

Machine Learning Overview

MACHINE LEARNING IN EMOJI

Becoming Human.AI

SUPERVISED

human builds model based on input / output

UNSUPERVISED

human input, machine output
human utilizes if satisfactory

REINFORCEMENT

human input, machine output
human reward/punish, cycle continues

BASIC REGRESSION

LINEAR

`linear_model.LinearRegression()`

Lots of numerical data



LOGISTIC

`linear_model.LogisticRegression()`

Target variable is categorical



CLUSTER ANALYSIS

K-MEANS

`cluster.KMeans()`

Similar datum into groups based on centroids



ANOMALY DETECTION

`covariance.EllipticalEnvelope()`

Finding outliers through grouping



CLASSIFICATION

NEURAL NET

`neural_network.MLPClassifier()`

Complex relationships. Prone to overfitting
Basically magic.



K-NN

`neighbors.KNeighborsClassifier()`

Group membership based on proximity



DECISION TREE

`tree.DecisionTreeClassifier()`

If/then/else. Non-contiguous data.
Can also be regression.



RANDOM FOREST

`ensemble.RandomForestClassifier()`

Find best split randomly
Can also be regression



SVM

`svm.SVC()` `svm.LinearSVC()`

Maximum margin classifier. Fundamental
Data Science algorithm



NAIVE BAYES

`GaussianNB()` `MultinomialNB()` `BernoulliNB()`

Updating knowledge step by step
with new info



FEATURE REDUCTION

T-DISTRI STOCHASTIC NEIB EMBEDDING

`manifold.TSNE()`

Visual high dimensional data. Convert
similarity to joint probabilities



PRINCIPLE COMPONENT ANALYSIS

`decomposition.PCA()`

Distill feature space into components
that describe greatest variance



CANONICAL CORRELATION ANALYSIS

`decomposition.CCA()`

Making sense of cross-correlation matrices



LINEAR DISCRIMINANT ANALYSIS

`lda.LDA()`

Linear combination of features that
separates classes



OTHER IMPORTANT CONCEPTS

BIAS VARIANCE TRADEOFF

UNDERFITTING / OVERFITTING

INERTIA

ACCURACY FUNCTION

$(TP+TN) / (P+N)$

PRECISION FUNCTION

`manifold.TSNE()`

SPECIFICITY FUNCTION

$TN / (FP+TN)$

SENSITIVITY FUNCTION

$TP / (TP+FN)$