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## The Future: Machine learning

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### Abstract:

*Learning is a process or activity of understanding and improving one's then it may be human or machineability to perform a operations efficiently. Machine learning is one of sub-field of computer science, which enables computers to learn and analyze thinks without being or writing explicitly programmed. It basically evolved from AI(artificial intelligence) via pattern recognition and computational learning theory. It also explores the area of algorithms, which can make high end predictions on data. Currently it deployed in a wide range of computing tasks, where designing efficient algorithms and programs becomes rather difficult, such as email spam filtering, optical character recognition, search engine improvement etc. Advance machine learning will basically concentrate on modeling, generation, and prediction of multiple inter-dependent variables.*

**Keywords:** AI, pattern, modeling, optical, program.

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### Introduction:

Now its a time in the world when technology is constantly evolving and adapting to boost and changes everyday efficiency and make our lives simple. Modern day technologies and tools give us the power to connect from around the world and bridge gaps as soon as they appear. One such advancement in technology is the rise of Machine Learning which is a part of Artificial Intelligence.

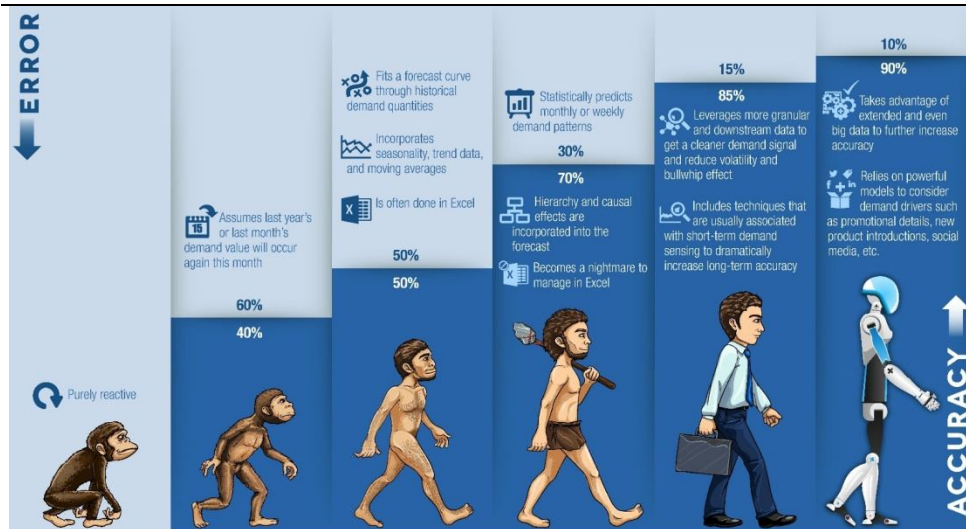
**Machine learning field is the study and developing of such algorithm which can learn and make decision and prediction on available data, such algorithm overcome the following strict static program instructions by making data driven analysis and prediction.**

Machine learning is used where designing and programming explicit algorithms get fail to give good performance like applications include email filtering, OCR etc.

Machine learning is closely overlap and related with computational mathematics and statistics, which basically focuses on data prediction-making with the use of computers and it ties to mathematical optimization methods.

Machine learning is used in many sectors like :

- Fraud detection.
- Web search results.
- Real-time ads on web pages and mobile devices.
- Text-based sentiment analysis.
- Credit scoring and next-best offers.
- Prediction of equipment failures.
- New pricing models.
- Network intrusion detection.
- Pattern and image recognition.
- Email spam filtering.



## Machine Learning algorithms and Classifications

Machine learning classified into following types:

### 1. Supervised

In this the system uses past or already done examples and new data sets to predict the outcomes. In this programmer must provide the system with inputs and outputs in order to train the software. Over time, the system can automatically construct outputs or targets for new data sets.

### 2. Unsupervised

It Does not involve any labels or data classifications. The system evaluates data in order to identify patterns and make inferences or predictions. It's not a matter of mapping the input to an output, but detecting more obscure trends or insights in the data set. There is also a sub-set category known as "semi-supervised", which combines unlabeled data and human-based training.

### 3. Reinforcement

This classification includes a specific task or goal that the system must complete. Throughout the process, it receives feedback in order to learn the desired behaviors. For example, the system encounters an error while performing the action or a reward for achieving the most favorable outcome. Thus, the program is able to learn the most effective approach via "reinforcement signals".

### 4. Semi-supervised learning

Used for the same applications as supervised learning. But it uses both labeled and unlabeled data for training – typically a small amount of labeled data with a large amount of unlabeled data (because unlabeled data is less expensive and takes less effort to acquire). Such type of learning can be used in methods such as classification, regression and prediction.

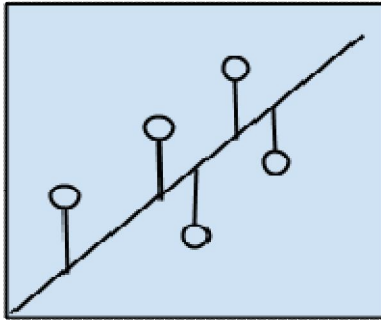
Machine Learning includes algorithms that allow the system to analyse and predict future outcomes and detected patterns based on specific user data. Here are some algorithm used in machine learning

### Regression Algorithms

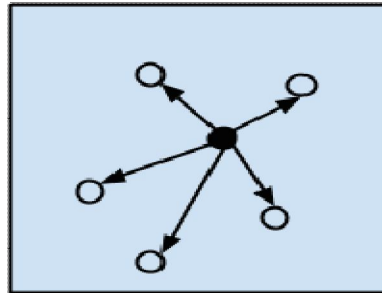
Regression is deal with modeling and structuring the relationship between variables .Such algorithms are:

- Multivariate Adaptive Regression Splines (MARS)
- Locally Estimated Scatterplot Smoothing (LOESS)
- Linear Regression

- Logistic Regression
- Stepwise Regression
- Ordinary Least Squares Regression (OLSR)



Regression Algorithms



Instance-based Algorithms

### Instance-based Algorithms

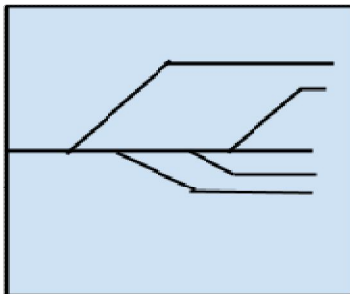
Such algorithms help in decision and such algorithms are

- Self-Organizing Map (SOM)
- Locally Weighted Learning (LWL)
- k-Nearest Neighbor (kNN)
- Learning Vector Quantization (LVQ)

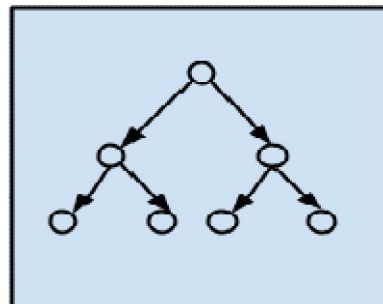
### Regularization Algorithms

Such algorithms analyze models based on their complexity and such algorithms are:

- Elastic Net
- Ridge Regression
- Least-Angle Regression (LARS)
- Least Absolute Shrinkage and Selection Operator (LASSO)



Regularization Algorithms



Decision Tree Algorithms

### Decision Tree Algorithms

Such algorithms made decisions based on actual values in the data. such algorithms are

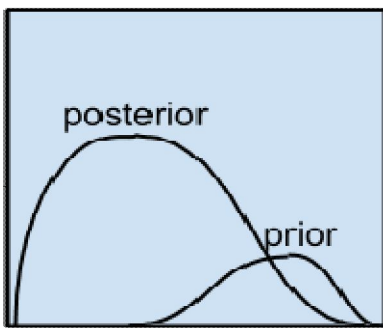
- Conditional Decision Trees
- C4.5 and C5.0 (different versions of a powerful approach)
- Chi-squared Automatic Interaction Detection (CHAID)
- Decision Stump
- Classification and Regression Tree (CART)

- Iterative Dichotomiser 3 (ID3)

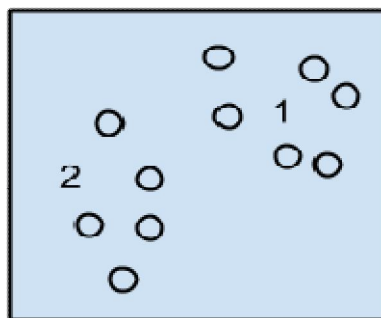
**Bayesian Algorithms**

Such algorithms related with classification and regression. such algorithms are

- Averaged One-Dependence Estimators (AODE)
- Bayesian Belief Network (BBN)
- Naive Bayes
- Gaussian Naive Bayes
- Bayesian Network (BN)
- Multinomial Naive Bayes



Bayesian Algorithms



Clustering Algorithms

**Clustering Algorithms**

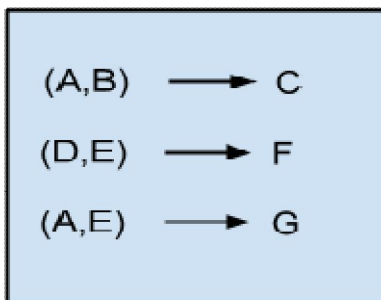
Such algorithms deal with cluster or collective data.

- Expectation Maximisation (EM)
- k-Means
- k-Medians
- Hierarchical Clustering

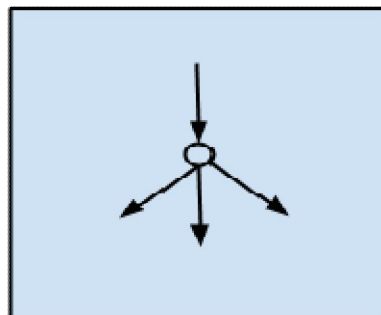
**Association Rule Learning Algorithms**

Such algorithms observe and analyse relation between variables.

- Eclat algorithm
- Apriori algorithm



Association Rule Learning Algorithms



Artificial Neural Network Algorithms

### Artificial Neural Network Algorithms

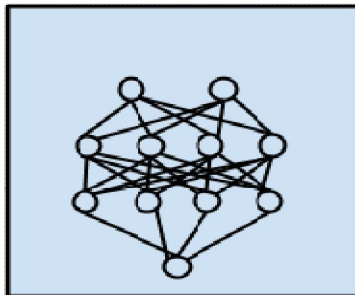
Such algorithms deal with structure or way used in neural network and such algorithm are:

- Back-Propagation
- Hopfield Network
- Perceptron
- Radial Basis Function Network (RBFN)

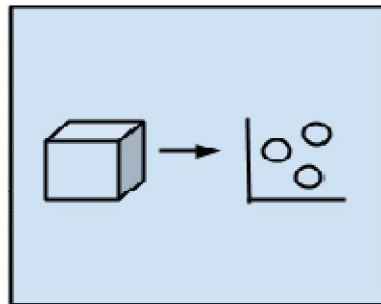
### Deep Learning Algorithms:

Such algorithm deal with computation

- Convolutional Neural Network (CNN)
- Stacked Auto-Encoders
- Deep Boltzmann Machine (DBM)
- Deep Belief Networks (DBN)



Deep Learning  
Algorithms



Dimensional Reduction  
Algorithms

### Dimensionality Reduction Algorithms

Such algorithm summarize or describe data using less information.

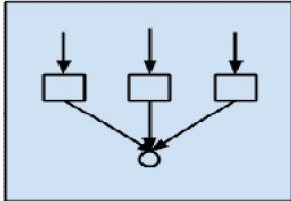
- Mixture Discriminant Analysis (MDA)
- Quadratic Discriminant Analysis (QDA)
- Partial Least Squares Regression (PLSR)
- Sammon Mapping
- Multidimensional Scaling (MDS)
- Projection Pursuit
- Principal Component Analysis (PCA)
- Principal Component Regression (PCR)
- Linear Discriminant Analysis (LDA)
- Flexible Discriminant Analysis (FDA)

### Ensemble Algorithms

Work for weaker models and make it more efficient..

- Gradient Boosted Regression Trees (GBRT)
- Random Forest
- Stacked Generalization (blending)
- Gradient Boosting Machines (GBM)

- Boosting
- Bootstrapped Aggregation (Bagging)
- AdaBoost



Ensemble Algorithms

### Other Algorithms

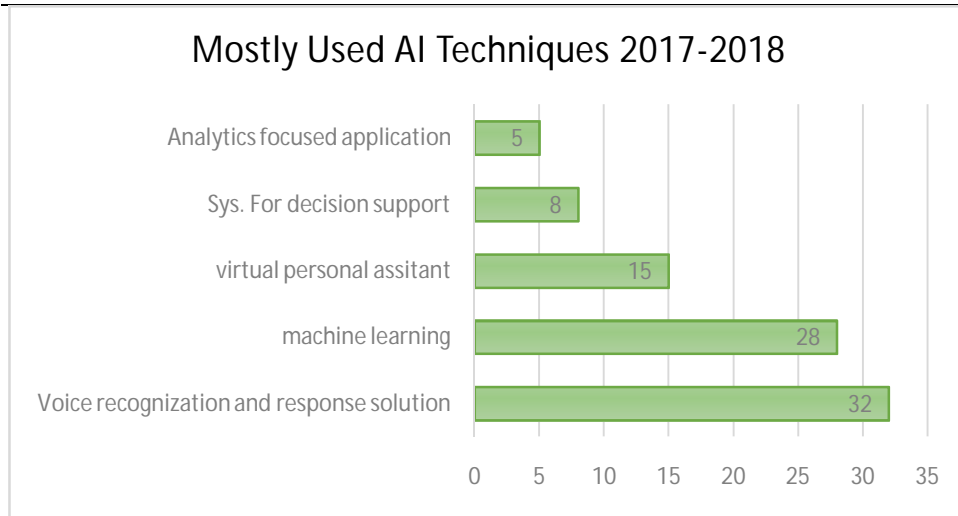
- Algorithm accuracy evaluation
- Computational intelligence (evolutionary algorithms, etc.)
- Natural Language Processing (NLP)
- Recommender Systems
- Reinforcement Learning
- Graphical Models
- Performance measures
- Feature selection algorithms
- Computer Vision (CV)

After this much info the question arise is what's the difference between data mining, machine learning and deep learning?

- Data mining discovers previously or past unknown patterns and knowledge. then used such knowledge for further operations.
- Machine learning is basically used to reproduce or produce known patterns and knowledge, automatically apply that to other data, and then it apply those results to decision making and actions.
- Deep learning combines advances in computing power and special types of neural networks to learn complicated patterns in large amounts of data. Deep learning techniques are currently state-of-the-art for identifying objects in images and words in sounds.

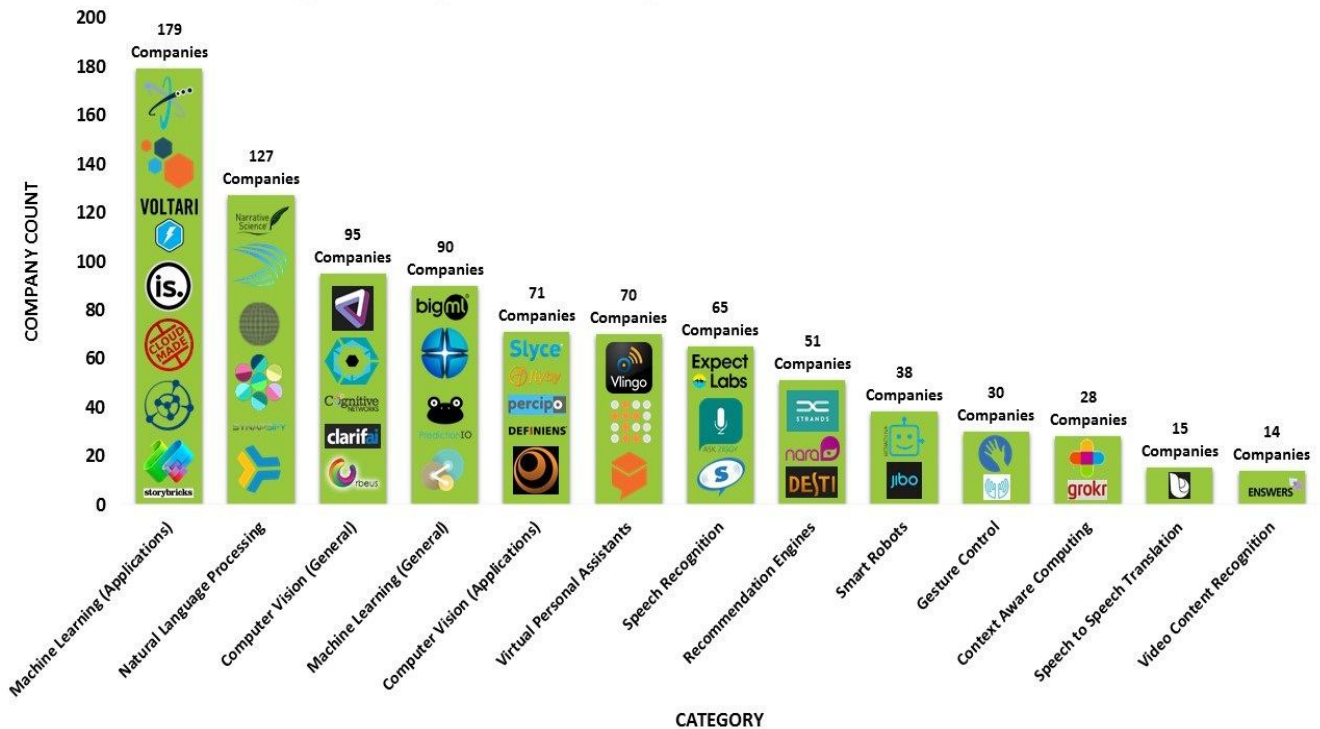
Widely publicized examples of ML.

- Self-driving Google car.
- Online recommendation offers like those from Amazon and Netflix
- Knowing what customers are saying about you on Twitter
- Fraud detection Etc.



- Above distribution is in percentage(%)

### Which Artificial Intelligence Categories Are Seeing the Most Innovation



### Advantage of machine learning:

- 1.Data Input from unlimited resources.
- 2.Fast processing and real time predictions.
- 3.make scenarios very simple.
- 4.heavily used in medical in dustries for data analysis.
- 5.Used in marketing industries for data predictions.
- 6.A system randomly initialized and trained on some datasets will eventually learn good feature

representations for a given task.

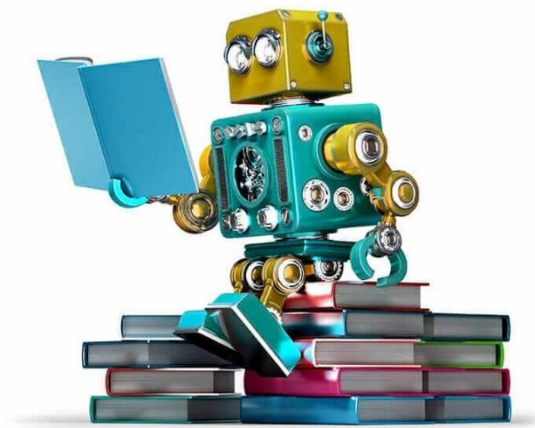
7. Deep learning based systems, data engineering and preprocessing costs are dropping.
8. Used for solving classification and regression problems.
9. Helps serve customer better and reduce attrition
10. Ensure better profiling to understand customer requirement.

**Disadvantage of machine learning:**

- It also Works with continuous loss functions which lead to incorrect analysis.
- With limited information or data it lead to incorrect prediction
- Large data is requirements for better output.

**Machine Learning Software**

1. Azure Machine Learning Studio
2. Google Cloud ML Engine
3. TensorFlow
4. BigML
5. C3 IoT
6. CrowdFlower
7. IBM Data Science Experience
8. NathanCORE
9. Protégé
10. SAP Leonardo Machine Learning
11. Shogun
12. Skytree
13. Torch
14. Weka
15. Wekinator



**Top Frameworks**



**Programming languages**





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### Conclusion:

This paper discuss about machine learning and what it is and what it use.it is a general technique which used in google,amazon ,Netflix and soon it used in many fields.currently this technology is quite new and not mature but soon it become the most used technology because it solve many problems related to data analysis ,prediction etc.

So future is ahead with machine learning and its correct time to learn and used this technology.

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