# Prerequisites

## NumPy

* The fundamental package for scientific computing with Python
* Check installations
  + Go to terminal and execute below command:

*python -m pip show numpy*

* In multi-dimensional arrays, all the sub arrays should have the same size and data types should be homogeneous.
* np.arange: Start is inclusive and end is exclusive. Step count is the distance between two elements.
* np.linspace: Start and end both are inclusive
* np.reshape: Total elements in reshaped array are equal to total elements in original array
* Size means total number of elements in an array

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| Problem | NumPy Solution |
| **Converting list into an array** | easyArray = np.array(easyList) |
| **Get dimensions of an array** | easyArray.ndim |
| **Get size of an array** | easyArray.size |
| **Get shape of an array** | easyArray.shape |
| **Create array contain all zeros and all ones ((row, column))** | arr0 = np.zeros((3,5))  arr1 = np.ones((5,3)) |
| **Generate random number (value between 0 to 1** | np.random.random() |
| **Generate array of random numbers ((row, column))** | np.random.random((3,5)) |
| **Loop over array (start, end, step count)** | np.arange(1, 10, 1) |
| **Find n number of arrays within range (start, end, n)** | np.linspace(1, 10, 5) |
| **Reshape an array** | arr\_random = np.random.random((3,5))  arr\_random\_reshaped = np.reshape(arr\_random, (5,3)) |
| **Sort an array** | sorted\_array = np.sort(original\_array) |
| **Find mean** | np.mean(sorted\_array) |
| **Find median** | np.median(sorted\_array) |
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# Notes:

* Intelligence is ability to learn and solve problems, that is, acquire and apply knowledge
* Applications of AI: NLP, gaming, speech recognition, vision systems, vehicle driving systems, financial advisors, whether forecasts, etc
* Intelligence components:
  + Reasoning
  + Learning
  + Problem solving
  + Perception
  + Linguistic abilities
* Types of learning
  + **Reward based learning:**

Entity gets trained to perform certain actions. Once the actions is performed by the entity then entity gets some reward. Entity remembers after performing tasks reward will be obtained.

* + Generalized learning:

Learning from one event can be applied to other similar events. This type of learning is called generalized learning.

* Segments of Artificial Intelligence:
  + Machine Learning

Purpose of machine learning to predict result at certain situation after being trained by another situation.

* + - Deep Learning

Neural networks are part of deep learning.

Neural networks resemble the human brain.

* + NLP / Natural Language Processing:

Ability to communicate with computer with human understandable language.

* + Computer vision
  + Robotics:

Union of software and hardware

* Types of AI research:
  + Computational psychology
  + Computational philosophy
  + Computer science
* Approaches of AI - How AI should act/think:
  + **Humanly**
    - **The Turing test approach – Acting humanly:**

Ideology: AI system passes the test only if human interrogator, after asking some written questions, cannot identify whether the returned responses are from human or the AI system

* + - **The cognitive modeling approaches – Thinking humanly:**

Ideology: Determine whether AI system thinks like human.

* + Rationally
    - The rational agent approaches.
    - The “laws of thought” approach
* John McCarthy is the father of AI.
* Data scientist work:
  + Understand problem.
  + Data collection and data storage
  + Data cleaning
    - Removes data irregularities.
    - Exploratory data analysis: Removal of insignificant / misleading data
  + Influence business decisions

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| Artificial Intelligence | Machine Learning | Deep Learning |
| Design algorithms that replicate human behavior | Train an algorithm to learn from experience | Uses neural networks like algorithms. Functional unit is neuron |
| It is field of science for engineering intelligent algorithms and devices | It helps in learning without explicitly being programmed | It helps in learning like humans from vast amounts of data |
| Chances of success are more important than accuracy | Accuracy is more important than success | Accuracy is more important than success.  Deep learning has maximum accuracy |
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# Resources:

* NumPy tutorial: <https://youtu.be/QUT1VHiLmmI>
* GeeksForGeeks course: