Recruitment Analytics
An Investigation of Program Awareness & Matriculation

Liye Sun, Kimberly Lanham, Matthew A. Lanham

Purdue University Krannert School of Management

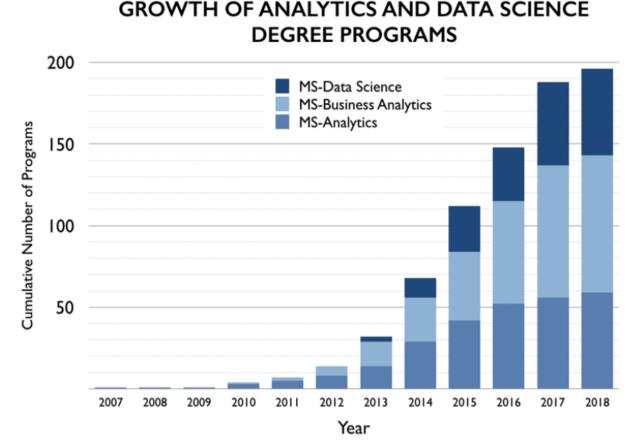sun783@purdue.edu; klanham173@gmail.edu; lanhamm@purdue.edu

Abstract

In this study, we provide a descriptive analysis of analytical program recruitment and awareness in China. We also aim to build a predictive model that can accurately predict whom would matriculate if provided an admission offer. The motivation of this study is that with increasing demand of analytics talents in companies, the demand for master programs in Business Analytics and Data Science has increased rapidly in recent years. More and more universities are opening analytics programs or offering concentrations on analytics. Understanding where students obtain information and how they view programs is important for attraction and recruitment. From the planning perspective, being able to estimate the matriculation rate could provide valuable decision-support for program preparation. In this project, we first investigate the awareness and marketing about Purdue's M.S. in Business Analytics and Information Management (BAIM) and peer programs on ChaseDream.com. Then we analyze the application and matriculation rates of Purdue MS BAIM over the past two years to develop a predictive model of whom is most likely to attend if provided an offer.

Introduction

With increasing demand of analytics talents in companies, the demand for master programs in Business Analytics and Data Science has increased rapidly in recent years. Understanding where students obtain information and how they view programs is important for attraction and recruitment. Being able to estimate the matriculation rate could provide valuable decision-support for program preparation.
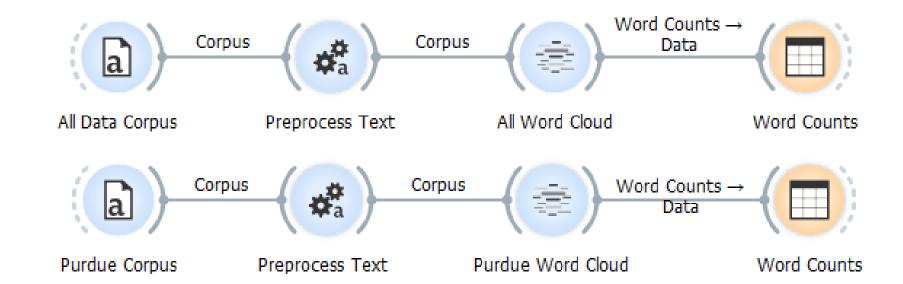

GROWTH OF ANALYTICS AND DATA SCIENCE DEGREE PROGRAMS

Source: https://analytics.ncsu.edu

Research Questions:
➢ What is the awareness and marketing about Purdue's M.S. in Business Analytics and Information Management (MS BAIM) program in China?

➢ Can we predict which students will matriculate in MS BAIM if provided an admissions offer to provide better admissions decision-support?

Literature Review

Many university administrators agree that admissions melt is a serious issue that must be combatted with a multitude of techniques and methods. Can a predictive model be developed to ascertain whether a student will matriculate to a university? Though there is adequate research on the topic, there is a gap and question as to which model or models will obtain the most accurate estimations and results in relation to student melt and enrollment.

Study	Goal	Methodology	Results
Felton, 2015	Predict Enrollment	Probability	Subjective factors such as gender/race/ethnicity are not reliable for prediction and may cause discriminatory results
ASR Analytics, 2014	Predict Enrollment	Trend Analysis	Using past enrollment data and high school graduate information to track the number of students who were admitted and enrolled from different regions of a state in order to make accurate estimations on an ongoing basis.
Sampath, Flagel, & Figueroa, 2009	Predict Enrollment	Logistic Regression	Advantages: The estimated data lies anywhere between -∞ to +∞, the model performs even when the enrollment probabilities are non-normal, and the model has a linear format and the parameter estimates can be directly related to enrollment
Baier, et al., 2016	What affect enrollment & retention	Multiple Regression Analysis	Mentorship and self-efficacy had a stronger connection to student persistence and retention.
EAB, 2016	Predict Melt	Front-end & Back-end Approaches	This method allows direct contact between admissions staff and at-risk students, which can be an effective means of enrolling and retaining students.
Small et al., 2016	Predict characteristics of at-risk	Predictive Analysis	The study examined data to determine whether certain factors, such as exam scores, high school GPAs/rank, and Pell Grant eligibility could be used as predictors of at-risk students

Methodology

Understand Program Awareness in China

ChaseDream.com is a Chinese online forum where students discuss various schools and degree programs. In our study we focus on analytics programs and try to identify what info is being conveyed about Purdue MS BAIM and peer institutions, such as those from the Big Ten, and other often highly ranked programs. After manually collecting this data, it was cleaned, pre-processed, and word clouds were developed.
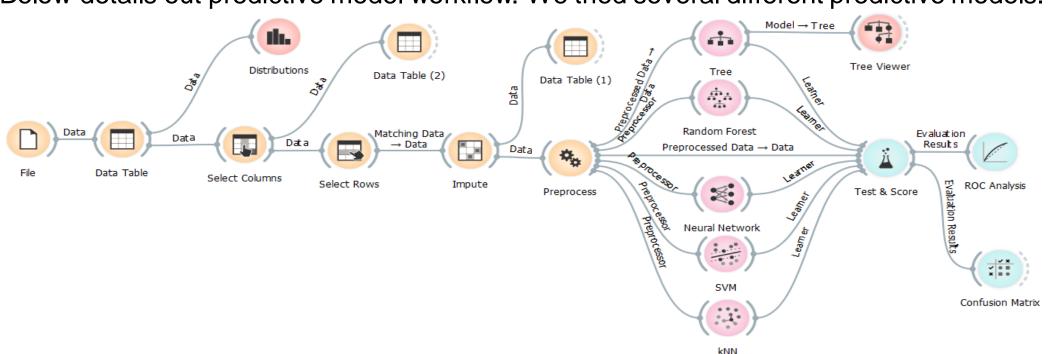

Predicting Attendance / Estimating Admissions Melt

Proprietary data was collected from the 2016-17 and 2017-18 MS BAIM classes.

Features Collected
- Student demographics (Country, Age, Gender)
- Test scores (GMAT/GRE, IBT, TOEFL) & GPA
- Degree types (Business, Eng., Math/Stats, etc.)
- Previous work experience
- Prev. school rankings/reputation
- Prev. employer type (Consulting, Analytics, etc.)
- Interview Q assessments (scale 1 to 5)

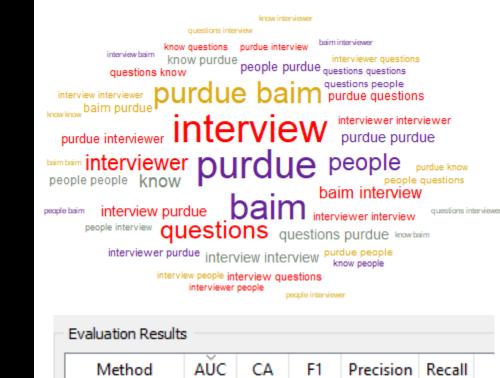Below details out predictive model workflow. We tried several different predictive models.

Results

We read through every discussion and tagged it based on four distinct categories and if it was positive or negative. We found that no discussions (good or bad) about these topics were discussed for Purdue MS BAIM. Rather the focus was completely on the interview process.

ChaseDream.com Summary	Curriculum			Reputation			Projects			Career Ser/Placement		
Analytics Program	+	-	% +	+	-	% +	+	-	% +	+	-	% +
Indiana U					no data available							
U of Iowa					no data available							
Michigan State U	0	0		0	0		0	0		0	1	0%
Northwestern U	2	0	100%	1	0	100%	0	0		1	0	100%
Ohio State U					no data available							
U of Maryland--College Park	11	3	79%	6	1	86%	2	0	100%	4	3	57%
U of Minnesota	6	0	100%	11	1	92%	3	0	100%	10	3	77%
Purdue	0	0		0	0		0	0		0	0	
Arizona State U	8	5	62%	2	1	67%	0	0		5	1	83%
MIT	0	0		0	0		0	0		0	0	
Notre Dame	1	0	100%	1	1	50%	0	0		1	0	100%
RPI	8	0	100%	11	4	73%	4	0	100%	8	1	89%
Southern Methodist U	5	0	100%	19	18	51%	9	0	100%	28	0	100%
U of Southern California	7	5	58%	0	0		0	2	0%	8	1	89%
UTexas--Austin	1	1	50%	1	1	50%	0	0		3	0	100%
Grand Total	49	14	78%	55	27	67%	18	2	90%	68	10	87%

process. Some schools have been providing program info that might have helped increase the number of applicants, such as SMU discussing their career services and placement statistics. This could be a missed opportunity for MS BAIM.

The word cloud on the right shows all the comments for all schools. Students tend to discuss the program's experience, application process, required pre-experience, and employment opportunities obtained by previous graduates. **Projects with companies was also a popular topic.**
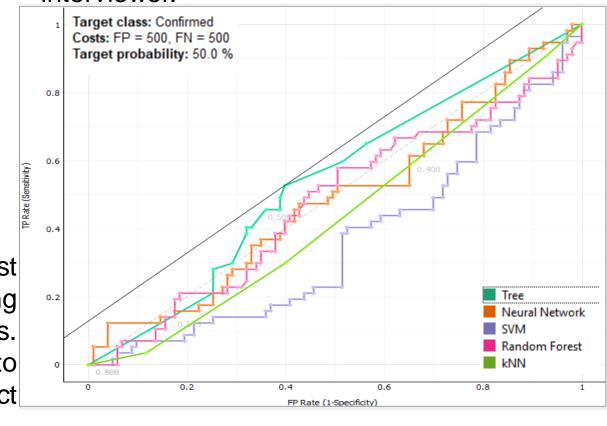

The word cloud on the left is for all discussions related to Purdue MS BAIM. We found that they only talk about the interview process, and share previous questions provided by the interviewer.

Evaluation Results

Method	AUC	CA	F1	Precision	Recall
Tree	0.536	0.571	0.576	0.583	0.571
Neural Network	0.483	0.646	0.507	0.417	0.646
Random Forest	0.476	0.590	0.543	0.533	0.590
kNN	0.436	0.497	0.498	0.499	0.497
SVM	0.358	0.640	0.543	0.578	0.640

We found that Tree model had the most convincing results of predicting characteristics of confirmed students. The figure below is the Tree model to show the important factors that affect student's to matriculate.
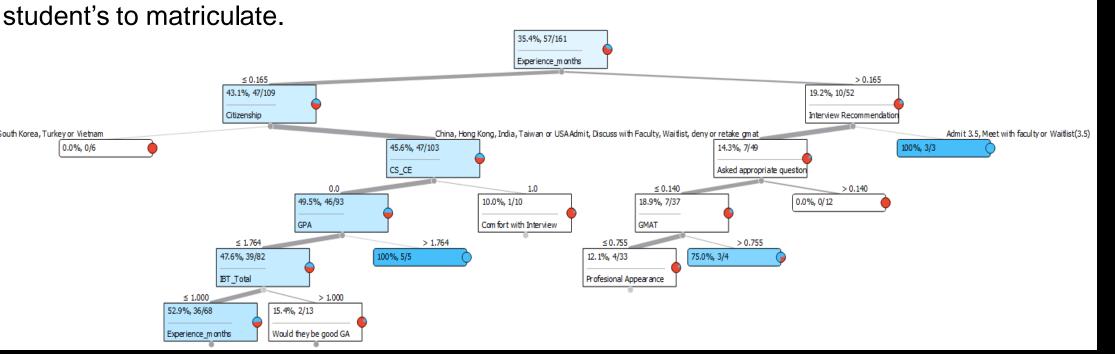

Conclusions

Chinese students tend to be talking about Purdue MS BAIM only in regards to the interview. Some schools are having representatives post information on ChaseDream.com to provide more information about their programs, and get a positive dialogue going. Most Chinese students do not know about the great projects that MS BAIM provides, so Purdue might consider marketing that in this highly competitive environment. Predicting admissions melt is challenging. While the best model we obtained was not highly accurate, the model provides some insights that might help estimate whom is more likely to attend versus not attend if provided an offer. This could help with better planning for the upcoming year.

Acknowledgements