Machine Learning

Lecture 10: Create Your First ML Project

COURSE CODE: CSE451

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Course Teacher

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Iris Flower Classification

Iris Flower Dataset

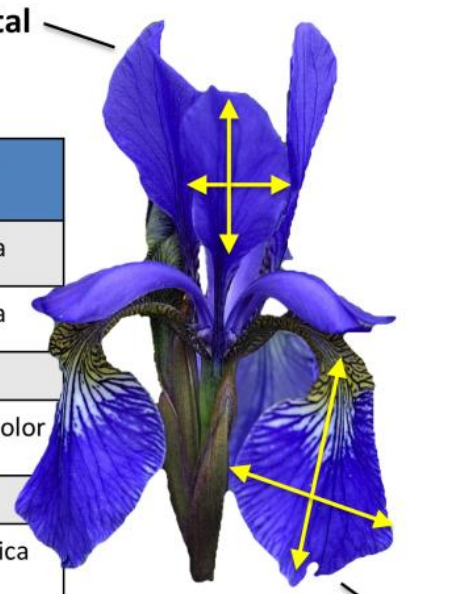
- 150 samples
- 3 labels/categories: Species of Iris (Iris setosa, Iris virginica and Iris versicolor)
- 4 features: Sepal length, Sepal width, Petal length, Petal Width in cm

- Download Link: Kaggle

Iris Dataset Instances

Samples
(instances, observations)

	Sepal length	Sepal width	Petal length	Petal width	Class label
1	5.1	3.5	1.4	0.2	Setosa
2	4.9	3.0	1.4	0.2	Setosa
...					
50	6.4	3.5	4.5	1.2	Versicolor
...					
150	5.9	3.0	5.0	1.8	Virginica

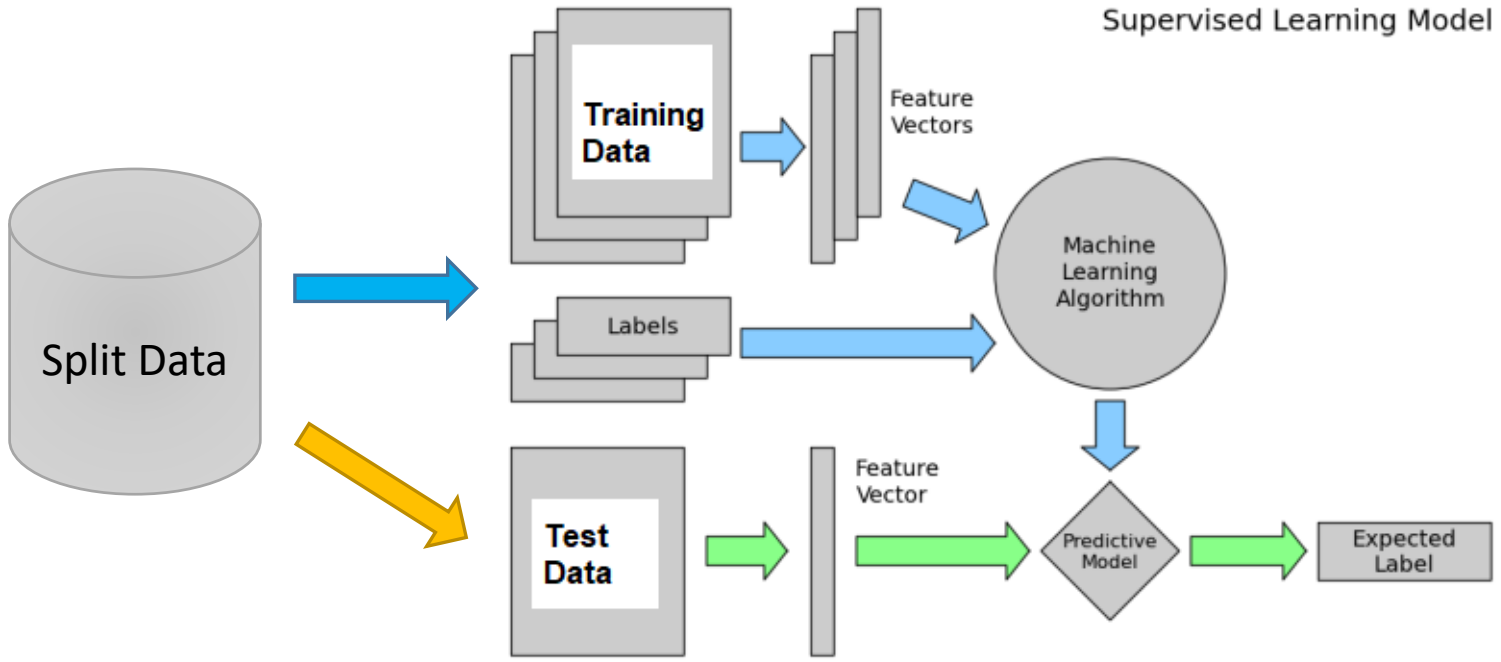


Features
(attributes, measurements, dimensions)

Class labels
(targets)

Supervised Learning Workflow

- Also called Predictive Modeling



Supervised Learning Steps

1. Data collection
2. Data Pre-Processing
3. Spilt dataset into training and test set
4. Choose Machine Learning algorithm
5. Train/build Model
6. Test Model/Evaluation
7. Fine-tune Model
8. Deployment for Predictions

Import libraries

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn import tree
from sklearn.metrics import accuracy_score
```

Load the dataset

```
iris_data = pd.read_csv('IRIS.csv')
```

Summarize the dataset

```
# dimensions (no. of rows & columns)
print(iris_data.shape)
# list of columns/features
print(iris_data.columns)
# peek some data
print(iris_data.head(10))
# statistical summary
print(iris_data.describe())
```

Specify the target variable and its distribution

```
# target variable
target = iris_data['species']

# distribution of class labels or categories
print(pd.value_counts(target))
```

Specify the target variable and its distribution

```
# target variable
target = iris_data['species']

# distribution of class labels or categories
print(pd.value_counts(target))

# alternative of finding class distribution
print(iris_data.groupby('species').size())
```

Split dataset into training and test data

```
seed = 7
train_data, test_data = train_test_split(iris_data, test_size=0.3,
random_state= 7)
# shape of the datasets
print('\nShape of training data :',train_data.shape)
print('\nShape of testing data :',test_data.shape)
# class distribution of the training data
print(pd.value_counts(train_data['species']))
# class distribution of the test data
print(pd.value_counts(test_data['species']))
```

Balanced split of the dataset

```
seed = 7
train_data, test_data = train_test_split(iris_data, test_size=0.3,
random_state=seed, stratify=target)
```

Why do we use random state in splitting dataset?
Find in on stackoverflow.

Separate the independent and target variables

```
# separate the independent and target variables from training data
train_x = train_data.drop(columns=['species'],axis=1)
train_y = train_data['species']

# separate the independent and target variables from test data
test_x = test_data.drop(columns=['species'],axis=1)
test_y = test_data['species']
```

Build the model

```
# create a classifier object/model
model=tree.DecisionTreeClassifier()

# train the model with fit function
model.fit(train_x, train_y)
```

Make predictions

```
# make predictions on training data
predictions_train = model.predict(train_x)
print('\nTraining Accuracy :', accuracy_score(train_y, predictions_train))

# make predictions on test data
predictions_test = model.predict(test_x)
print('\nTest Accuracy :', accuracy_score(test_y, predictions_test))
```

Home work for the Lab.

- ✓Apply some preprocessing tasks
  - Normalization
  - Standardization
- ✓Apply different classifiers and compare their performances
  - Logistic Regression (LR)
  - K-Nearest Neighbors (KNN)
  - Support Vector Machines (SVM)
- ✓Compute training accuracy, testing accuracy for each model
- ✓Find the best model for the prediction task

Some example projects

24 Data Science Projects To Boost Your Knowledge and Skills [link]

25 Machine Learning Projects for All Levels [Link]

45+ Interesting Machine Learning Project Ideas For Beginners [Link]

Top 100+ Machine Learning Projects for 2023 [Link]

End of Lecture-10