

Python & AI Chatbot Bootcamp

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University/College Student Placement Prediction: End-to-End ML Pipeline

1. Dataset Insights

- The dataset contains **10,000 students** with features such as IQ, previous semester result, CGPA, academic performance, internship experience, extra-curricular score, communication skills, and projects completed.
- **Target variable:** Placement (Yes/No)
- **Internship experience:** About 40% had internships, 60% did not.
- **Placement rate:**

```
Total students: 10000  
Placed students: 1659.0  
Placement percentage: 16.59%
```

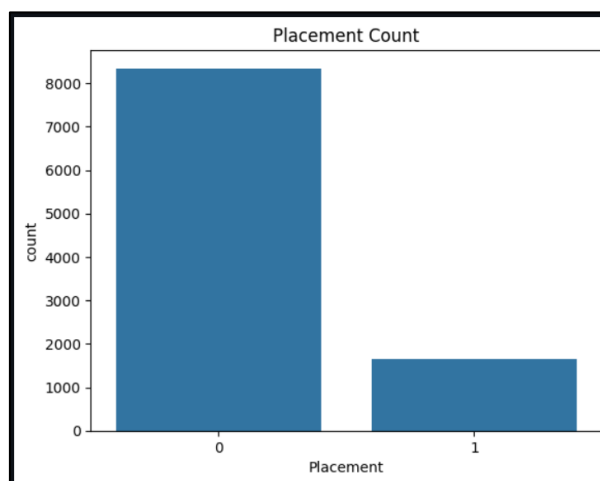
- **Dependence of Internship on Placements:**

There is no visible dependence on internships on placements. Placement rate of students is 16.32% (with internship), 16.77% (without internship) which is very little difference.

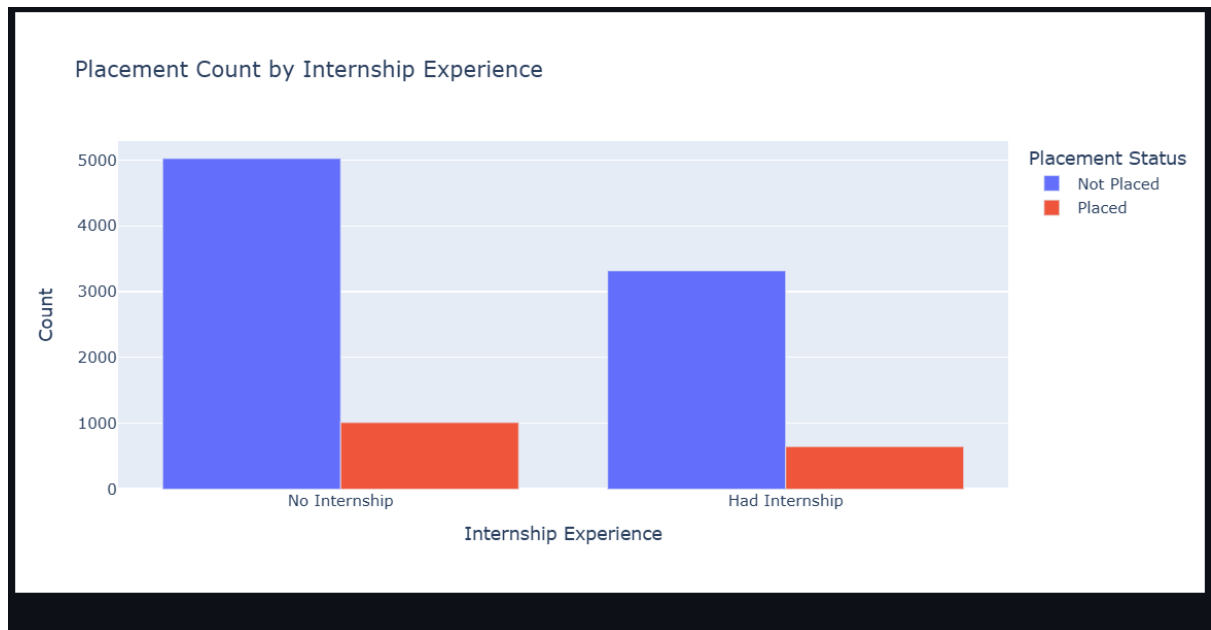
```
Placement rate with internship: 16.32%  
Placement rate without internship: 16.77%
```

2. Visualization Findings

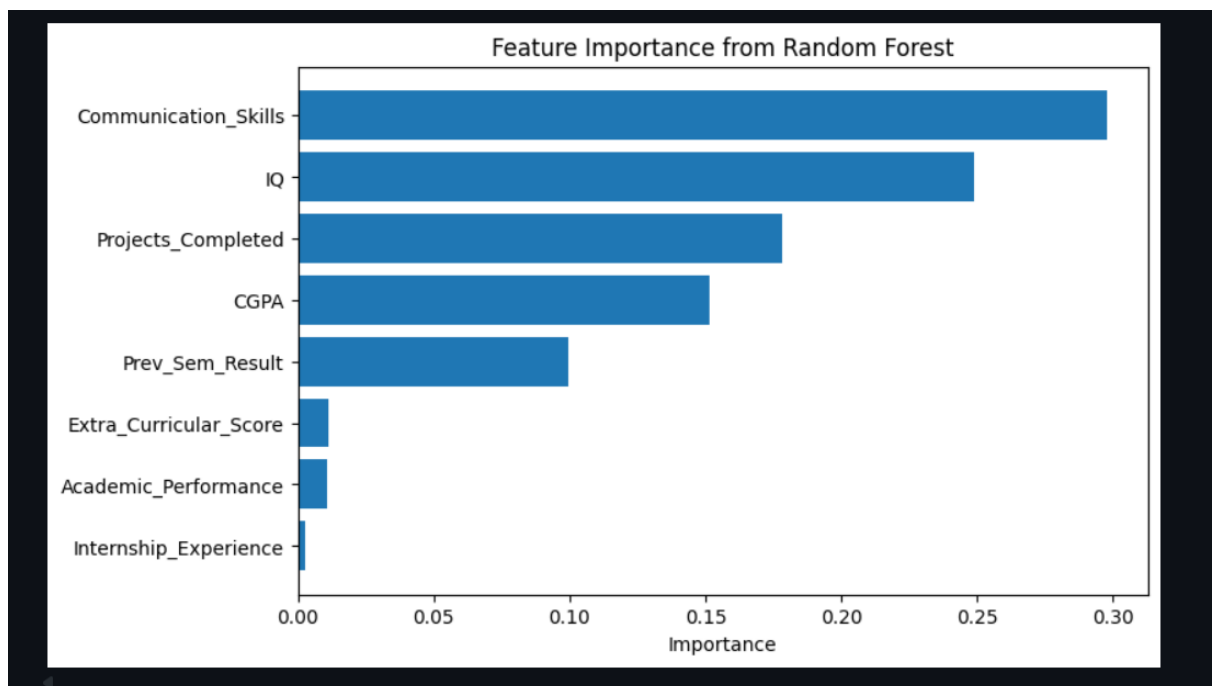
- **Countplot:** Only a few (16.59%) of students were placed.



- **Internship Experience:** Most students did not have internship experience.
- **Interactive Plot (Plotly):** Placement rates are similar for students with and without internships



- **Feature Importance Plot:** Communication Skills, IQ, Projects Completed, and CGPA are the most important features for placement.



3. Model Comparison Table

	Model	Accuracy	Precision	Recall	F1 Score
0	KNN	0.9470	0.898551	0.760736	0.823920
1	Decision Tree	1.0000	1.000000	1.000000	1.000000
2	Random Forest	1.0000	1.000000	1.000000	1.000000
3	KNN (Tuned)	0.9545	0.957198	0.754601	0.843911
4	Decision Tree (Tuned)	1.0000	1.000000	1.000000	1.000000
5	Random Forest (Tuned)	1.0000	1.000000	1.000000	1.000000

4. Key Conclusions

- **Best Models:** Decision Tree and Random Forest (both default and tuned) achieved perfect accuracy; KNN performed slightly lower.
- **Feature Importance:** Communication Skills, IQ, Projects Completed, and CGPA are the strongest predictors of placement.
- **Internship Experience:** Had little impact on placement outcome.
- **Hyperparameter Tuning:** Improved KNN performance slightly; Decision Tree and Random Forest were already optimal.
- **Recommendation:** Students should focus on improving communication skills, IQ, and practical project experience to enhance placement chances.