Machine Learning Toolkit

Use this document for a quick list of ML search commands as well as some tips on the more widely used algorithms from the Machine Learning Toolkit.

Search Commands for Machine Learning	The Machine Learning Toolkit provides custom search commands for applying machine learning to your data.	
Command	**Description**	**Syntax**
fit	Fit and apply a machine learning model to search results.	`... | fit algorithm y from x params into model_name as output_field`
apply	Apply a machine learning model that was learned using the fit command.	`... | apply model_name as output_field`
summary	Return a summary of a machine learning model that was learned using the fit command.	`| summary model_name`
listmodels	Return a list of machine learning models that were learned using the fit command.	`| listmodels`
deletemodel	Delete a machine learning model that was learned using the fit command.	`| deletemodel model_name`
sample	Randomly sample or partition events.	`... | sample options by split_by_field`
score	Run statistical tests to validate model outcomes.	`... | score method actual predicted options`

FREQUENTLY USED ALGORITHMS

Anomaly Detection	Find events that contain unusual combinations of values.
Algorithm	**Examples**
LocalOutlierFactor	`... | fit LocalOutlierFactor * n_neighbors=10 algorithm=kd_tree metric=minkowski p=1 contamination=0.14 leaf_size=10`
OneClassSVM	`... | fit OneClassSVM * kernel=poly nu=0.5 coef0=0.5 gamma=0.5 tol=1 degree=3 shrinking=f into TESTMODEL_OneClassSVM`

Feature Extraction	Feature extraction algorithms transform fields for better prediction accuracy.
Algorithm	**Examples**
FieldSelector	`... | fit FieldSelector type=categorical SLA_violation from *`
KernelPCA	`... | fit KernelPCA * k=3 gamma=0.001`
PCA	`... | fit PCA * k=3`
TFIDF	`... | fit TFIDF Reviews into user_feedback_model max_def=0.6 min_def=0.2`

Preprocessing	Preprocessing algorithms are used for preparing data and help with prediction accuracy.
Algorithm	**Examples**
RobustScaler	`... | fit RobustScaler *`
StandardScaler	`... | fit StandardScaler *`

Cluster Numeric	Partition events with multiple numeric fields into clusters.
Algorithm	**Examples**
Birch	`... | fit Birch * k=3`
DBSCAN	`... | fit DBSCAN * eps=0.9`
KMeans	`... | fit KMeans * k=3`
SpectralClustering	`... | fit SpectralClustering * k=3`
XMeans	`... | fit XMeans *`

Forecasting	Forecast future values given past values of a metric (numeric time series).
Algorithm	**Examples**
ARIMA	`... | fit ARIMA Voltage order=4-0-1`

Predict Numeric

Predict the value of a numeric field using the values of other fields in that event.

Algorithm	Examples
DecisionTreeRegressor	`... | fit DecisionTreeRegressor temperature from date_month date_hour into temperature_model`
ElasticNet	`... | fit ElasticNet temperature from date_month date_hour normalize=true alpha=0.5 into temperature_model`
GradientBoostingRegressor	`... | fit GradientBoostingRegressor temperature from date_month date_hour into temperature_model`
KernelRidge	`... | fit KernelRidge temperature from date_month date_hour into temperature_model`
Lasso	`... | fit Lasso temperature from date_month date_hour into temperature_model`
LinearRegression	`... | fit LinearRegression temperature from date_month date_hour into temperature_model`
RandomForestRegressor	`... | fit RandomForestRegressor temperature from date_month date_hour into temperature_model`
Ridge	`... | fit Ridge temperature from date_month date_hour normalize=true alpha=0.5 into temperature_model`
SGDRegressor	`... | fit SGDRegressor temperature from date_month date_hour into temperature_model`

Predict Categorical

Predict the value of a categorical field using the values of other fields in that event.

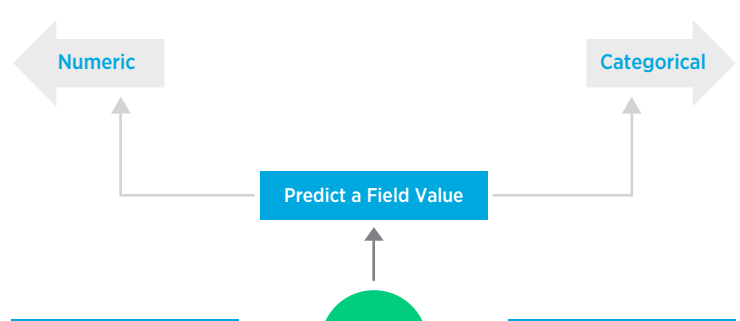
Algorithm	Examples
BernoulliNB	`... | fit BernoulliNB species from * alpha=0.5 binarize=0 fit prior=f into species_model`
DecisionTreeClassifier	`... | fit DecisionTreeClassifier SLA_violation from * into sla_model`
GaussianNB	`... | fit GaussianNB species from * into species_model`
GradientBoostingClassifier	`... | fit GradientBoostingClassifier species from * into species_model`
LogisticRegression	`... | fit LogisticRegression SLA_violation from IO_wait_time into sla_model`
MLPClassifier	`... | fit MLPClassifier species from * into species_model`
RandomForestClassifier	`... | fit RandomForestClassifier SLA_violation from * into sla_model`
SGDClassifier	`... | fit SGDClassifier SLA_violation from * into sla_model`
SVM	`... | fit SVM SLA_violation from * into sla_model`

Predict Numeric Fields (Regression)

- DecisionTreeRegressor
- ElasticNet
- GradientBoostingRegressor
- KernelRidge
- Lasso
- LinearRegression
- RandomForestRegressor
- Ridge
- SGDRegressor

Predict Categorical Fields (Classification)

- BernoulliNB
- DecisionTreeClassifier
- GaussianNB
- GradientBoostingClassifier
- LogisticRegression
- MLPClassifier
- RandomForestClassifier
- SGDClassifier
- SVM



Forecast Numeric Time Series

- ARIMA
- KalmanFilter (use predict command)

Detect Outliers

- anomalydetection (command)
- LocalOutlierFactor
- OneClassSVM
- streamstats, median, mean, p25, p75

Cluster Numeric Events

- Birch
- DBSCAN
- KMeans
- SpectralClustering
- XMeans

Analyze Data

- ACF (autocorrelation function)
- PACF (partial autocorrelation function)

Feature Extraction

- FieldSelector
- KernelPCA
- PCA
- TFIDF

Preprocessing

- RobustScaler
- StandardScaler

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