**MACHINE LEARNING**

**And Its Uses**

There are numerous applications of machine learning. It's actually hard to realize how much machine learning has achieved in real world applications.

Machine learning is generally just a way of fine tuning a system with tunable parameters. It is a way of making a system better with examples, usually in a supervised or unsupervised manner.

Machine learning is normally applied in the offline training phase.Thus machine learning is used to improve the following applications.

1. **Face detection**: The face detection feature in mobile cameras is an example of what machine learning can do. Cameras can automatically snap a photo when someone smiles more accurately now than ever before because of advances in machine learning algorithms.
2. **Face recognition**: This is where a computer program can identify an individual from a photo. You can find this feature on Facebook for automatically tagging people in photos where they appear. Advances in machine learning means more accurate auto-face tagging softwares.
3. **Image classification**: A good example is the application of deep learning to improve image classification or image categorization in apps such as Google photos. Google photos would not be possible without advances in deep learning.
4. **Speech recognition**: Another good example is Google now. Improvements in speech recognition systems has been made possible by, you guessed right, machine learning specifically deep learning.
5. **Google**: Google defines itself as a machine learning company now. It is also a leader in this area because machine learning is a very important component to it's core advertising and search businesses. It applies machine learning to improve search results and search suggestions.
6. **Anti-virus**: Machine learning is used in Anti-virus softwares to improve detection of malicious software on computer devices.
7. **Anti-spam**: machine learning is also used to train better anti-spam software systems.
8. **Genetics**: Classical data mining or clustering algorithms in machine learning such as agglomerative clustering algorithms are used in genetics to help find genes associated with a particular disease.
9. **Signal denoising:** Machine learning algorithms such as the K-SVD which is just a generalization of k-means clustering are used to find a dictionary of vectors that can be sparsely linearly combined to approximate any given input signal. Thus such a technique is used in video compression and denoising.
10. **Weather forecast**: Machine learning is applied in weather forecasting software to improve the quality of the forecast.

Machine learning makes it relatively easier to develop sophisticated software systems without much effort on the human side. Instead of spending years handcrafting features or fine tuning a system with a lot of parameters, machine learning does that quicker. It also only requires training data to learn better features or parameters needed to improve a given system.

The only drawback is that machine learning doesn't work well for non-convex problems or problems with discrete parameters that are not differentiable.

Machine learning algorithms are applicable to many real-life problems. Due to it being mainly an offline system applied only during training, it is hard to realize it's importance and contributions in reality.

Hope this helps.