

# MACHINE LEARNING IN EMOJI



SUPERVISED



UNSUPERVISED



REINFORCEMENT



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



or



## 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



## CLUSTER ANALYSIS



K-MEANS

`cluster.KMeans()`

Similar datum into groups  
based on centroids



ANOMALY DETECTION

`covariance.EllipticalEnvelope()`

Finding outliers  
through grouping



## FEATURE REDUCTION

T-DISTRIE STOCHASTIC NEIB EMBEDDING

`manifold.TSNE()`

Visualize 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

$TP / (TP + FP)$

SPECIFICITY FUNCTION

$TN / (FP + TN)$

SENSITIVITY FUNCTION

$TP / (TP + FN)$

