINE LEARNING IN ACTION

- Houses learning from experience to optimize energy costs based on the particular usage patterns of their occupants

MACHINE LEARNING IN ACTION

- Helicopters can learn aerial tricks by watching other helicopters perform the stunts first

MACHINE LEARNING IN ACTION

- Document Classification

Sports
Science
News

MACHINE LEARNING IN ACTION
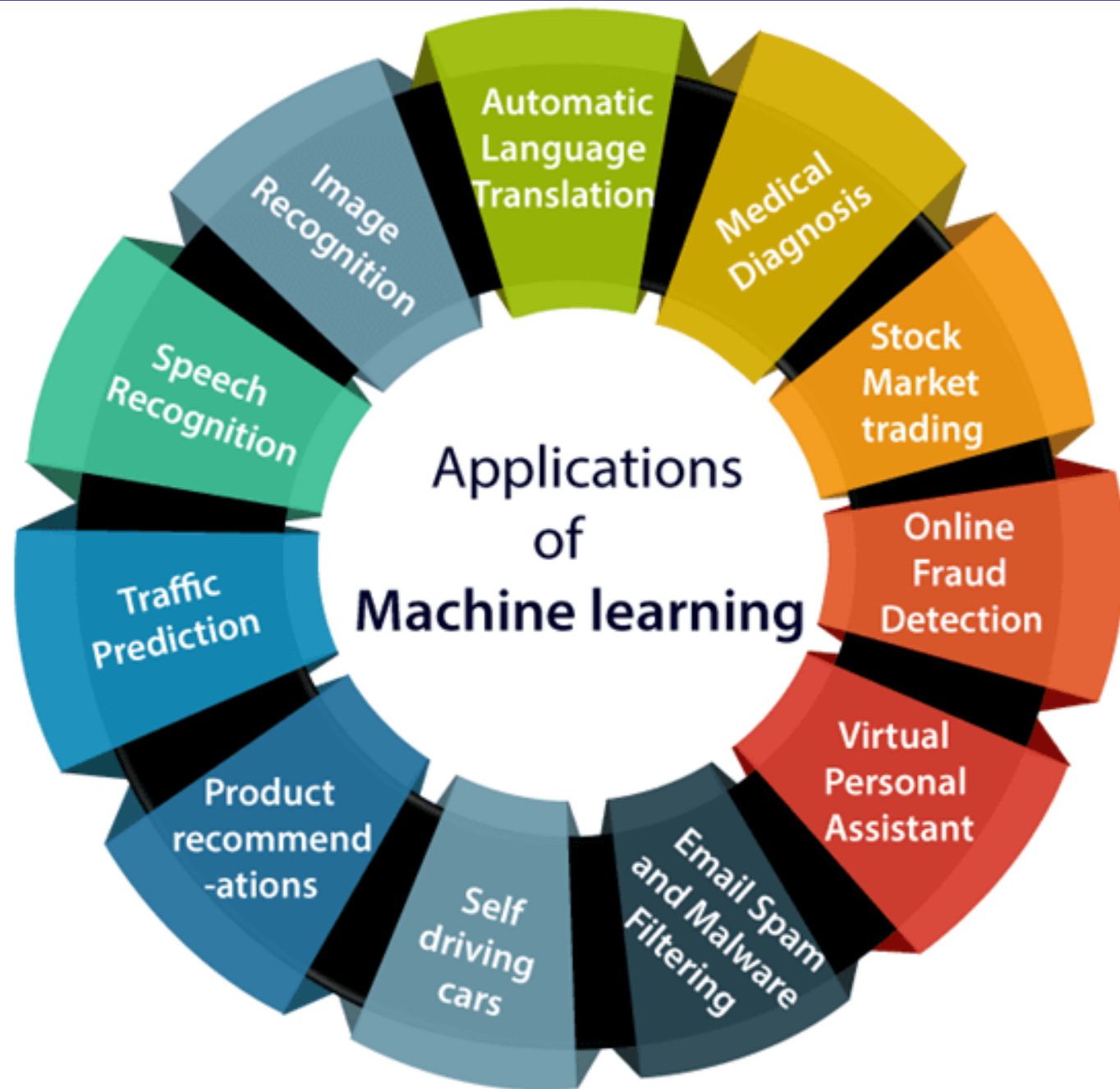
- Stock Market Prediction

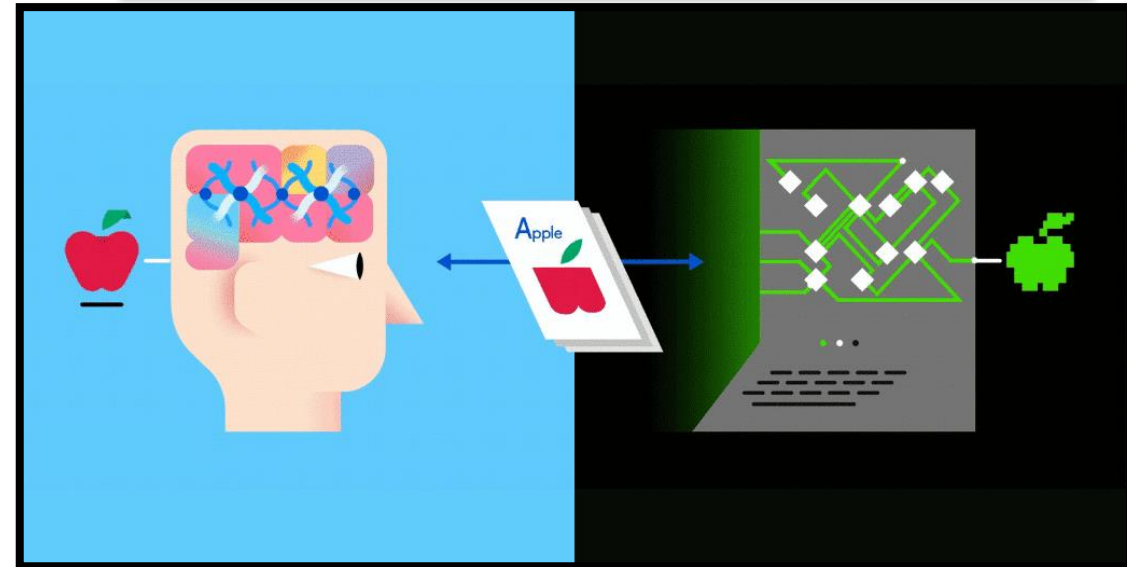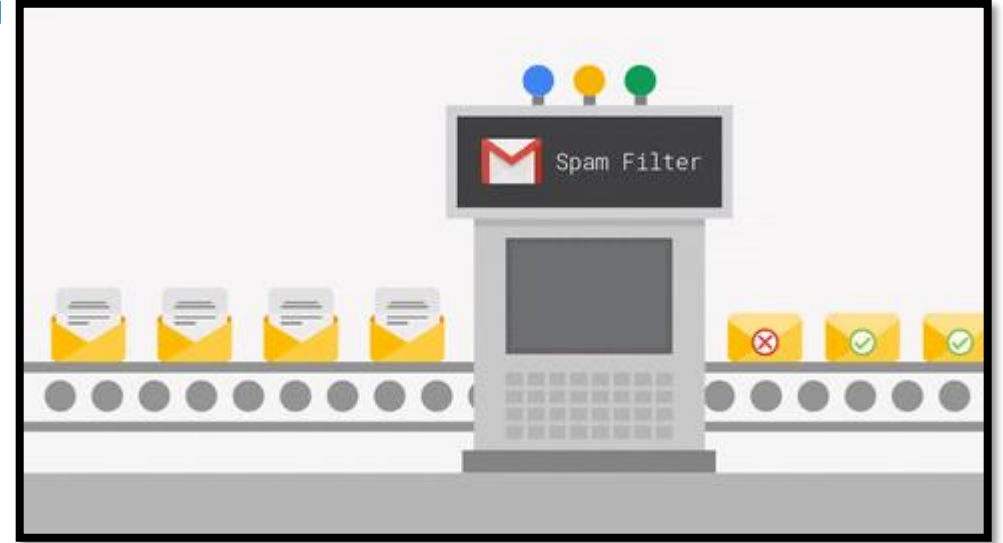# MACHINE LEARNING IN ACTION

- Weather Prediction

WHY ML?

- Data is everywhere and is generated at high speed.
  - Example: Every second, on average, **around 6,000** tweets are tweeted 350,000 tweets sent per minute, 500 million tweets per day and around 200 billion tweets per year.
- Writing a computer program with if-else conditions to solve a problem including lot of data is practically not feasible
- Machine Learning algorithms can provide a better solution
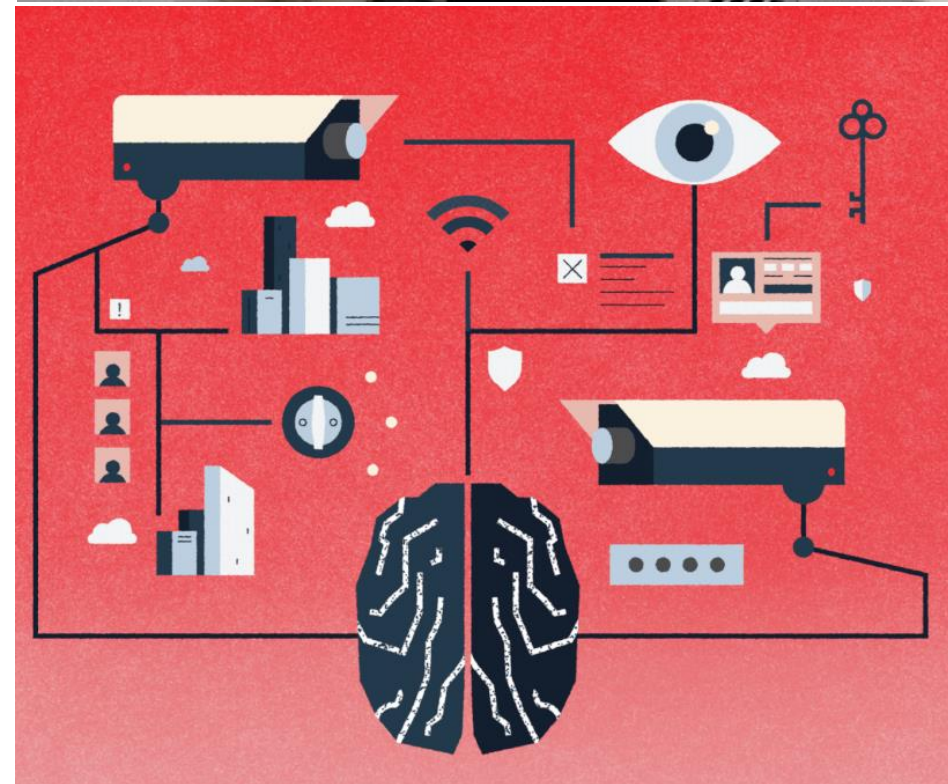 - Understand the data and make prediction on unseen data

Applications of Machine learning

- Automatic Language Translation
- Image Recognition
- Medical Diagnosis
- Speech Recognition
- Stock Market trading
- Traffic Prediction
- Online Fraud Detection
- Product recommend-ations
- Virtual Personal Assistant
- Self driving cars
- Email Spam and Malware Filtering

WHY ML?

➢ Traffic Alerts (Maps)

➢ Spam Detection

➢ Social Media

➢ Products Recommendations

➢ Speech Recognition

➢ Speech to Text Conversion

➢ Text to Speech Conversion

WHY ML?

➤ Fraud Detection

➤ Sentiment Analysis

➤ Chatbots

➤ ML for health care

   ➤ Detection and diagnosis

   ➤ Discovery of new drugs

➤ Security Purposes

   ➤ Cyber threat detection

   ➤ Weapon Detection

WHY ML?

- ➢ Faults Detection
- ➢ Character recognition
- ➢ Automatic License Plate Recognition
- ➢ Fingerprint Recognition
- ➢ Face Recognition
- ➢ Autonomous Car driving
- ➢ Object Detection and Tracking

Development Environment Setup

- Download and Install Anaconda
  - https://www.anaconda.com/
  - Individual Edition is Free
- Install Scikit-Learn
  - https://anaconda.org/anaconda/scikit-learn
  - For Python Learning : https://www.youtube.com/playlist?list=PL0lyaPtig4dat vqVgz3PWGVEjSGDf_1_q

Thank You ☺