

Implementation of Decision Tree from scratch

Objective:

The objective of this experiment is to implement the ID3 algorithm and CART algorithm for a dataset and compare the accuracy.

Introduction:

The basic idea of ID3 algorithm is to construct the decision tree by employing a top-down, greedy search through the given sets to test each attribute at every tree node. ID3 operates by recursively partitioning the dataset based on the attributes that best discriminate between different classes.

The CART algorithm is a type of classification algorithm that is required to build a decision tree on the basis of Gini's impurity index. It is additionally a predictive model which helps to seek out a variable supported other labelled variables.

Dataset:

	A	B	C	D	E
1	Outlook	Temperat	Humidity	Wind	play
2	Sunny	Hot	High	Weak	No
3	Sunny	Hot	High	Strong	No
4	Overcast	Hot	High	Weak	Yes
5	Rain	Mild	High	Weak	Yes
6	Rain	Cool	Normal	Weak	Yes
7	Rain	Cool	Normal	Strong	No
8	Overcast	Cool	Normal	Strong	Yes
9	Sunny	Mild	High	Weak	No
10	Sunny	Cool	Normal	Weak	Yes
11	Rain	Mild	Normal	Weak	Yes
12	Sunny	Mild	Normal	Strong	Yes
13	Overcast	Mild	High	Strong	Yes
14	Overcast	Hot	Normal	Weak	Yes
15	Rain	Mild	High	Strong	No

Result:



the decision tree for ID3 algorithm:

```
{'Outlook': {'Overcast': 'Yes',
             'Rain': {'Wind': {'Strong': 'No', 'Weak': 'Yes'}},
             'Sunny': {'Temperature': {'Cool': 'Yes',
                                         'Hot': 'No',
                                         'Mild': 'No'}}}}
```

#ID3 algorithm: Output class: Yes
#ID3 algorithm: Accuracy: 66.667



The decision tree for CART:

```
{'attribute': 'Outlook',
 'left': {'class': 'Yes'},
 'right': {'attribute': 'Wind',
           'left': {'class': 'No'},
           'right': {'attribute': 'Outlook',
                     'left': {'class': 'Yes'},
                     'right': {'attribute': 'Temperature',
                               'left': {'class': 'Yes'},
                               'right': {'class': 'No'},
                               'value': 'Cool'},
                     'value': 'Rain'},
           'value': 'Strong'},
 'value': 'Overcast'}
```

#CART algorithm: Output class: Yes
#CART algorithm: Accuracy: 66.667

Discussion:

The accuracy for each algorithm is found to be 66.667%.