

Predicting Student Academic Performance

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Motivation





Research Objective

01

Providing universities
a framework for using
student data to
improve
decision-making

02

Reduce student
failure in universities.

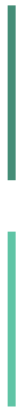
03

Improve the use of
resources in
universities

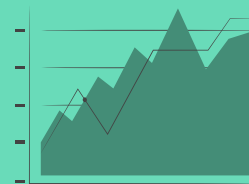
Research Questions

What are the best used to predict student performance?

What are the most effective features to predict students performance?



Dataset



1

From King Khalid University

2

824 records



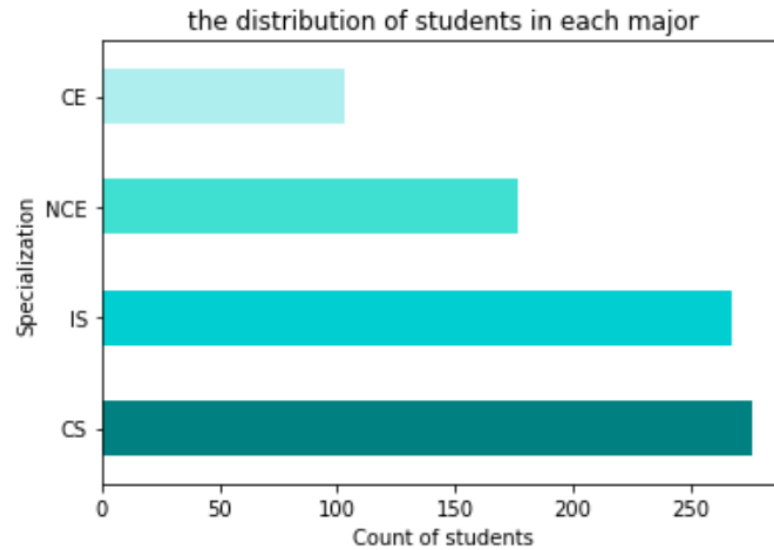


Figure 2: Number of students records for each department

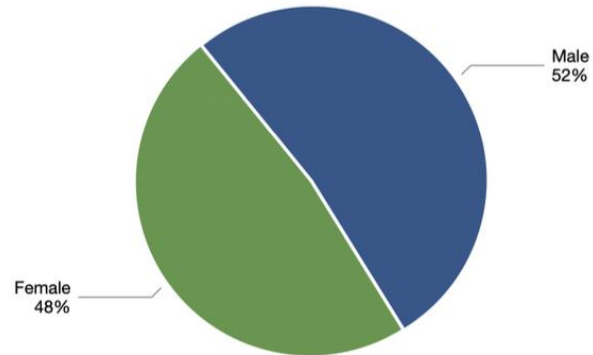
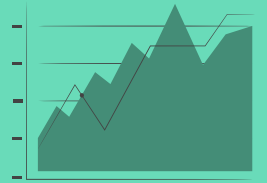


Figure 3: The ratio of male to female students in the dataset

Dataset



1

From King Khalid University

2

824 records

At-risk students



Exceeded the regular period of study
Graduated with CGPA less than or equal to 2.75 and exceeded the regular period
Graduated with CGPA is less than 2.7

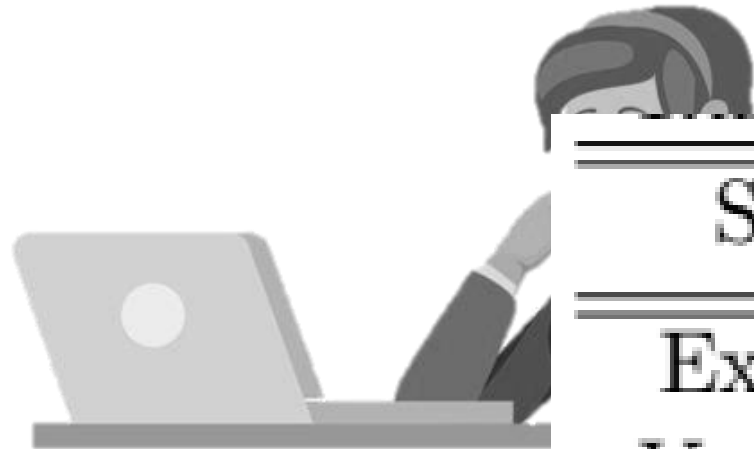
Normal students



CGPA is greater than 2.75 and completed their studies in the normal period of the program

At-risk students

Normal students



Status	Grade
Excellent	4.50 - 5.00
Very good	3.75 - 4.49
Good	2.75 - 3.74
Acceptable	1 - 2.74

Exceeded the regular pe

Graduated with CGPA le
to 2.75 and exceeded th

Graduated with CGPA is less than 2.7

program
r than 2.75 and completed
the normal period of the

At-risk students



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Normal students



CGPA is greater than 2.75 and completed their studies in the normal period of the program



Data Pre-processing

- Some features that did not improve the prediction value for our model were omitted.
- Deal with missing data.
- Duplicate records and irrelevant features were also removed.
- All words were translated into English to facilitate data mining.
- Incorrect or in a different format and causing noise in the data were corrected.

Machine Learning Algorithm

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graph TD; A((Machine Learning Algorithm)) --- B(( )); B --- C((Decision Tree)); B --- D((Random Forest));
```

Decision Tree

Random Forest

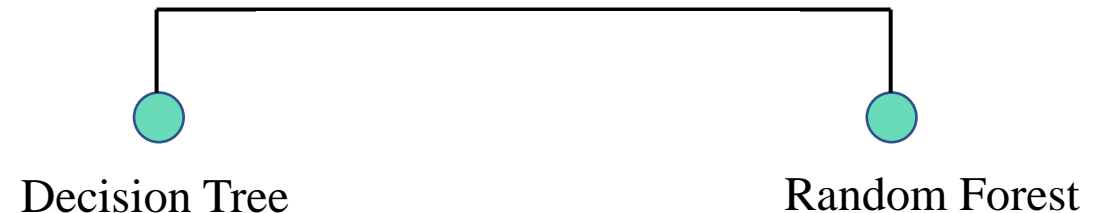
Machine Learning Algorithm

- GPA of High school
- General Aptitude Test(GAT)
- Standard Achievement Admission Test (SAAT)

- ENG1
- MATH 1
- CSM1
- ENG2
- MATH 2
- CSM2

Type of measure	RF	DT
Precision	0.79	0.62
Recall	0.70	0.72
F1-score	0.74	0.67
Accuracy	0.78	0.68

Table2:Comparison of algorithms based on evaluation metrics.



02

What are the main attributes that will influence the prediction of student performance?

Depending on RF Classifier - At risk students				
Features	Precision	Recall	F1-score	Accuracy
Pre-admission	0.66	0.55	0.60	0.67
Pre-admission & First semester	0.71	0.59	0.65	0.71
All attributes	0.79	0.70	0.74	0.78

TABLE 4.4: The most important features that affect the prediction of student performance.

Thank you
For your listening