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QUICK START GUIDE

Machine Learning with MATLAB

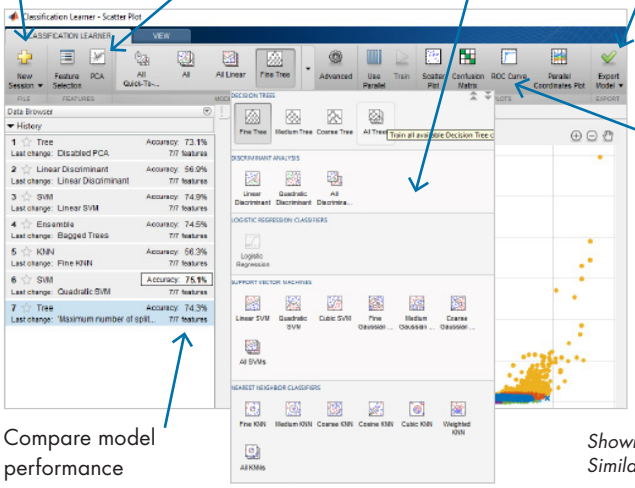
Train Models in Learner Apps

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

Compare model performance

Shown: Classification Learner
Similar: Regression Learner

Machine Learning Functions

Naming Convention

`fit` + `c`(lassification) / `r`(egression) + `model`

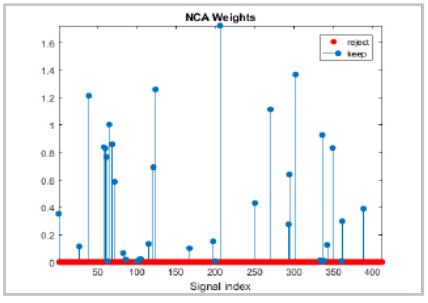
e.g., for SVM classifier `m = fitcsvm(X,Y)`

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`
Naïve 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.

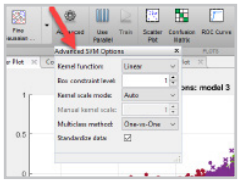
```
fscnca(X labels, 'Lambda',…);
find(mdl.FeatureWeights > 0.01)
```



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

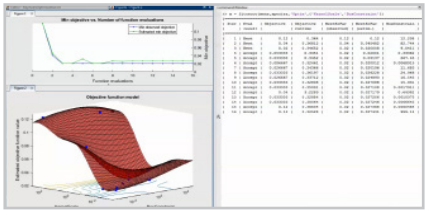
Hyperparameter Tuning

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 = fitcsvm(X,Y);`
2. `saveCompactModel(Mdl,'mySVM');`
3. Define entry-point function

```
function label = predictSVM(x)
  m = loadCompactModel('mySVM');
  label = predict(m,x);
end
```

4. Generate C code

```
codegen predictSVM -args {X}
```

Learn more: *mathworks.com/machine-learning*