

Implementation of Decision Tree Classifiers

ID3 versus C4.5

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- ▶ Data mining: compress, understand and predict
 - ▶ Clustering
 - ▶ Classification
 - ▶ Regression
 - ▶ ...

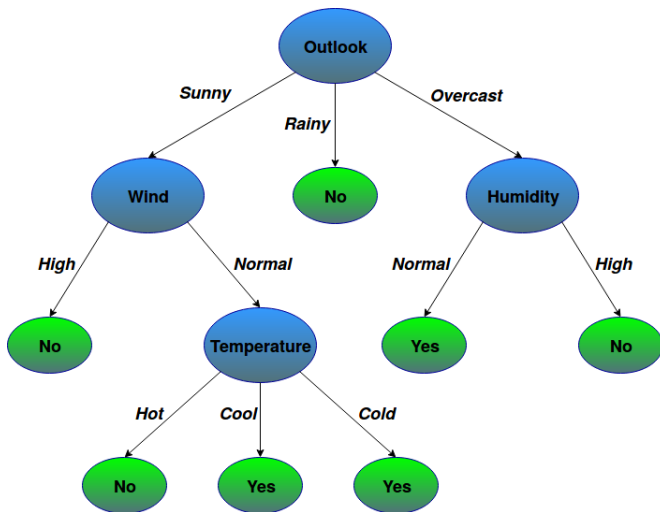
- ▶ Techniques to find links
 - ▶ Linear Regression
 - ▶ Decision Trees
 - ▶ Neural Networks
 - ▶ ...

Classification

- ▶ Classical example: play tennis today?
 - ▶ **Features:**
 - ▶ Outlook: sunny, overcast, rainy
 - ▶ Temperature: hot, cool, cold
 - ▶ Wind: high, weak
 - ▶ Humidity: high, normal
 - ▶ **Class labels:**
 - ▶ Yes
 - ▶ No

Decision Tree

- ▶ Visual model, easily understandable
- ▶ Model: tree with **decision** and **leaf nodes**





- ▶ Given a training data-set
- ▶ Recursively split on a node:
- ▶ If node is pure return leaf (class value)
- ▶ Else compute entropy & info gain:
 - ▶ Shannon's entropy: $E(S) = \sum_i -p_i \log_2(p_i)$
 - ▶ Subtree gain: $Gain(T, X) = E(T) - E(T, X)$

ID3 versus C4.5

- ▶ Goal: implement ID3 and C4.5 algorithms
- ▶ Objectives: compare ID3 and C4.5 output
 - ▶ Compare ID3 and C4.5
 - ▶ Create an application that classifies any data using both algorithms

- ▶ Initial implementation of decision trees
- ▶ Top down approach
- ▶ Split current node based on information gain:







K-fold cross validation

