**CSE472 (Machine Learning Sessional)**

**Assignment 1: Decision Tree and AdaBoost for Classification**

*Moaz Mahmud*

*1505064*

**Telco-customer-churn**

**Decision Tree**

|  |  |  |
| --- | --- | --- |
| Performance measure | Training | Test |
| Accuracy | 97.95882144124955 % | 97.94180269694819 % |
| True positive rate (sensitivity, recall, hit rate) | 93.95134779750164 % | 93.96551724137932 % |
| True negative rate (specificity) | 99.44079747143203 % | 99.24599434495760 % |
| Positive predictive value (precision) | 98.41597796143250 % | 97.61194029850746 % |
| False discovery rate | 1.584022038567493 % | 2.388059701492537 % |
| F1 score | 96.13185334678775 % | 95.75402635431918 % |

**AdaBoost Accuracy**

|  |  |  |
| --- | --- | --- |
| Number of boosting rounds | Training | Test |
| 5 | 78.34575789847355 % | 77.92760823278921 % |
| 10 | 79.33972310969116 % | 79.27608232789211 % |
| 15 | 79.60596379126731 % | 79.48899929027680 % |
| 20 | 79.97870074547390 % | 79.70191625266146 % |

**Adult**

**Decision Tree**

|  |  |  |
| --- | --- | --- |
| Performance measure | Training | Test |
| Accuracy | 96.11486486486487 % | 96.05404575464456 % |
| True positive rate (sensitivity, recall, hit rate) | 87.58262511803588 % | 93.96551724137932 % |
| True negative rate (specificity) | 98.86767543414237 % | 98.38838042180662 % |
| Positive predictive value (precision) | 96.14720110573600 % | 94.18103448275862 % |
| False discovery rate | 3.852798894263994 % | 5.818965517241379 % |
| F1 score | 91.66529402075440 % | 91.07328933657520 % |

**AdaBoost Accuracy**

|  |  |  |
| --- | --- | --- |
| Number of boosting rounds | Training | Test |
| 5 | 83.26550982800983 % | 83.44848764010440 % |
| 10 | 83.65709459459460 % | 83.34101028711807 % |
| 15 | 84.29821867321867 % | 84.53861507753724 % |
| 20 | 84.69748157248156 % | 84.63073852295409 % |

**Creditcard Fraud**

**Decision Tree**

|  |  |  |
| --- | --- | --- |
| Performance measure | Training | Test |
| Accuracy | 100.0% | 100.0% |
| True positive rate (sensitivity, recall, hit rate) | 100.0% | 100.0% |
| True negative rate (specificity) | 100.0% | 100.0% |
| Positive predictive value (precision) | 100.0% | 100.0% |
| False discovery rate | 0% | 0% |
| F1 score | 100.0% | 100.0% |

**AdaBoost Accuracy**

|  |  |  |
| --- | --- | --- |
| Number of boosting rounds | Training | Test |
| 5 | 99.481486000122% | 98.68260551353988% |
| 10 | 99.62788995302874% | 98.56062454257136% |
| 15 | 99.74989324711767 | 98.56062454257136 |
| 20 | 99.87799670591106 | 98.7801902903147 |