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8 Machine Learning Algorithms

A quick Revision

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K-Means Clustering

Groups similar data points together. Imagine sorting a pile of unsorted laundry – you put shirts with shirts, pants with pants, etc. K-Means does this with data. Finds groups in data without labels.

Examples:

- Figuring out what kind of customers a store has (who buys what).
- Spotting weird activity on a computer network (someone hacking?).
- Making images smaller by grouping similar colors.

Linear Regression

Predicts a number based on other numbers. Like predicting someone's height based on their weight.

- Assumes the numbers have a straight-line relationship.
- Draws a line that fits the data best.
- Good for simple predictions where the relationship is clear.
- Can be thrown off by outliers (really unusual data points).

Examples:

- Guessing house prices from their size and location.
- Predicting how much a company will sell based on how much they advertise.
- Estimating how much a crop will grow based on rain and sun.

Decision Tree

Makes decisions like a flow chart. Asks a series of yes/no questions to arrive at a conclusion.

- Can handle different types of data (numbers and categories).
- Can get too complex and "memorize" the data, leading to errors on new data.

Examples:

- Doctors diagnosing diseases based on symptoms.
- Banks deciding who gets a loan.
- Scientists classifying plants and animals.

Logistic Regression

Predicts a "yes" or "no" answer. Like figuring out if an email is spam or not spam.

- Uses a special curve (sigmoid) to turn numbers into probabilities (chances of yes/no).
- Good for figuring out categories.
- Can be extended to handle more than two categories.

Examples:

- Email spam filters.
- Fraud detection.
- Predicting if a customer will cancel a service.

Support Vector Machine (SVM)

Finds the best line (or plane) to separate different groups of data.

- Can handle complex data using "tricks" (kernels).
- Good for tough classification problems.
- Can be slow with lots of data.

Examples:

- Recognizing images (cats vs. dogs).
- Sorting text into categories.
- Recognizing faces.

K-Nearest Neighbors (KNN)

Classifies things based on what their neighbors are. Like if your 3 closest neighbors all like pizza, you probably like pizza too.

- Simple to understand.
- No training needed.
- Can be slow with lots of data.
- Sensitive to irrelevant information.

Examples:

- Recommending movies or products.
- Recognizing images.
- Finding unusual data points.

Random Forest

Combines many decision trees to make better predictions.

- Reduces the risk of overfitting.
- Can handle different types of data.
- Gives a measure of which features are important.

Examples:

- Predicting credit risk.
- Predicting stock prices.
- Diagnosing medical conditions.

Dimensionality Reduction

Makes data simpler by reducing the number of features. Like turning a 3D object into a 2D drawing.

- Makes data easier to work with.
- Helps avoid problems with too many features.
- Can make models faster and easier to understand.
-Loses some information.

Examples:

Making images smaller.
Extracting the most important information from data.
Showing complex data in a simple chart.

Naive Bayes

A simple way to classify things based on probabilities. Assumes everything is independent (which is "naive," hence the name).

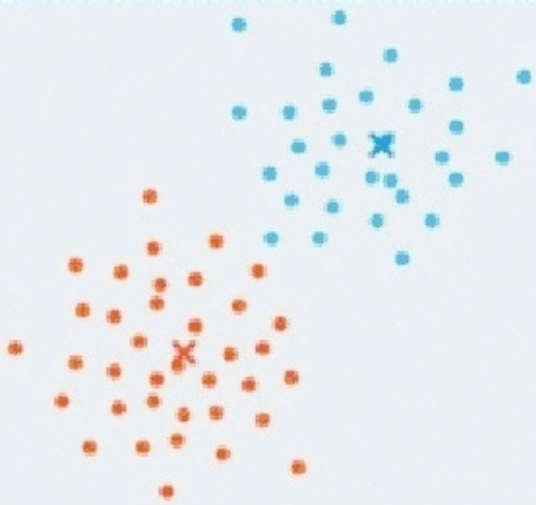
- Fast and efficient.
- Works well with lots of features.
- Can be used for many categories.
- Not always accurate if the features depend on each other.

Examples:

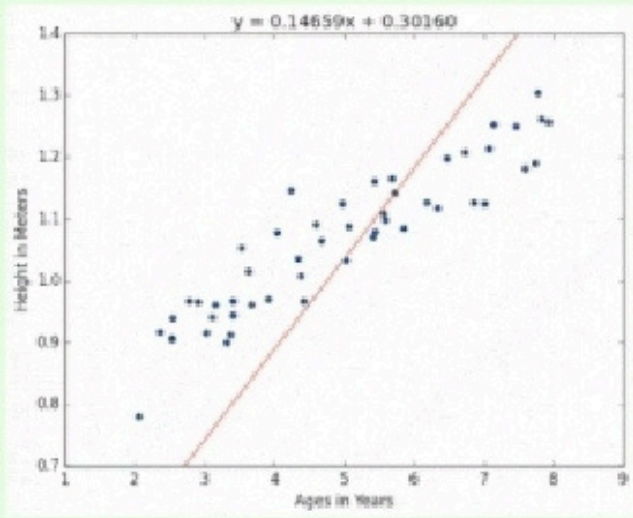
- Spam filtering.
- Classifying news articles.
- Figuring out someone's feelings from their writing.

Machine Learning Algorithms Graphs

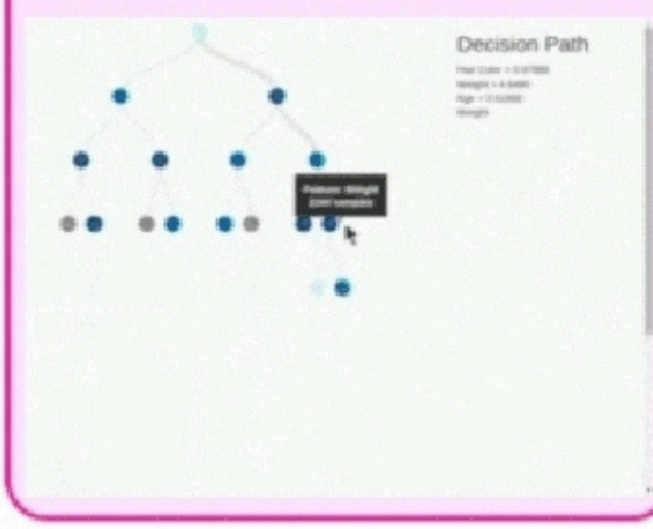
K Means Clustering



Linear Regression

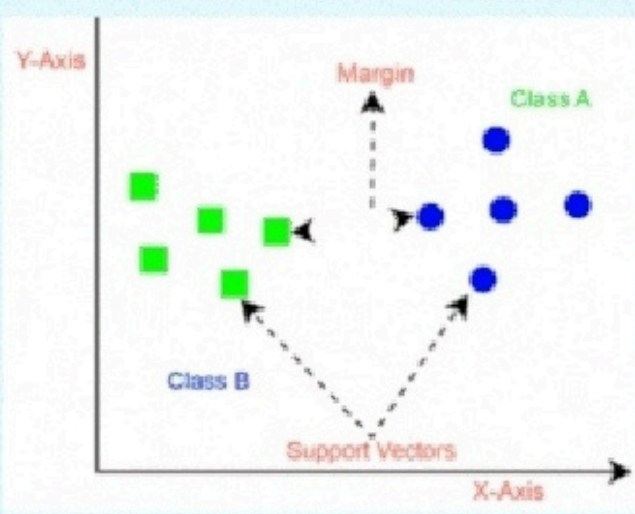


Decision Tree

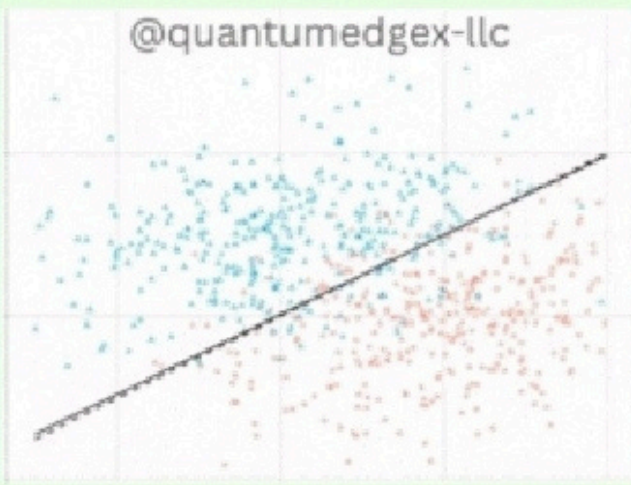


Logistic Regression

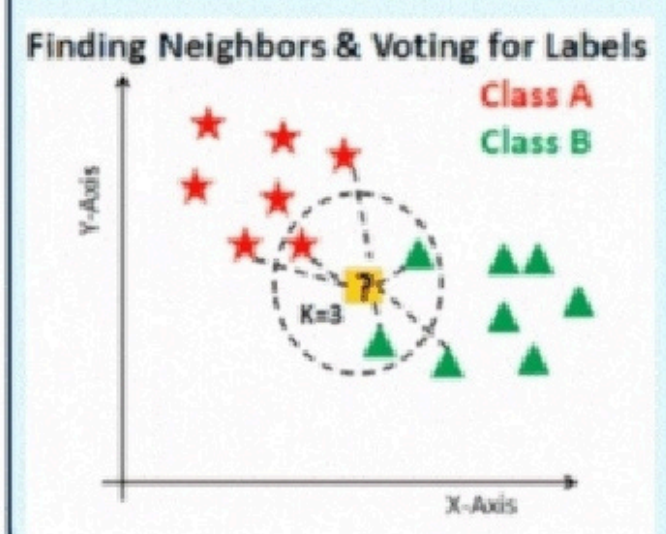
SVM



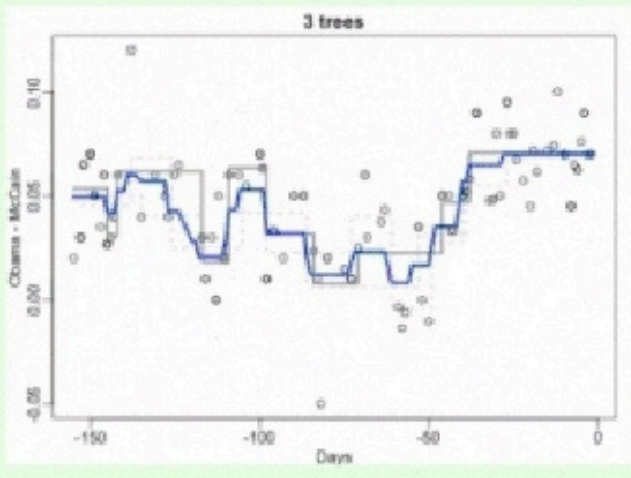
Naive Bayes



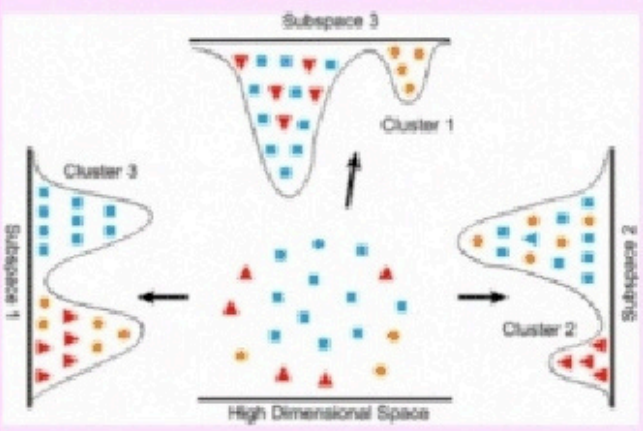
KNN



Random Forest



Dimensionality Reduction Algorithms



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