

QUICK START GUIDE

Machine Learning with MATLAB

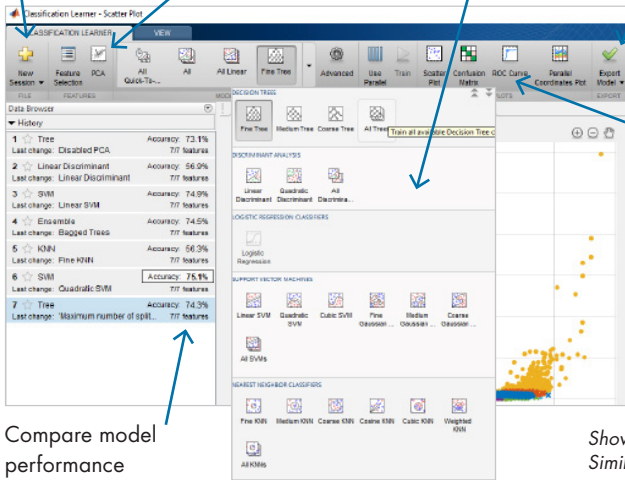
Train Models in Learner Apps

Import data from workspace or file

Enable PCA for feature reduction

Select among all common algorithms

Export model to further optimize or integrate with other code



Visually assess model performance

Shown: Classification Learner
Similar: Regression Learner

Compare model performance

Machine Learning Functions

Naming Convention

fit + c(classification) / r(egression) + model
e.g., for SVM classifier $m = \text{fitsvm}(X,Y)$

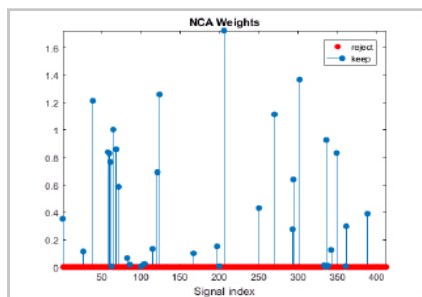
Algorithm		Model
Decision tree	c,r	tree
Linear model	c,r	linear
Support vectors	c,r	svm
Gaussian kernel	c,r	kernel
Ensembles (incl. random forest)	c,r	ensemble
K-nearest neighbor	c	knn
Discrim. analysis	c	discr
Naive Bayes	c	nb
Gaussian process	r	gp
(Gen.) Linear regression		(g)lm
Nonlin. regression		nlm

Feature Selection

Neighborhood Component Analysis

Automate identifying the features with predictive power.

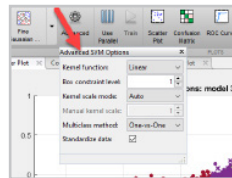
```
fscnca(X labels, 'Lambda',...);
find mdl.FeatureWeights > 0.01
```



Also available: Matrix factorization
PCA
Stepwise regression
Sparse filtering
Reconstruction ICA
t-SNE

Hyperparameter Tuning

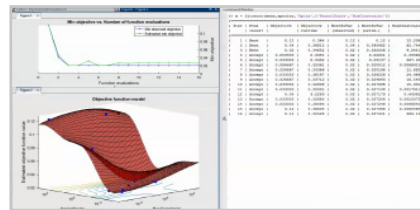
Explore and change parameters in app:



Automated Bayesian Optimization

Leverage Bayesian model to decide which points in the hyperparameter space to try next. Much faster than grid search.

```
mdl = fit...(X,labels,
'OptimizeHyperparameters','auto');
```



Deploy

Standalone, Web Apps, Spark

Share as standalone, MapReduce, and Apache Spark™ applications; web apps; and Microsoft® Excel® add-ins.

Integrate with Enterprise IT/OT

Convert into C/C++, Java®, .NET, or Python® library using MATLAB Compiler SDK™.

C-Code Generation

Automatically convert to C/C++ code for embedded deployment using MATLAB Coder™

1. Train model $Mdl = \text{fitsvm}(X,Y)$;
2. $\text{saveCompactModel}(Mdl, 'mySVM');$;
3. Define entry-point function

```
function label = predictSVM(x)
    m = loadCompactModel('mySVM');
    label = predict(m,x);
end
```
4. Generate C code
 $\text{codegen predictSVM -args \{X\}}$

Learn more: mathworks.com/machine-learning