Lecture 2 (Lesson 3 to 5)

Machine Learning is best suited for:

1. Pattern Recognition
2. Anomaly detection
3. Time Series Analysis
4. Recommendation system
   And much more.

Applications of Machine Learning, Deep Learning and Reinforcement Learning:

1. Natural Language Processing :
   It can be used to summarize texts, power search, topic detection, identifying if two texts are similar and convert Recorded Human Speech to Text, Text to spoken audio, and Translation of Speech etc.

2. Computer Vision:
   ML can also power Computer Vision applications like Self-driving cars, Object detection and Identification, LIDAR and visible spectrum.

3. Analytics:
   This includes Regression, classification, forecasting and unsupervised techniques like Clustering.

4. Decision Making:
   This includes Sequential decision making problems (like Video games) and Recommendation systems (E.g. Context Recommendation Systems based on User Interface).

Examples of ML

Machine learning is used to solve an extremely diverse range of problems. Eg. Healthcare and Banking use cases have multiple levels where ML can be applied.

1. Automating the recognition of a disease:
   ML can help extend the reach of human physician for those who cannot make an office visit and also enable higher amount of data that can be reviewed b physician alone.

2. Recommending next best plans for individual care plans:
   Through analysis of digital footprint (lab history and reported symptoms) advanced ML and analytical tools can help in potential diagnosis and recommend next best action for care.

3. Enabling Personalised real-time banking experience with Chabot's:
Machine learning can be used to intercept and handle common, straightforward issues through chat and messaging services, so customers can quickly and independently resolve simple issues that would otherwise have required human intervention

4. Identify the next best action for the customer:
Personally-tailored recommendations powered by machine learning can engage and delight customers with information and offers that are relevant to them.

5. Capture, prioritize, and route service requests to the correct employee, and improve response times:
A busy government can get innumerable requests on an annual basis. Ability to address such a volume of requests while maintaining high service can often strain on operation resources. ML tools can automate this process by capturing incoming service requests and routing to correct employee.

Data Process in Machine Learning

There are various stages in a Machine learning process:

1. Collecting Data :
This stage includes collecting data by writing codes to retrieve files, querying databases, calling web services or scrapping web pages.

2. Preparing Data:
This includes data wrangling, identifying new features to be added. A developer at this stage has to write code to clean data, explore and visualize data to identify features that can be useful in model training.

3. Training Model:
This stage includes selecting Algorithm to train the model, prepare train , test and validation datasets and evaluate best possible models. A developer at this stage needs to make a model pipeline (include feature vectorization, feature scaling, tuning ML algorithms. For tuning algorithms developers are also looking at performance on validation dataset that may involve some mathematics like computing certain evaluation metric or visualizing and interpreting graphs.

4. Evaluating Model :
This largely includes using dataset from validation set and analysing how it performs. At this stage, the developer has to write code or do math to test and compare performance of various models by comparing evaluation metrics and graphs on text data.

5. Deploying Model:
Deploying model is DevOps job that integrates training, evaluation and deployment scripts with respect to build and release pipelines.

6. Retrain the model:
   We need to retain the model on fresh data. It is an iterative process for models in production.