

Powerful Classifiers

Vahid Partovi Nia

Lecture 09



Random Forest

SVM

Neural Network

Zip code

① Random Forest

② SVM

③ Neural Network

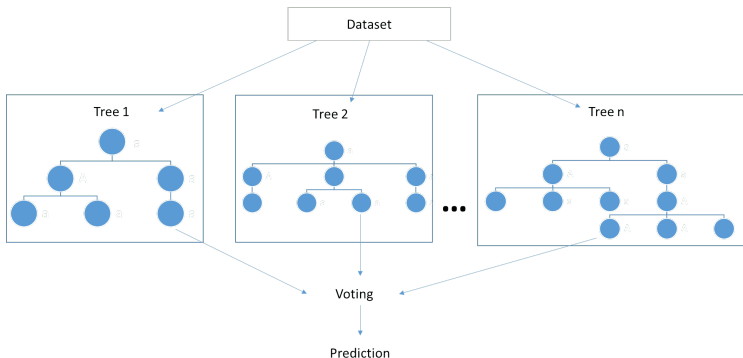
④ Zip code

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the data

- Shake the rows
- Shake the columns

<https://cs.stanford.edu/~karpathy/svmjs/demo/demoforest.html>

Random Forest

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```
import pandas as pd
import numpy as np
path='data/'
filename = path+'spamdata.csv'
spam = pd.read_csv(filename)
```

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```
import pandas as pd
import numpy as np
path='data/'
filename = path+'spamdata.csv'
spam = pd.read_csv(filename)

X = spam.values[:, :57]
y = spam.values[:, 57]

from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test =
    train_test_split(X,y, test_size= 0.1)
```

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import pandas as pd
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path='data/'
filename = path+'spamdata.csv'
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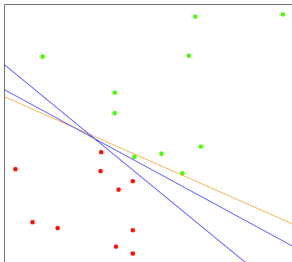
from sklearn.ensemble import RandomForestClassifier
rf = RandomForestClassifier(n_estimators=100)
rf.fit(X_train, y_train)
```

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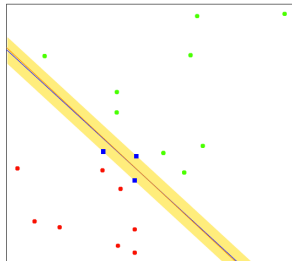
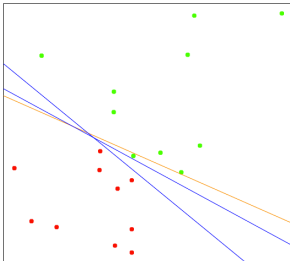


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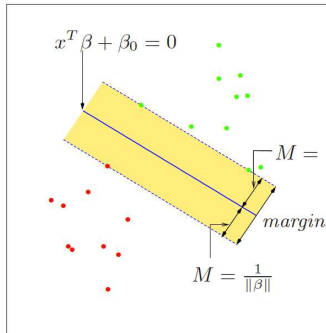
Maximum Margin

Random Forest

SVM

Neural Network

Zip code



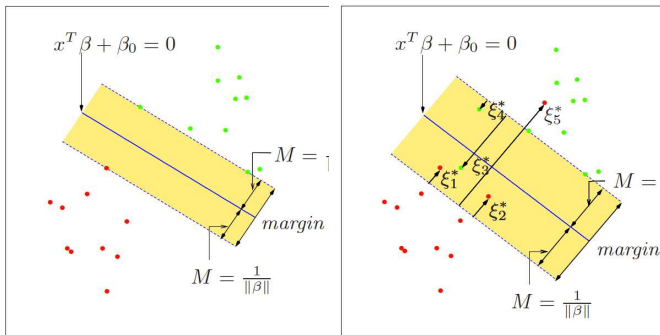
Maximum Margin

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<https://cs.stanford.edu/~karpathy/svmjs/demo/>

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- Linear: $\mathbf{x}^\top \mathbf{y}$
- Polynomial: $K(\mathbf{x}, \mathbf{y}) = (1 + \mathbf{x}^\top \mathbf{y})^d$
- Radial: $K(\mathbf{x}, \mathbf{y}) = \exp\{-\frac{1}{\sigma^2}(\mathbf{x} - \mathbf{y})^\top (\mathbf{x} - \mathbf{y})\}$
- Neural Network: $K(\mathbf{x}, \mathbf{y}) = \tanh\{b_0 + b_1 \mathbf{x}^\top \mathbf{y}\}$

Random Forest

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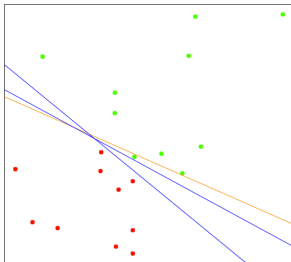
```
from sklearn.svm import SVC  
sv = SVC(C=10)  
sv.fit(X_train, y_train)  
accuracy_score(sv.predict(X_test), y_test)
```

Random Forest

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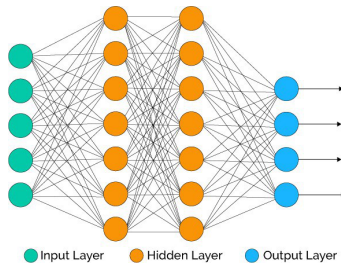
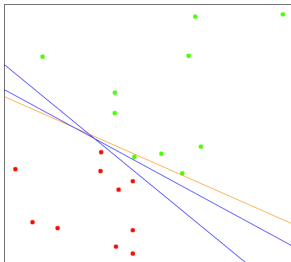


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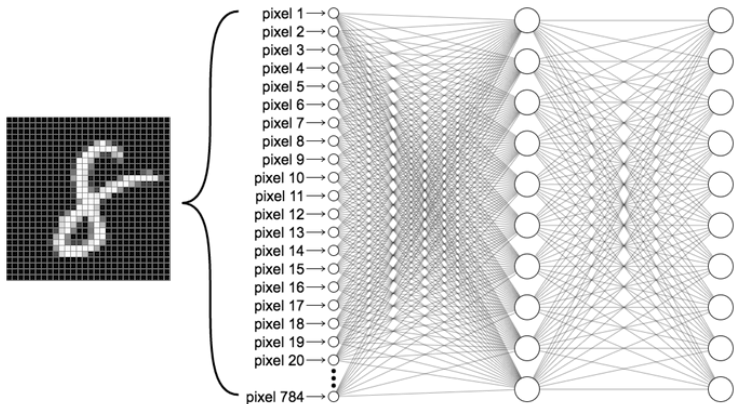
```
from sklearn.neural_network import MLPClassifier
nn = MLPClassifier(hidden_layer_sizes=(10, 10),
                    activation='logistic')
nn.fit(X_train, y_train)
accuracy_score(nn.predict(X_test), y_test)
```

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<http://scs.ryerson.ca/~aharley/vis/fc/>