**Learning - M.L. with python (shortened version):**

<https://www.tutorialspoint.com/machine_learning_with_python/index.htm>

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**Introduction:**

* Machine Learning (ML) is a field of computer science with the help of which computer systems provide sense to data similar to human beings
  + ML is used along with AI and is a sub section of AI that extracts patterns from raw data by using an algorithm or method
* The key focus of ML is to allow computer systems to learn from experience without being explicitly programmed or human intervention (from second instance or nth time onwards)
  + Prerequisites: The reader must have basic knowledge of artificial intelligence. He/she should also be aware of Python, NumPy, Scikit-learn, Scipy, Matplotlib

**Basics:**

What is ML and need for ML:

* + Data is enriched with better computational power and more storage resources
  + Data Science, Data Mining and Machine Learning are major components, ML is most interesting with application of algorithms and science; ML provides sense to data in same way human beings do; ML extracts patterns out of data via an algorithm (sometimes automated) or methods (dynamic)
  + Why ML? ML to make decisions, based on data, with efficiency and scale; probably faster than human being

Why and When to make machines learn:

* + Lack of human expertise
  + Dynamic scenarios
  + Difficulty in translating expertise into human tasks

Machine Learning Model:

* + A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measured by P, improves with experience E
  + ML is a field of AI that consists of learning algorithms that:
    - Improve with Performance P
    - At executing some tasks T
    - Over time with experience E
      * Task - Task could be a problem to be solved that is achieved via algorithms or methods
      * Experience - When model is provided with dataset it runs iteratively and learns inherent patterns, this is termed as Experience
        + Supervised, Unsupervised and Reinforcement are some of the ways to gain experience, via learning with iterations
      * Performance - Performance of ML algorithm is measured via accuracy score, F1 score, confusion matrix, precision, recall, sensitivity etc.

Challenges in ML:

* + Quality of data
  + Time consuming task
  + Lack of specialist person
  + Formulating business problems with objective
  + Issue of overfitting and undercutting
  + Dimensionality issues with input data
  + Model deployment

Applications of ML:

* + Emotion Analysis
  + Sentiment Analysis
  + Error detection and prevention
  + Weather forecasting and prevention
  + Stock market analysis and forecasting
  + Speech synthesis
  + Speech recognition
  + Customer segmentation
  + Object recognition
  + Fraud detection
  + Fraud prevention
  + Recommendation of products to customer in online shopping

**Methods for Machine Learning:**

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**Research:**

Computational power: <https://community.codenewbie.org/theoriginalbpc/4-principles-to-computational-thinking-2cf9>

* Decomposition, Abstraction, Pattern Recognition and Algorithm generation are 4 principles of computation
  + Along with ensemble modeling
  + Outlier recognition
  + Other data deep dive

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