MACHINE LEARNING

The A Team

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Contents in Brief

Let’s Get Started

Machine Learning — What ?

Field of study that gives computers the ability to learn without being explicitly programmed.

Instead of writing code, you feed data to the generic algorithm and it builds its own logic based on the data.

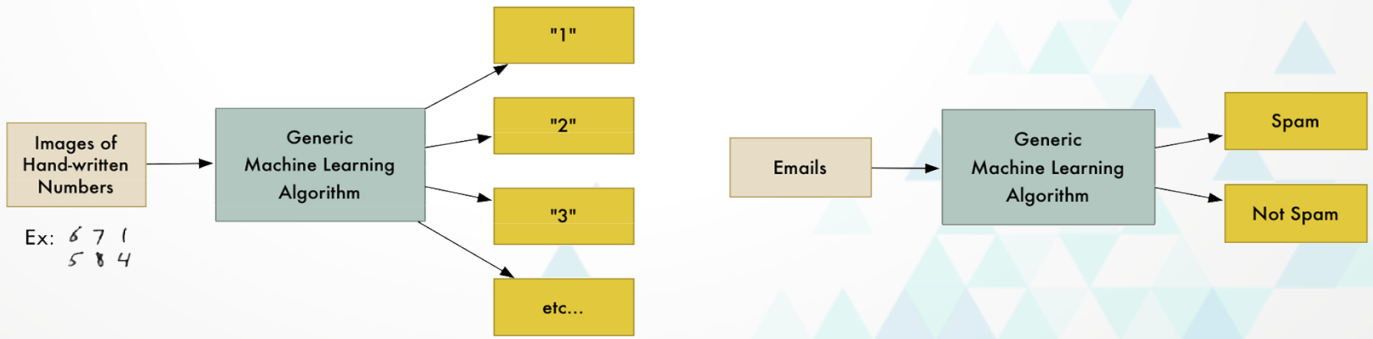

Figure: Classification Algorithms

Case Studies — Supervised Learning

Bedroom	Sq.Ft	Neighbourhood	Price
3	2000	Uptown	$350,000
2	800	Downtown	$200,000
2	850	City Centre	$150,000
1	550	Suburbs	$75,000
4	2000	Suburbs	$200,000

Bedroom	Sq.Ft	Neighbourhood	Price
3	2000	Uptown	???

Supervised learning is the machine learning task of inferring a function from labeled training data.

Case Studies — Supervised Learning

Math's Exam - Answer Keys	
1) 2 4 5 = 3	5) 6 2 2 = 10
2) 5 2 8 = 2	6) 3 1 1 = 2
3) 2 2 1 = 3	7) 5 3 4 = 11
4) 2 2 4 = 6	8) 1 8 1 = 7

- The training data consist of a set of training examples.
- Training Data :
  - Input Object : Set of Features
  - Desired Output : Supervisory Signal
- A supervised learning algorithm produces an inferred function.
- An analogus task in human and animal phsycology : Concept Learning.

Case Studies — Unsupervised Learning

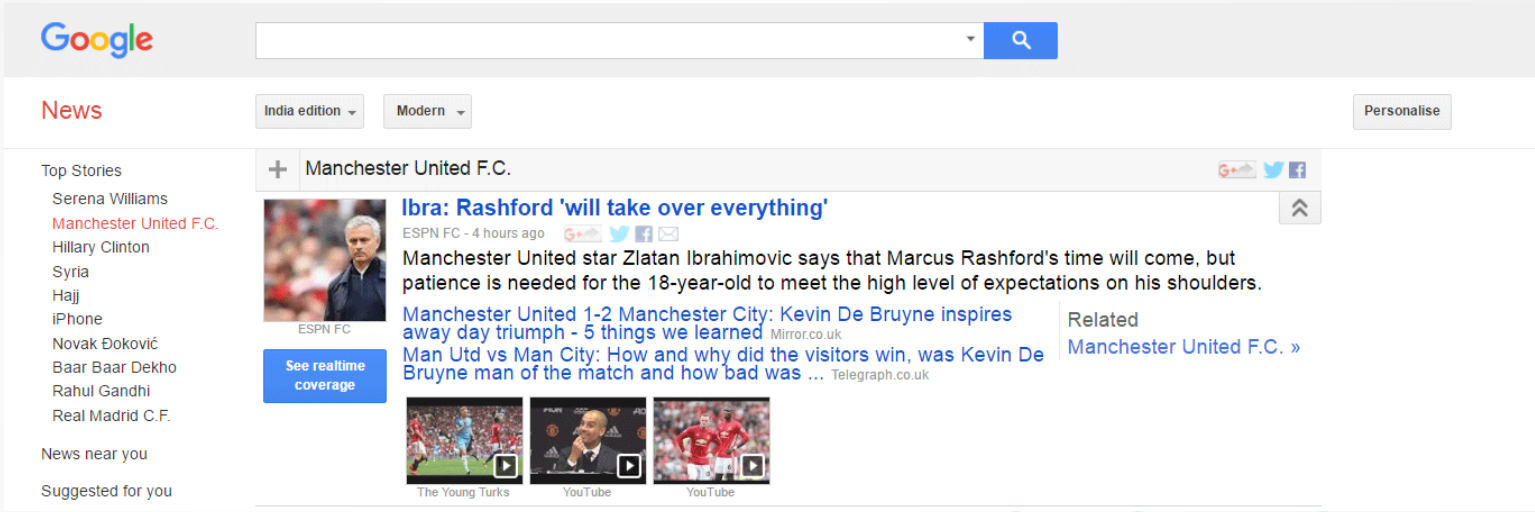

Figure: Google News grouping similar stories together.

Unsupervised learning is the machine learning task of inferring a function to describe hidden structure from unlabeled data.

Cocktail Party Problem — Unsupervised Learning

Sound from :

- *Microphone 1*
- *Microphone 2*

Output from
Learning Algorithm :

- *Output 1*
- *Output 2*

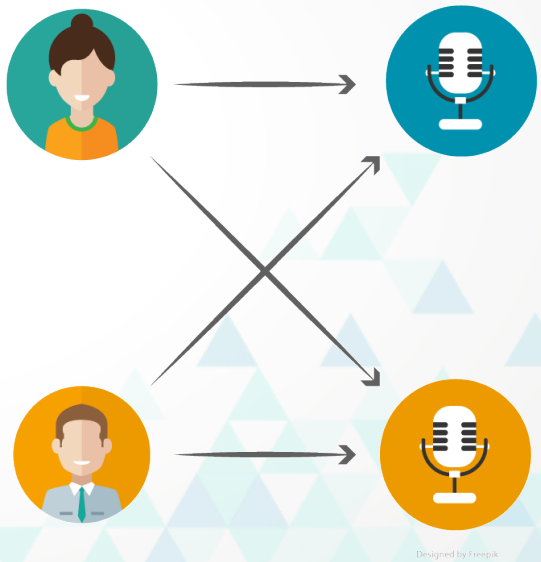

Figure: Overlapped Recordings

Case Studies — Unsupervised Learning

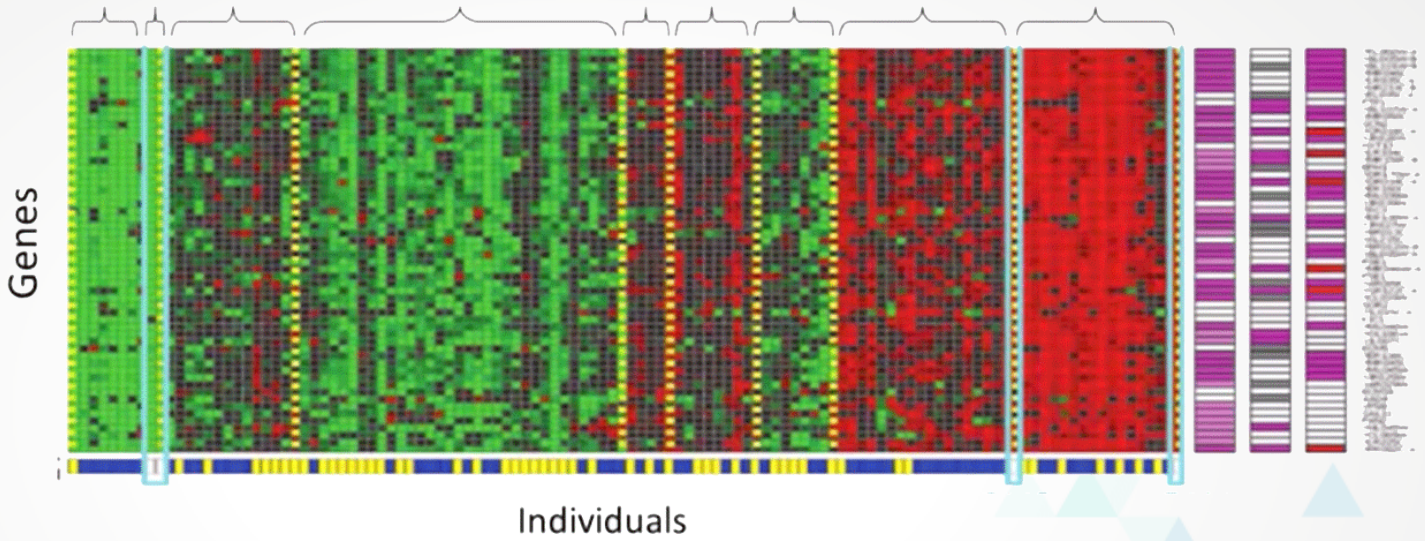

Figure: Gene Clustering

- Training Data given to the learner is unlabeled.
- No error or reward signal to evaluate a potential solution.
- Closely related to density estimation in statistics.

Machine Learning — Formal Definiton

The field of machine learning is concerned with the question of how to construct computer programs that automatically improve with experience.

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.

Evolved from :

- Pattern Recognition
- Computational Learning Theory
- Artificial Intelligence

Benefits — Machine Learning

Applications — Machine Learning

Introduction — Regression

Usages — Regression

Benefits — Regression

Example Cases — Regression

Introduction — Classifications

Usages — Classifications

Example Cases — Classifications

Introduction — Deep Learning

Neural Networks — Deep Learning

Meaning — Deep Learning

Usages — Deep Learning

Advantages — Deep Learning

The pain is almost over

Bibliography

- Phil Simon (March 18, 2013). Too Big to Ignore: The Business Case for Big Data. Wiley. p. 89. ISBN 978-1-118 -63817-0.
- Mitchell, T. (1997). Machine Learning, McGraw Hill. ISBN 0-07-042807-7
- Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar (2012) Foundations of Machine Learning, The MIT Press ISBN 9780262018258.
- Jordan, Michael I.; Bishop, Christopher M. (2004). "Neural Networks". In Allen B. Tucker. Computer Science Handbook, Second Edition (Section VII: Intelligent Systems). Boca Raton, FL: Chapman & Hall/CRC Press LLC. ISBN 1-58488-360-X.

Now that was very interesting!

The End