

UC San Diego

ECE 143 Group 6
2/26/2021

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Graduate University Admission Prediction

Objective and Methodology

- Objective
 - **Predict whether an engineering undergraduate student will be admitted to a graduate school**
 - Distinguish most important features of dataset
 - Compare different prediction models
- Methodology
 1. Cleanse data
 2. Perform feature analysis
 3. Build prediction models

Dataset

- Consists of student profiles from the education and career forum **edulix.com**
 - Profiles include education and career info about student
 - Predominately used in India
 - Profiles scraped and uploaded to Kaggle.com
- **14798 Rows, 26 columns**

Example:

major	researchExp	industryExp	specialization	toeflScore	program	department	toeflEssay	internExp	greV	greQ		
Systems and Control	0	18	Robotics	112.0	MS	Instrumentation & Control	26	5.0	160.0	167.0		
journalPubs	greA	topperCgpa	termAndYear	confPubs	ugCollege	gmatA	cgpa	gmatQ	cgpaScale	gmatV	univName	admit
0	4.5	8.90	Fall - 2015	0	Dharamsinh Desai University	NaN	8.50	NaN	10	NaN	Worcester Polytechnic Institute	1

Dataset Manipulation

- Altered Columns
 - `cgpa / cgpaScale` -> `cgpaRatio`
- Dropped Columns
 - categorical columns (`userProfileLink`, `major`)
 - GMAT and TOEFL scores (99% missing values)
- Added columns
 - `targetRank` - from US News Engineering Graduate Rankings

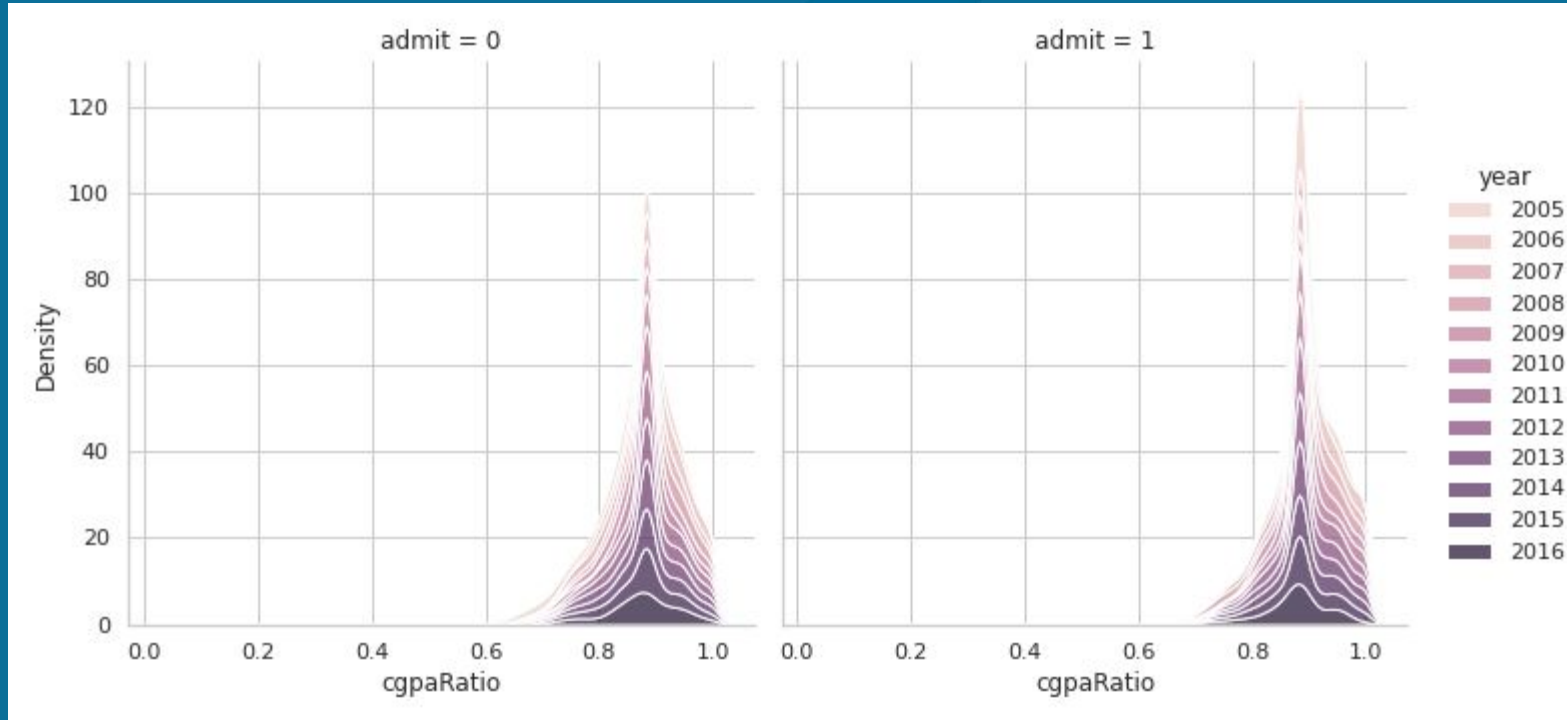
Motivating Questions

1. Do target schools care more for quantitative or verbal scores for the GRE?
2. Is a student who has more work experience more likely to be admitted?
3. Is a student who has a conference paper more likely to be admitted?
4. Which features does UCSD care about when evaluating graduate admissions?

Exploratory Data Analysis and Feature Engineering

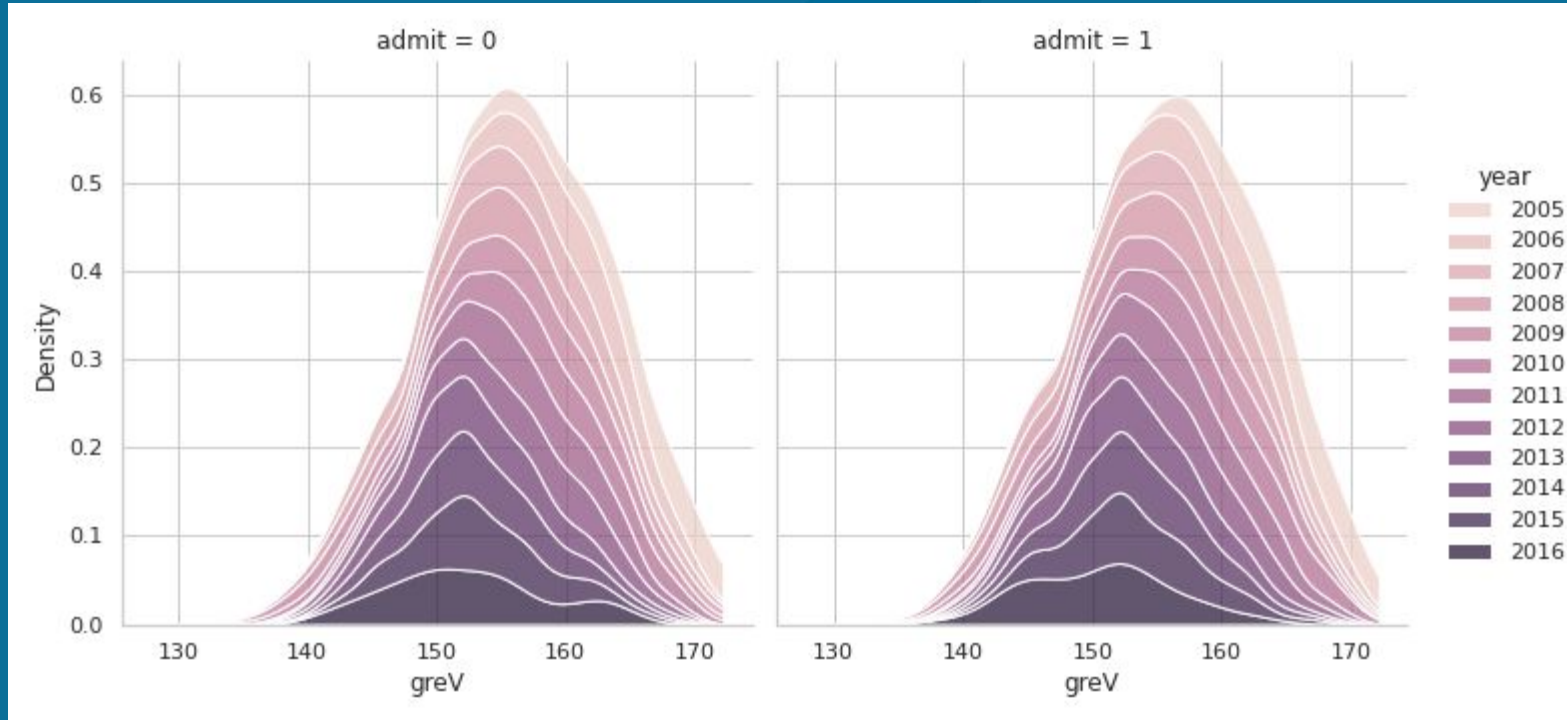
Yifan Wu

Cumulative GPA Ratio



CGPA Ratio = Individual CGPA / Topper's CGPA

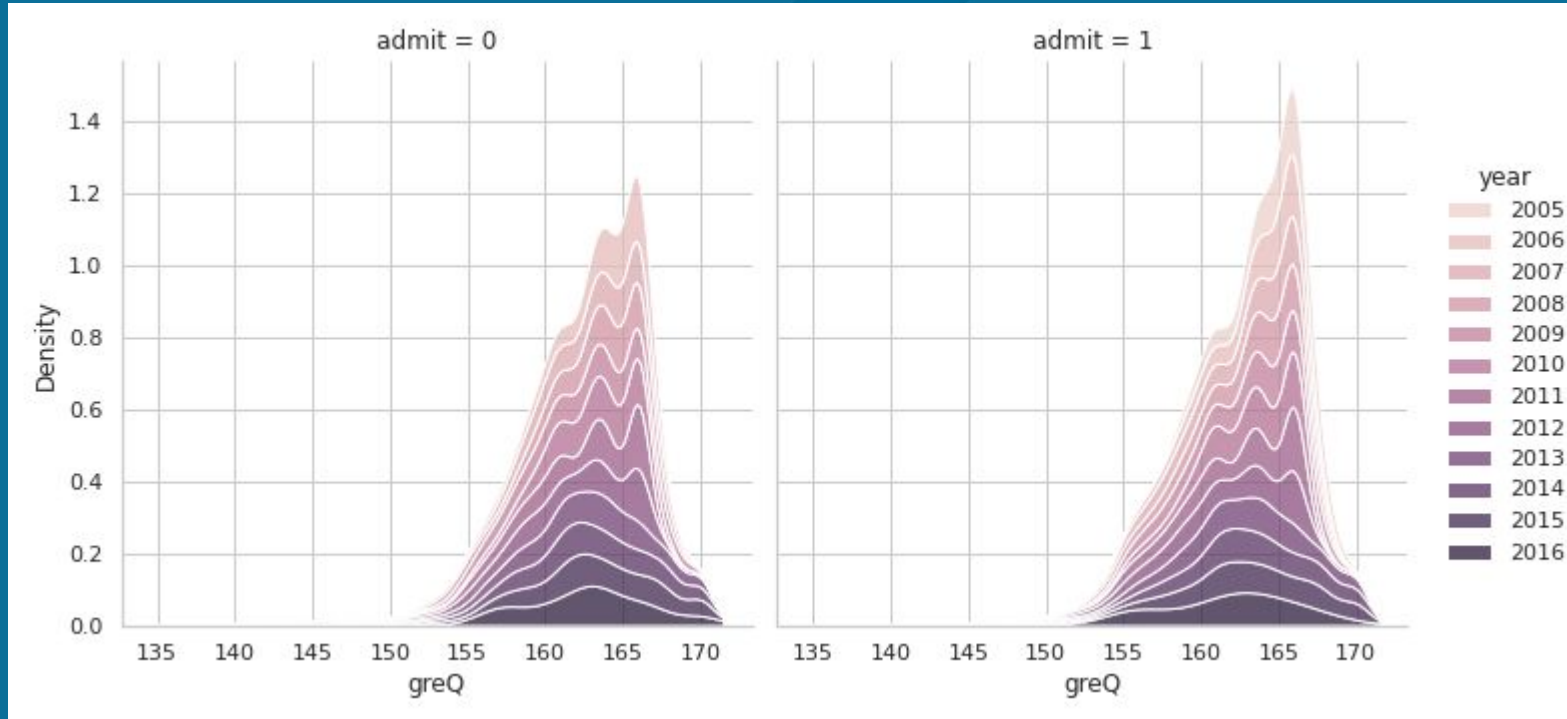
GRE Verbal Score



GRE Verbal scored between 130–170.

Average GRE Verbal falls around 152.

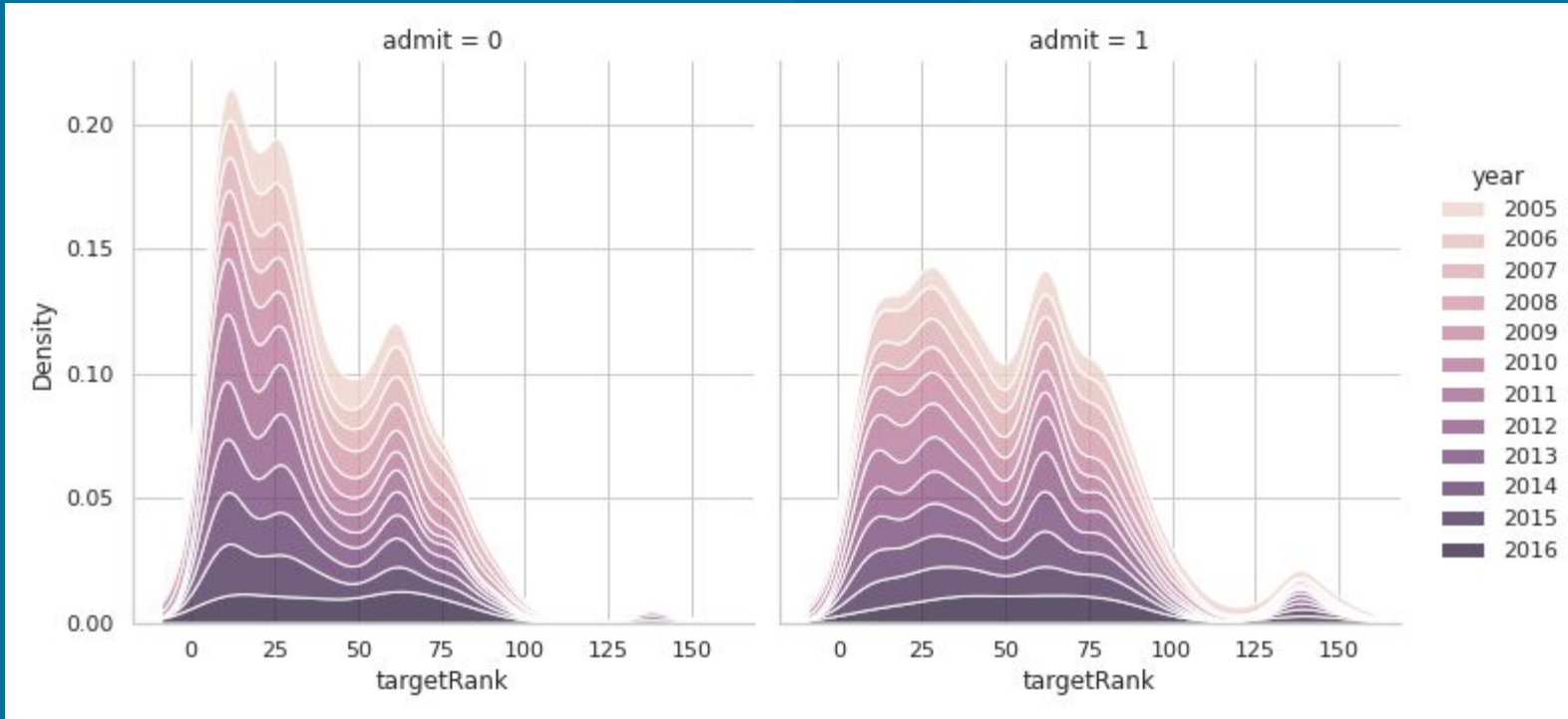
GRE Quantitative Score



GRE Quantitative scored between 130–170.

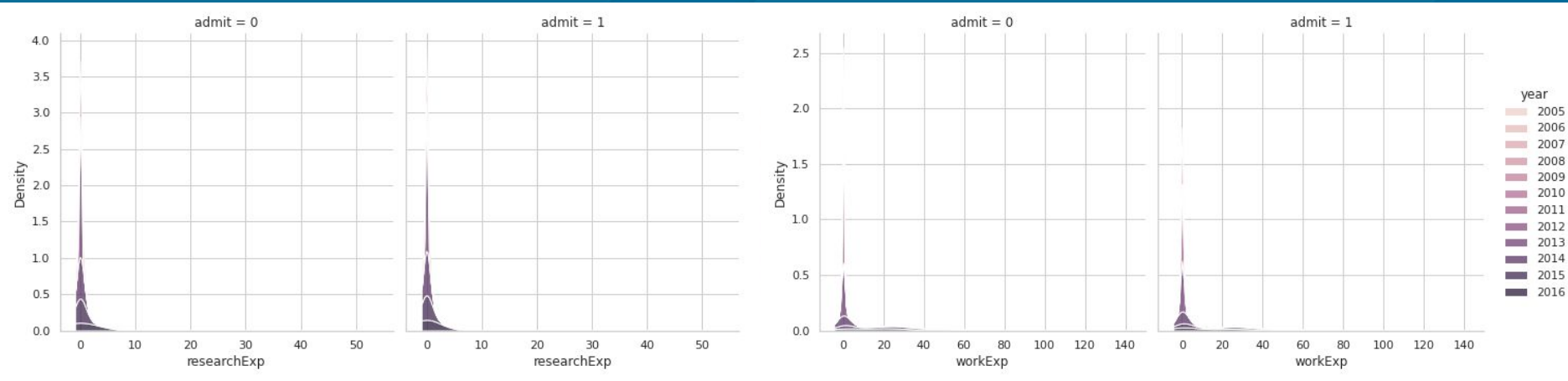
Average GRE Quantitative score falls around 163.

Engineering Graduate University Rank



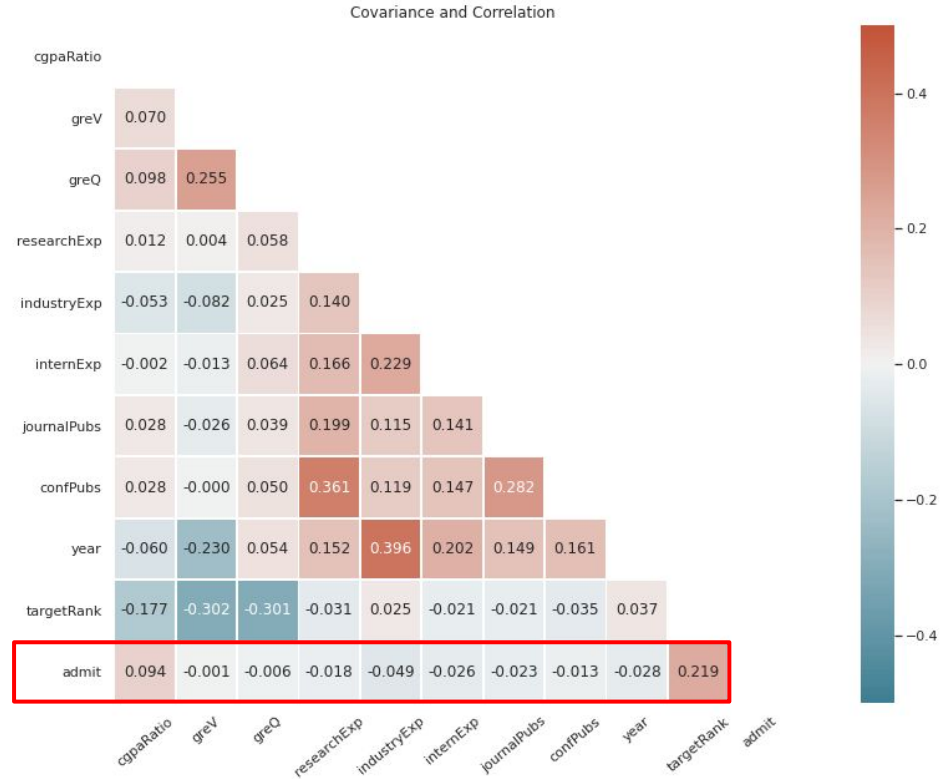
Source from Best Engineering Schools Ranked in 2021 - US News Rankings

Research Exp and Work Exp



Correlation Matrix

0.00-0.19	very weak
0.20-0.39	weak
0.40-0.59	moderate
0.60-0.79	strong
0.80-1.0	very strong



UCSD Specific Data Analysis

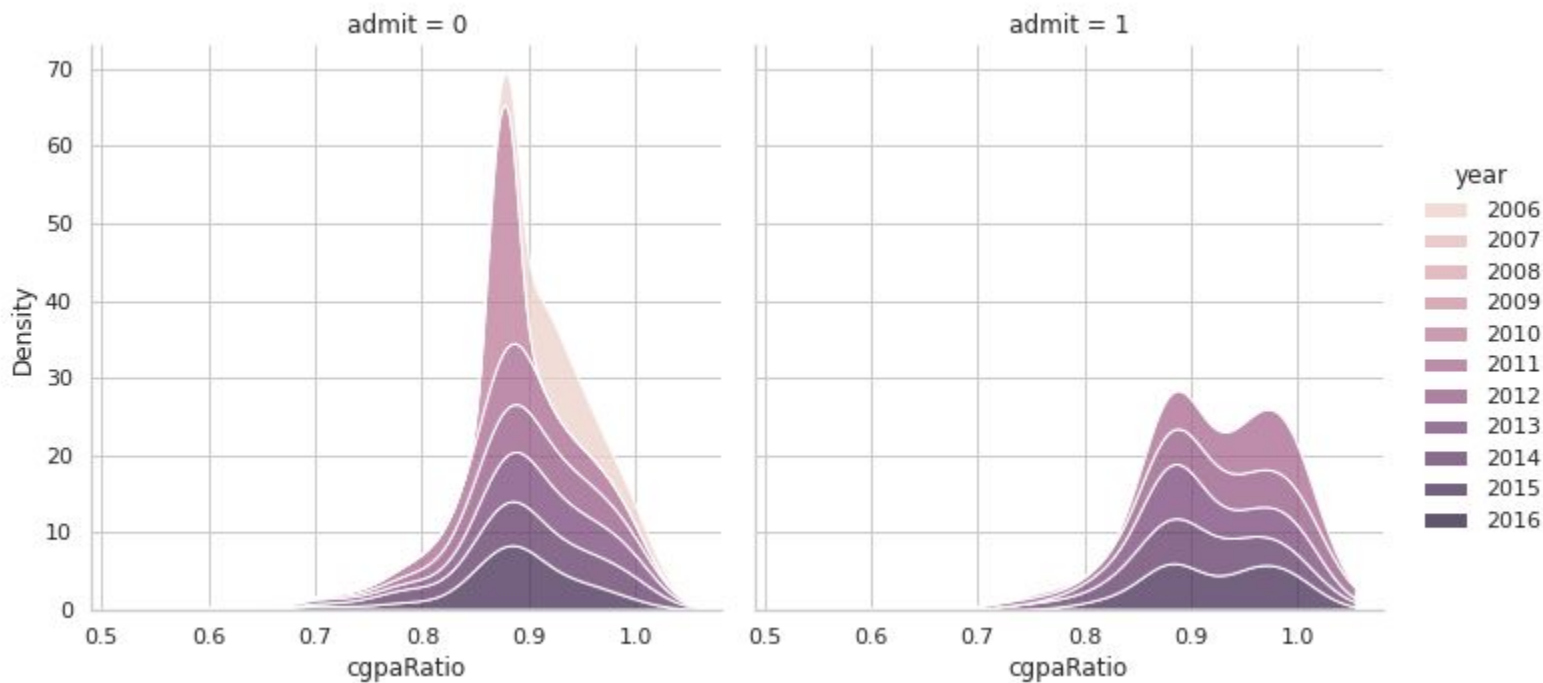
Guoren Zhong

UCSD ADMISSION

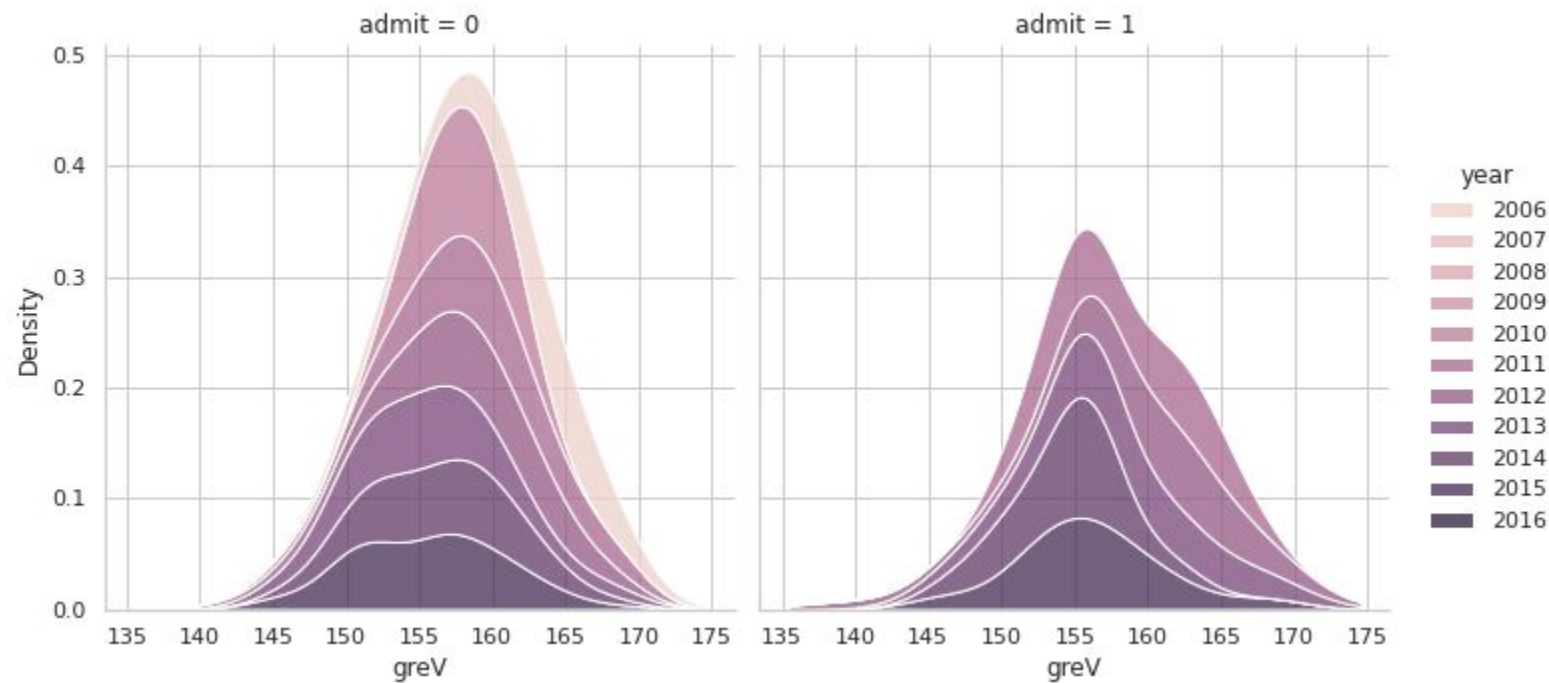
- CGPA Ratio
- GRE Verbal
- GRE Quantitative
- Correlation Matrix



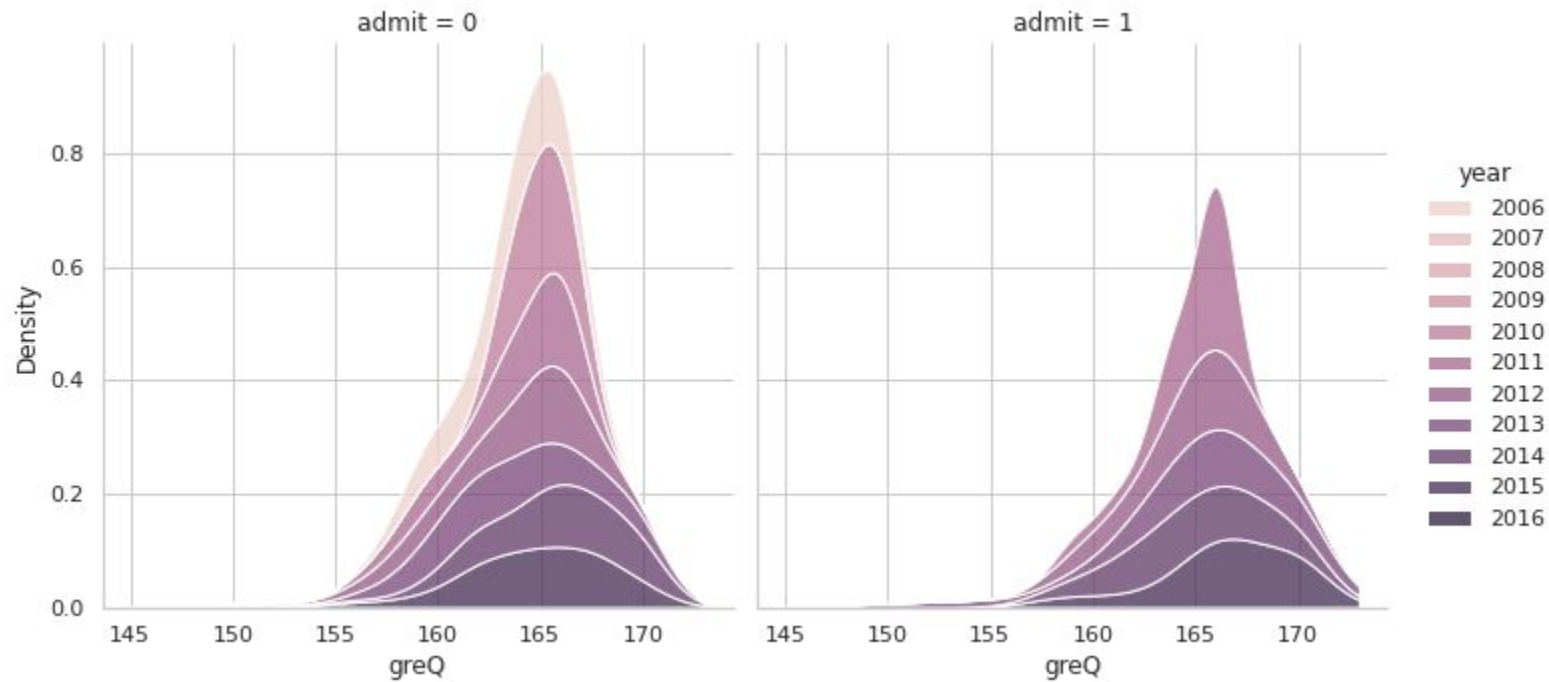
UCSD CGPA Ratio



UCSD GRE Verbal Score

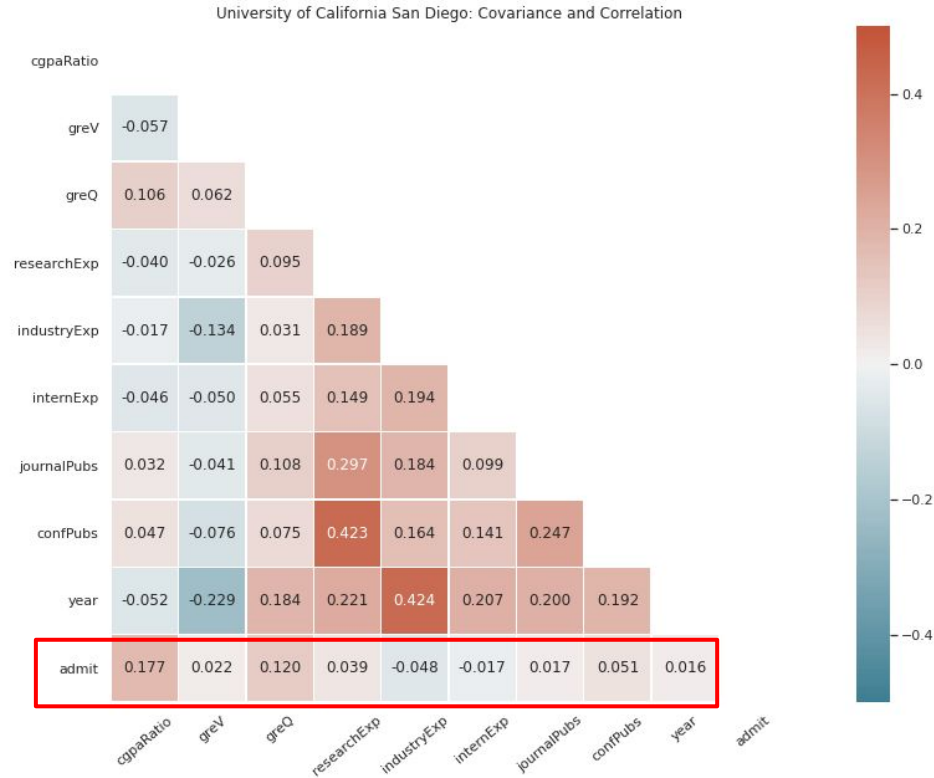


UCSD GRE Quantitative Score



UCSD Correlation Matrix

0.00-0.19	very weak
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0.40-0.59	moderate
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0.80-1.0	very strong



Prediction Results and Analysis

David He

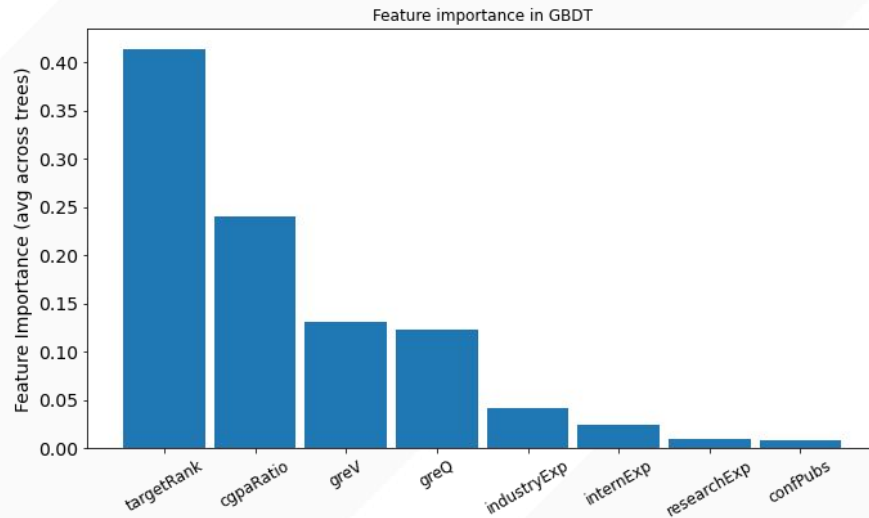
Result

	Accuracy	Precision	Recall
Linear regression	0.610	0.628	0.600
Logistic regression	0.610	0.627	0.604
SVM	0.617	0.637	0.600
Least Squares Binary	0.633	0.638	0.622
MLP	0.624	0.634	0.614
CNN	0.605	0.602	0.623
GBDT	0.690	0.705	0.688
XGBoost	0.694	0.713	0.682
Random forest	0.684	0.711	0.652

Random forest, GBDT, and XGBoost have better performance.

Result Analysis

- Non-linearity.
- High dimensions.
- Irregular nature of data.
- Lack of features.



Future works

- improve the machine learning results by taking consideration of the feature importance
- take advantage of some deleted columns such as major, undergraduate schools...
- introduce more models
- analyzing more data

Conclusion

- Our project website: <http://123.57.56.85:7791/> (made by python wsgiref.simple_server module)
- Visit and read our motivations
- Download the packages, play with the model we introduced, tune hyper-parameters, train
- Contact us with any questions
- Have fun predicting the admission results!
- Any questions?

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Thank You