
NASFAA
NATIONAL ASSOCIATION OF STUDENT FINANCIAL AID ADMINISTRATORS
NASFAA LEADERSHIP & LEGISLATIVE
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The Opportunities and Challenges of Predictive Analytics

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Brad Weiner, Ph.D – Sr. Director of Data Science, Capture Higher Ed
Co-Hosts, The Weightlist Podcast

NASFAA LEADERSHIP & LEGISLATIVE CONFERENCE & EXPO
STRATEGIC ENROLLMENT MANAGEMENT

Presenters

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17 years of expertise: Enrollment Management & Strategic Marketing,
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16 years expertise: Admissions, financial aid, retention, advancement, analytics
Former Enrollment and Fin. Aid Analyst, University of Minnesota-Twin Cities

Weightlist Podcast

Beer, Enrollment Management, & Data.

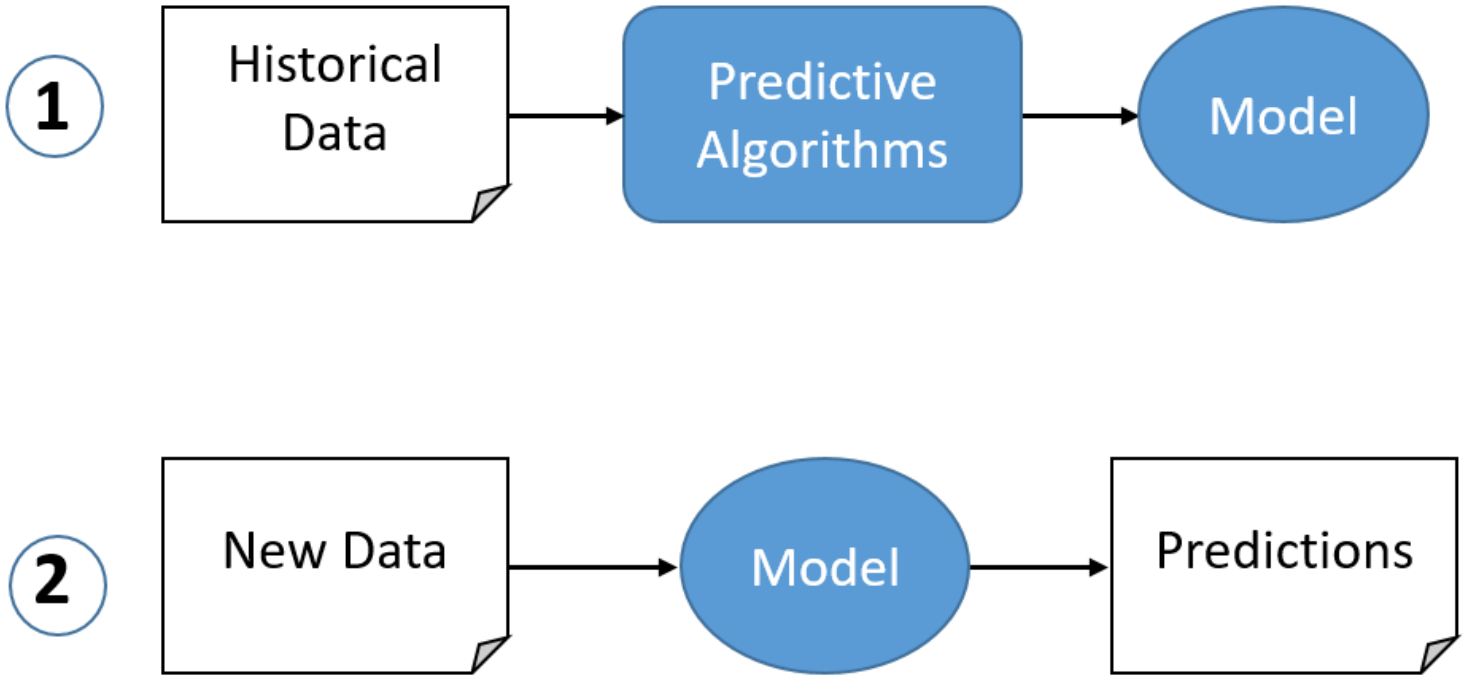
In that order.

- Started in November, 2016
- 31 episodes
- 200 downloads a week
- Anywhere you get your podcasts

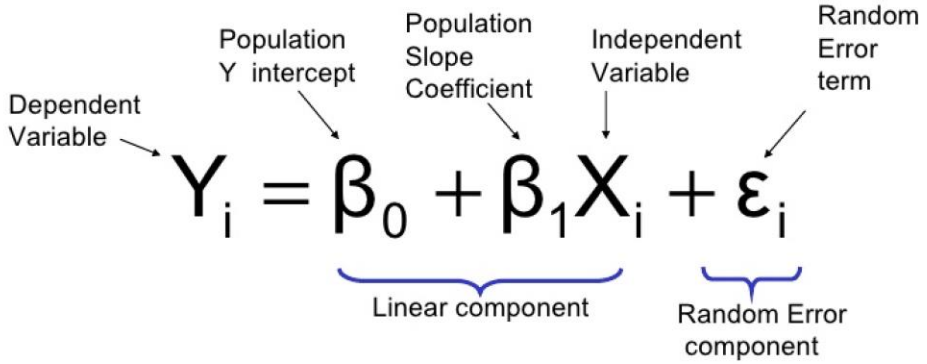
- Subscribe at https://tinyurl.com/wl-nasfaa

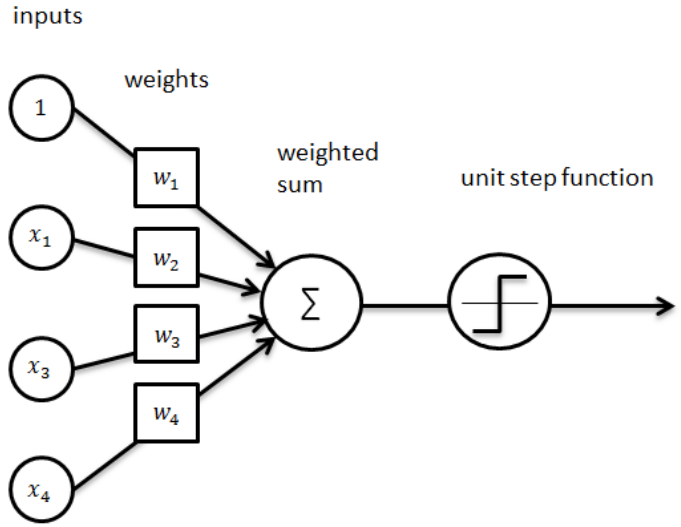
What Are Predictive Models?

Predictive Models: Uses Historical Data to Make Estimates About Unknown Future

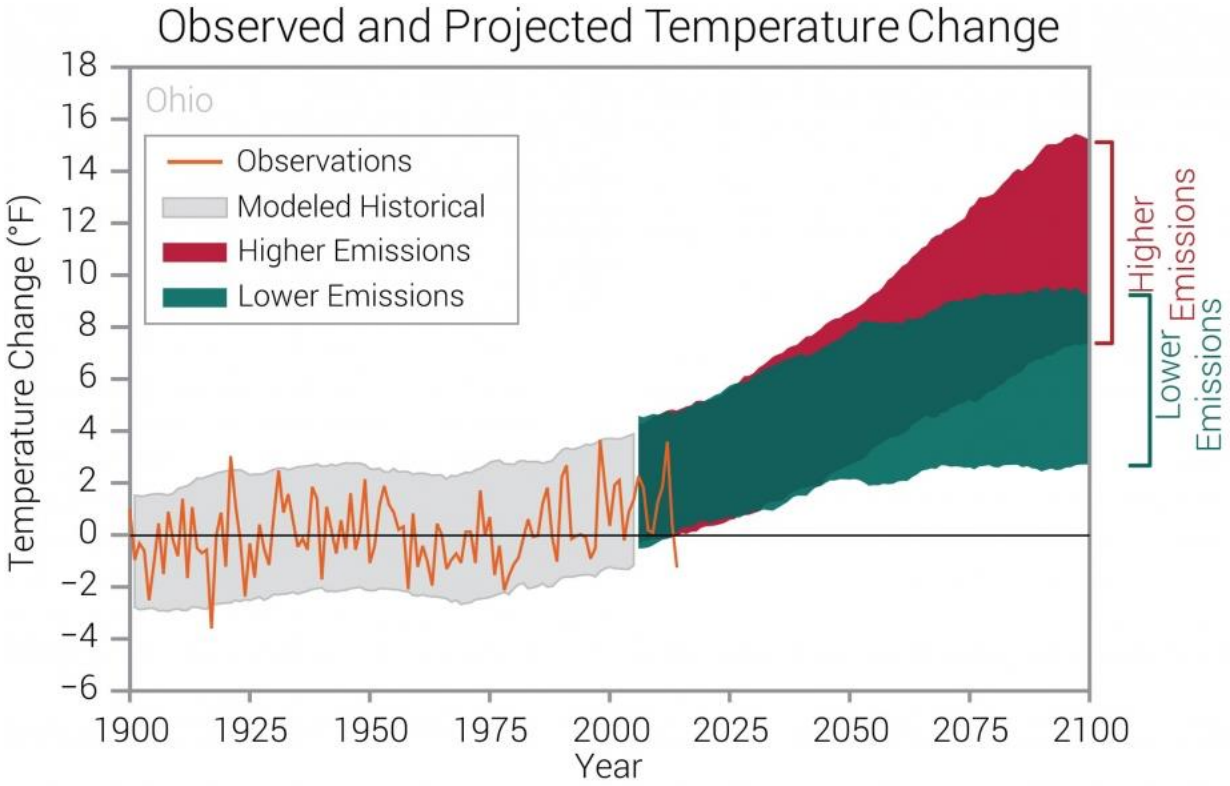


Predictive Models: Mathematical Equation or Function



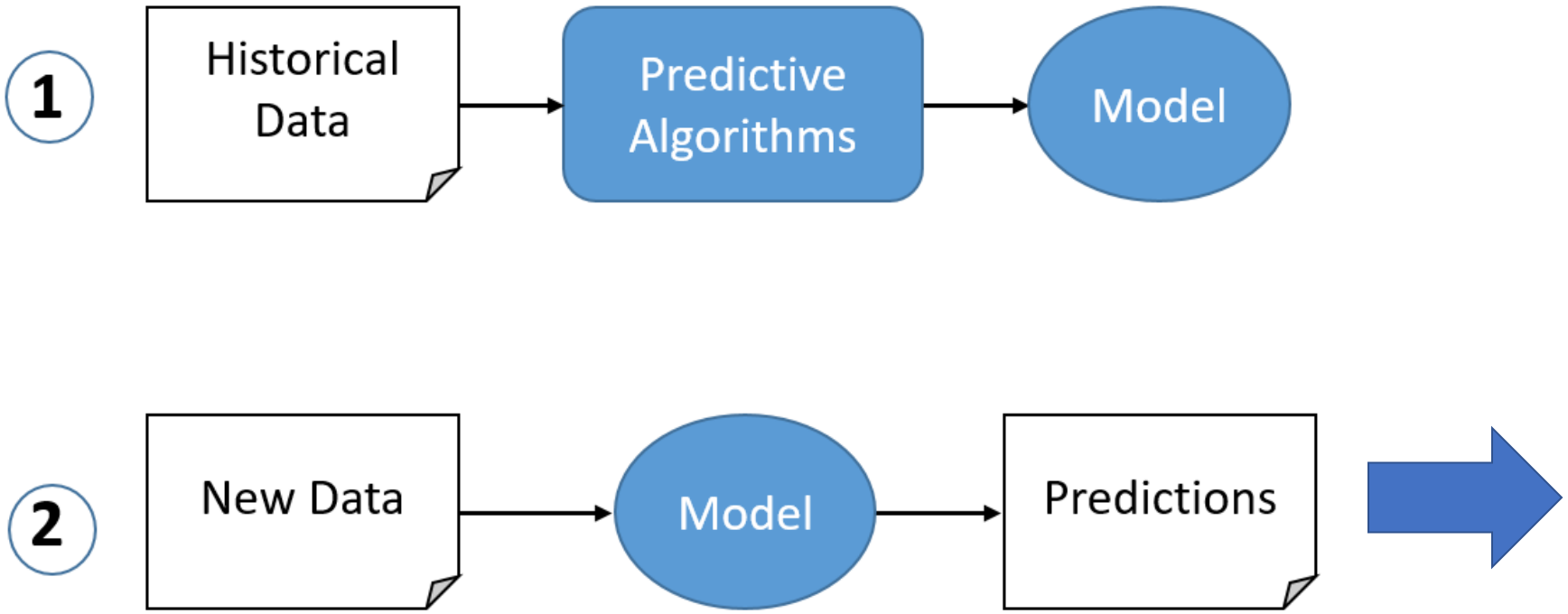


Predictive Models: Statistical Estimate not a Time Machine



Predictive Models in Enrollment Management

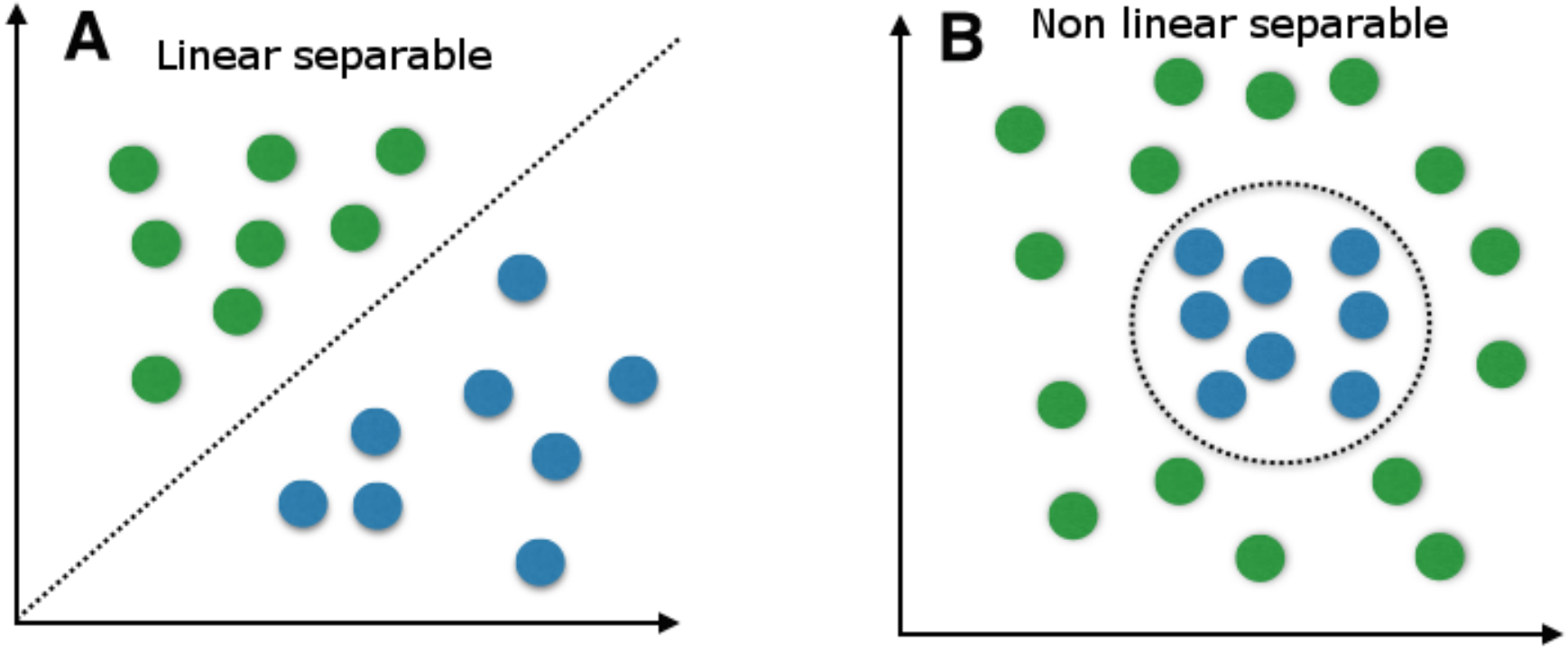
Predictive Models in EM: Campus Outcomes



- Application
- Enrollment
- Financial Aid Spend
- Discount Rate
- Persistence
- First Year GPA
- Graduation
- Alumni Involvement
- Donor
- Space Management
- Housing
- Parking
- NCAA Metrics
- Total Revenue

Opportunities for Enrollment Management

Opportunities: Advanced Algorithms



Opportunities: Interpretability and Accuracy

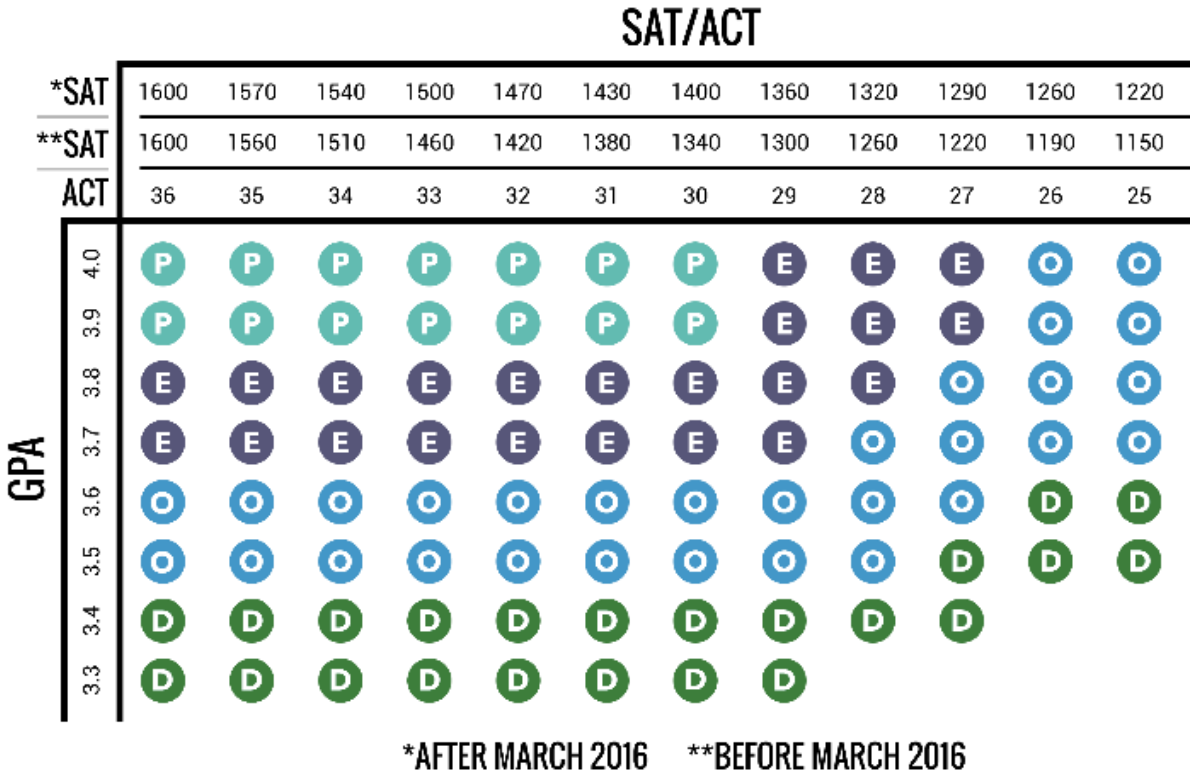
Interpretable

- Traditional research
- Policy-Making
- Asking "Why?"
- Explaining outcome to public

Machine Learning

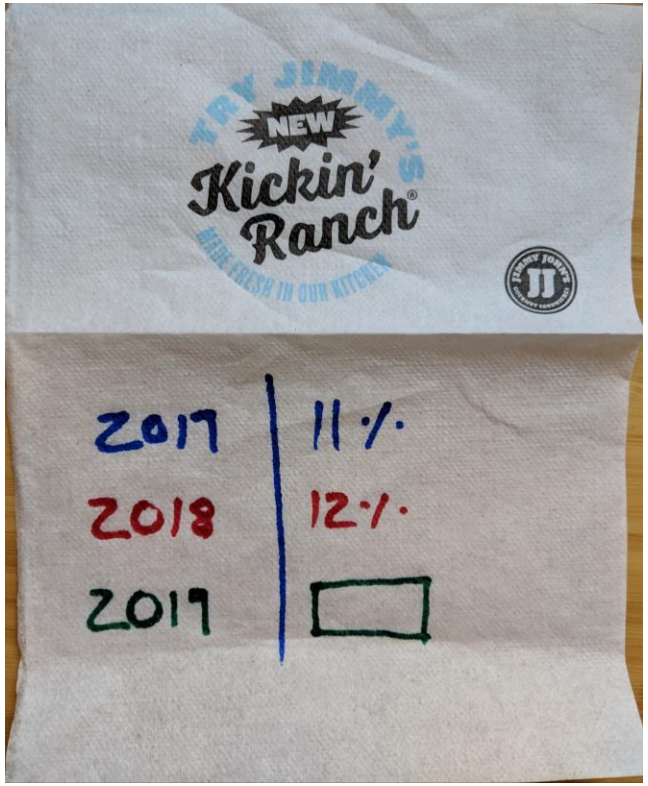
- More accurate
- Mitigates against human bias
- When understanding the problem isn’t as important as accurately predicting the outcome
- Making predictions for your institution

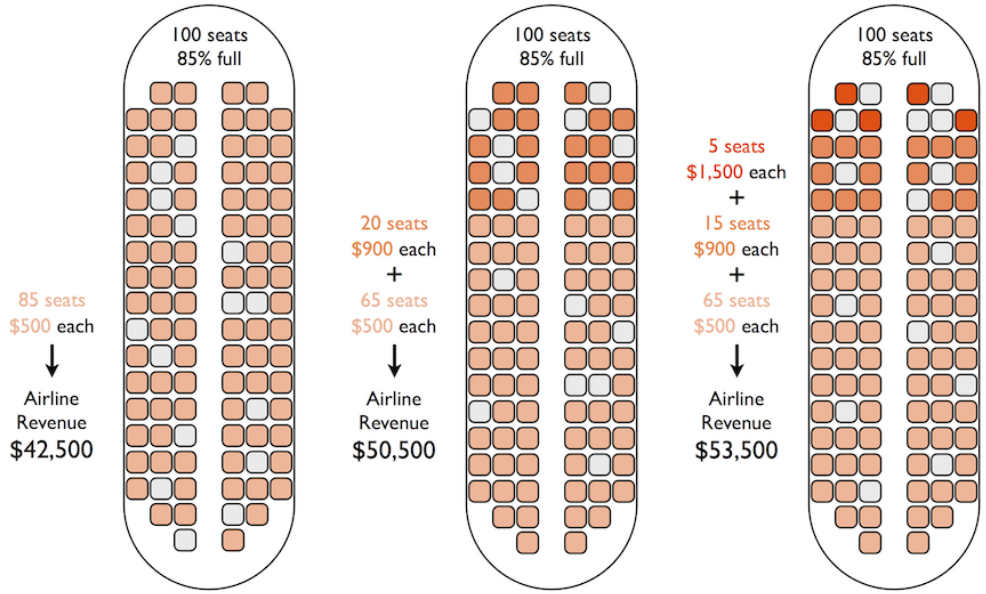
Opportunities: Bins to Individuals



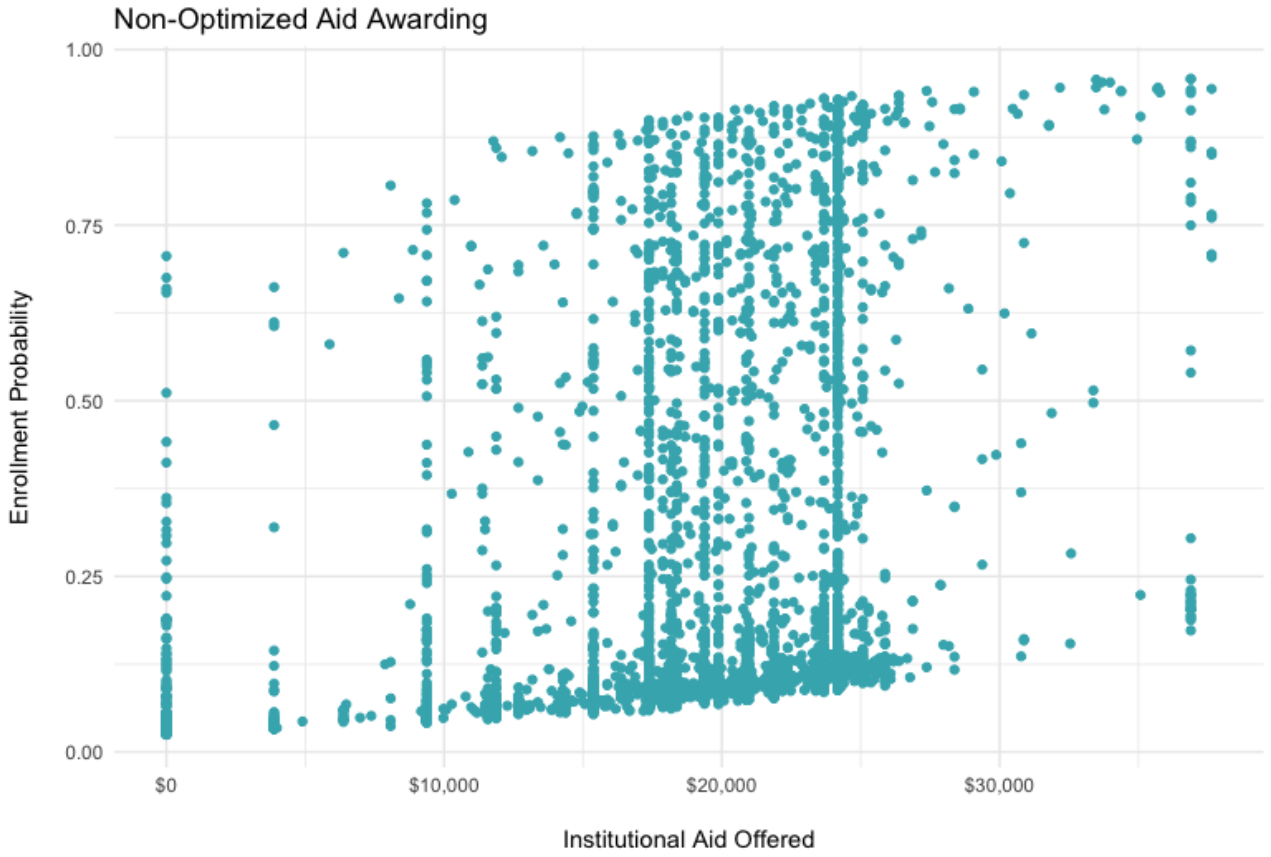
id	adj	total	coa	increase	decrease	offered	enrollment_probability
944505824	1	17375	37635	2000	0	19375	0.54730652
944516809	1	17375	37635	2000	0	19375	0.547305308
944508011	1	23775	37635	2000	0	25775	0.54696431
944507471	1	21075	37635	2000	0	23075	0.546066805
944510052	1	19575	37635	2000	0	21575	0.545703921
944511020	1	19875	37635	2000	0	21875	0.545144137
944517509	1	11875	37635	2000	0	13875	0.54476656
944510202	1	17375	37635	2000	0	19375	0.5445071
944501564	1	15375	37635	2000	0	17375	0.544404834
944506181	1	11875	37635	2000	0	13875	0.54436257
944516832	1	25075	37635	2000	0	27075	0.543890736
944508775	1	24375	37635	2000	0	26375	0.543880665
944503492	1	19375	37635	2000	0	21375	0.543626799

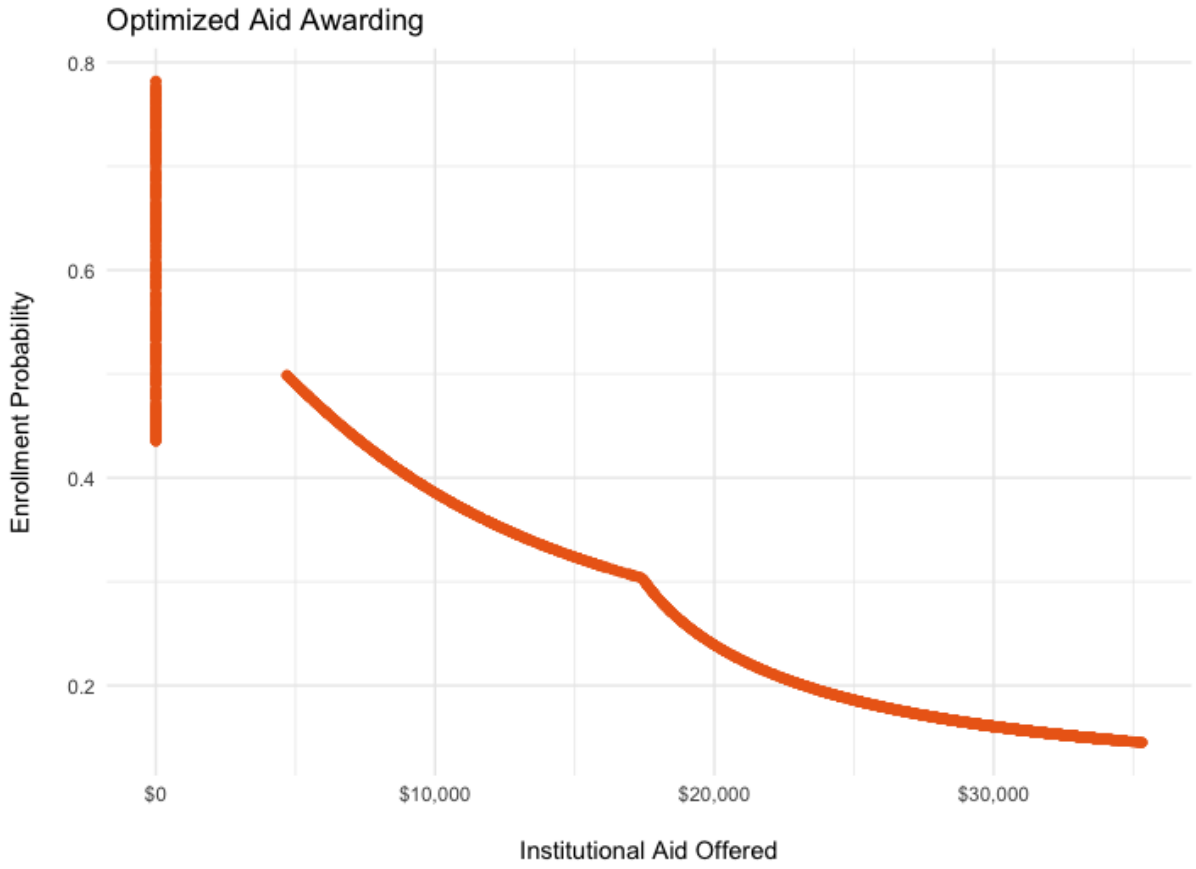
Opportunities: Extrapolation to Optimization



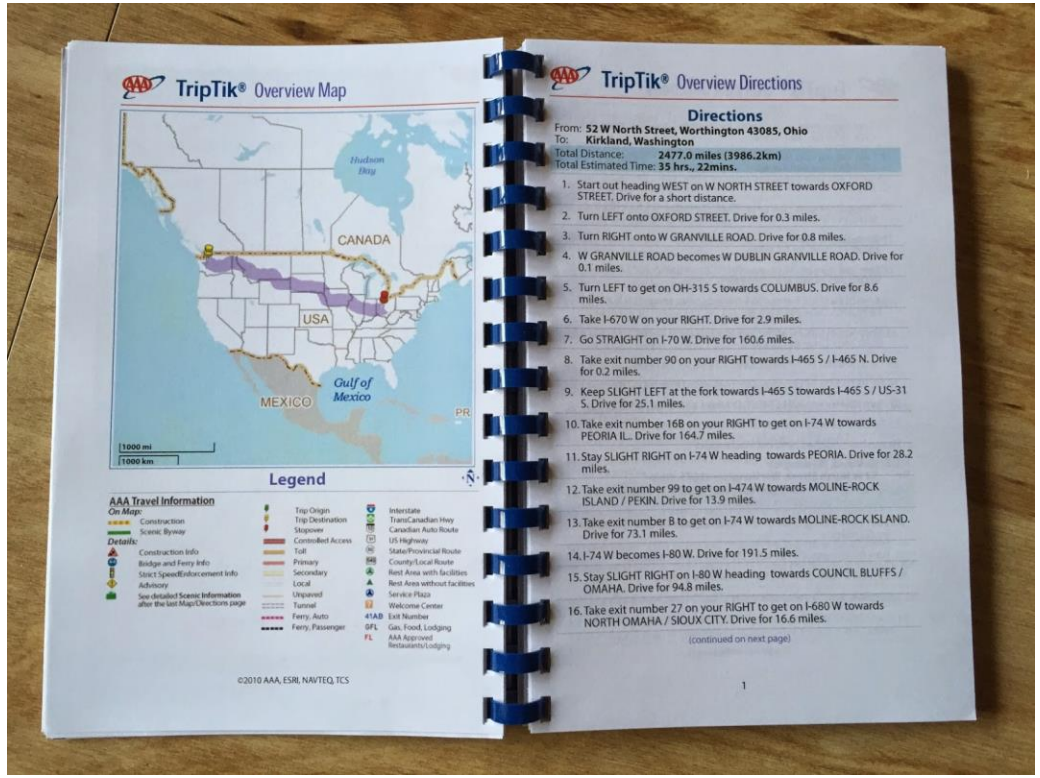


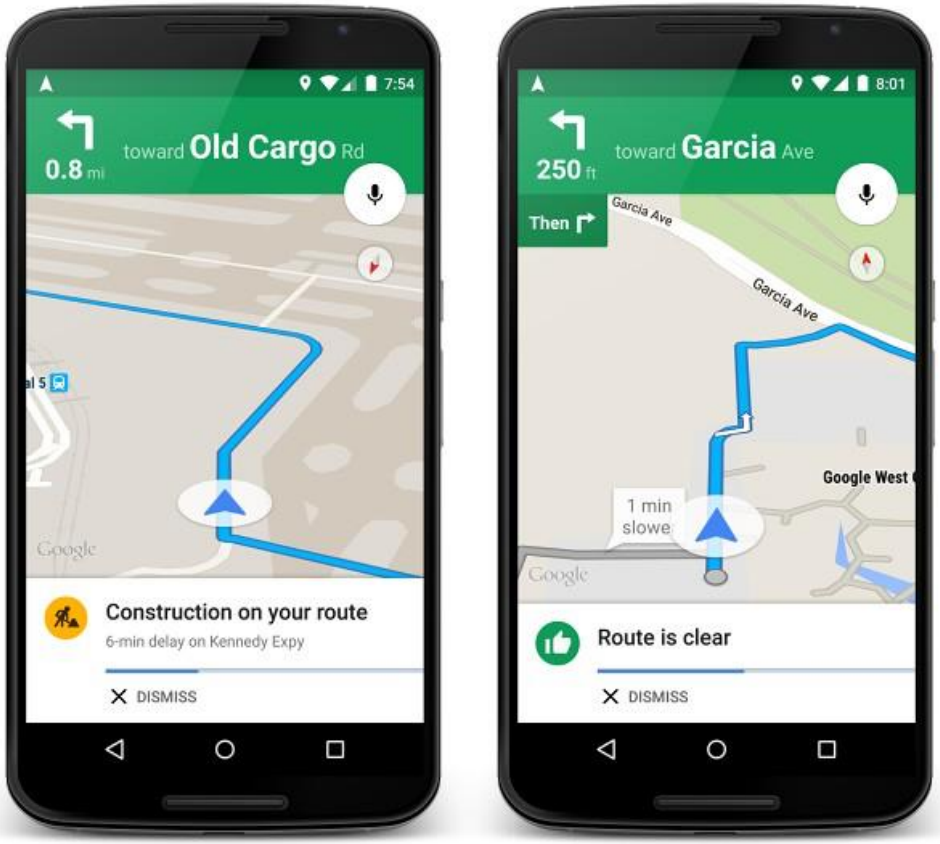
Opportunities: Aid Optimization



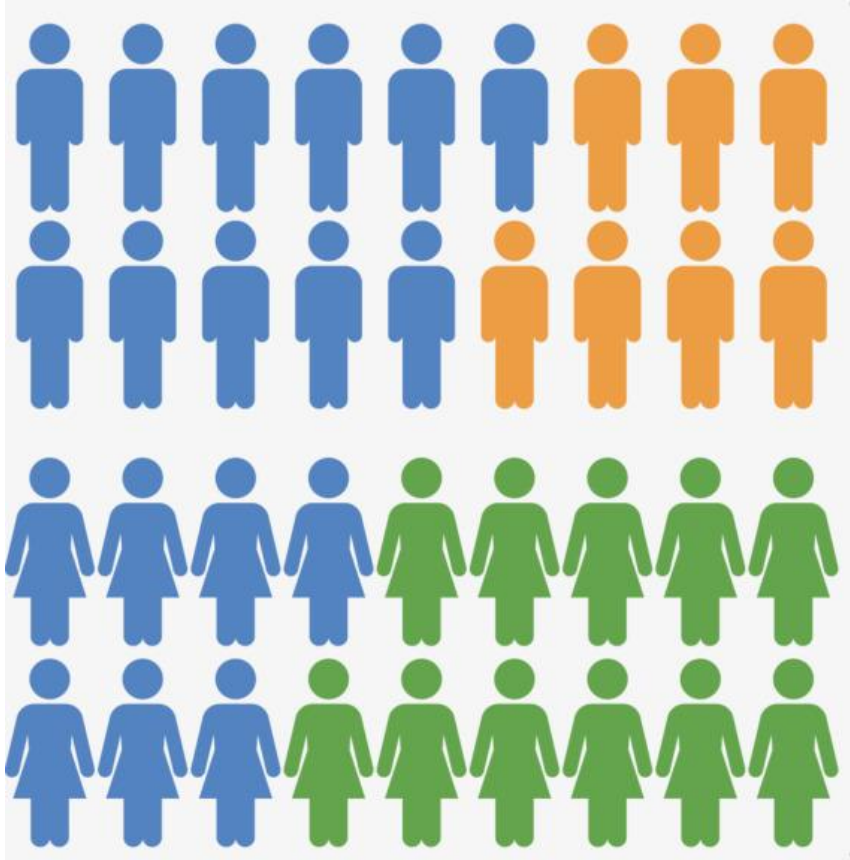


Opportunities: Descriptive to Prescriptive





Opportunities: Demographic to Behavioral Data



Opportunities: International Aid

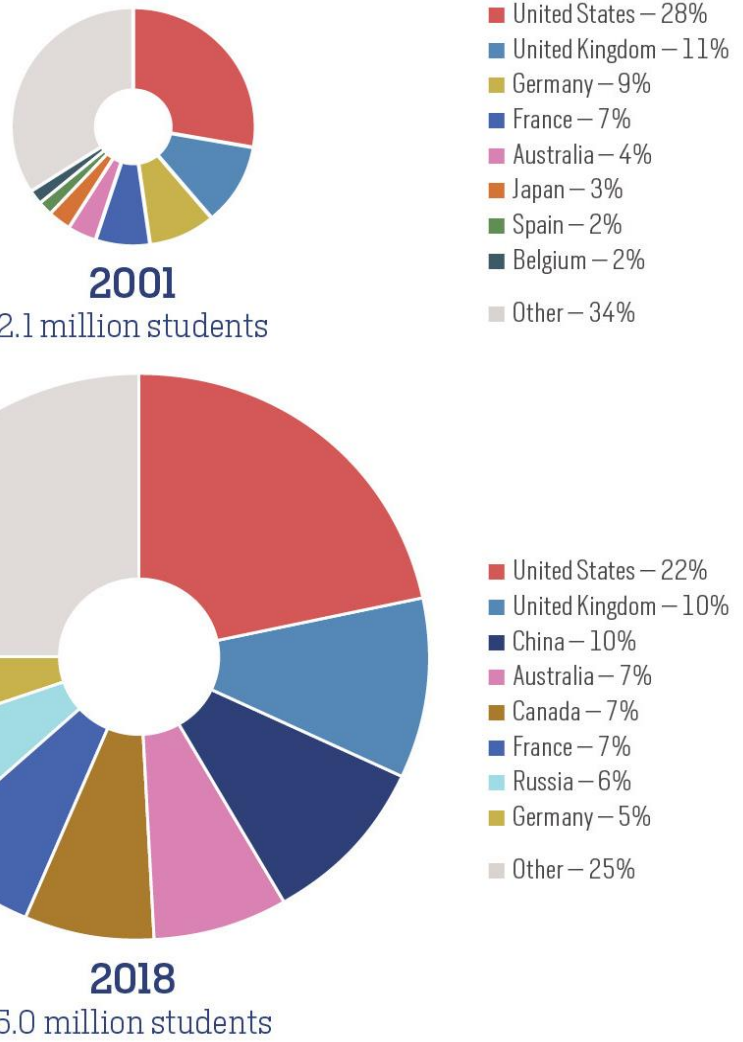
Currently 451 U.S. universities offering aid to international students*

- Average award: $21,900

**at least 50 awards*

Source: NAFSA, 2018; IMF, 2018

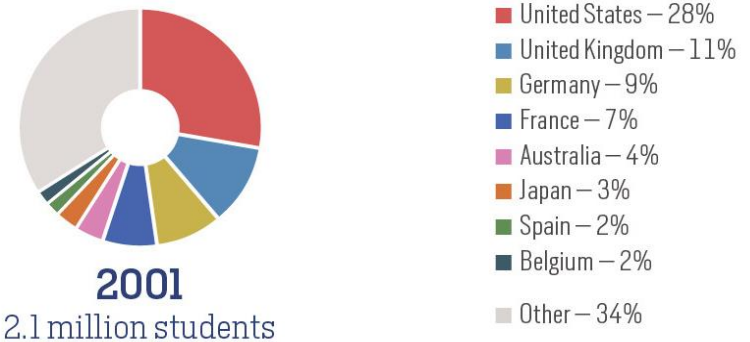
TOP HOST DESTINATIONS, 2001 & 2018



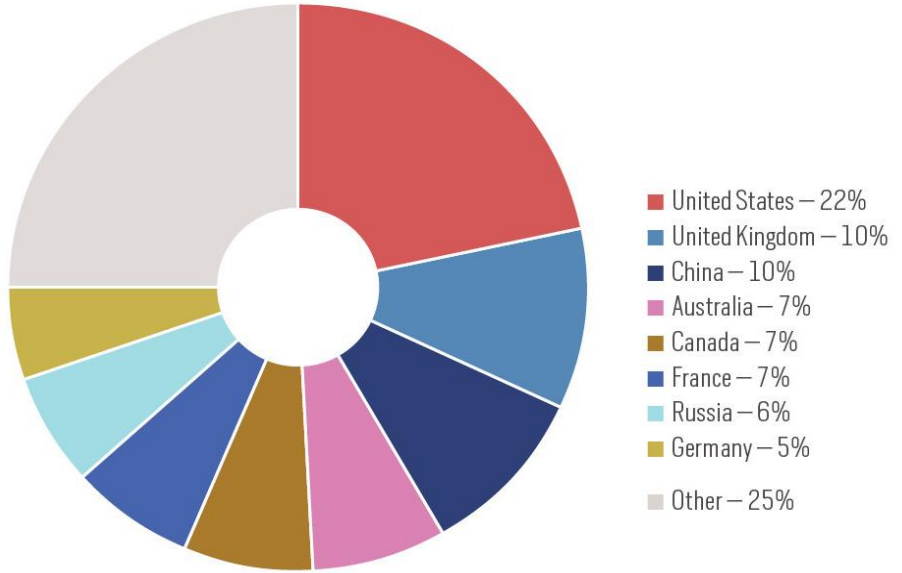
Source: Project Atlas, 2018; UNESCO, 2018

Opportunities: International Aid

TOP HOST DESTINATIONS, 2001 & 2018



2001
2.1 million students



2018
5.0 million students

Source: Project Atlas, 2018; UNESCO, 2018

Percent of Tuition and Fees paid by an Int'l family

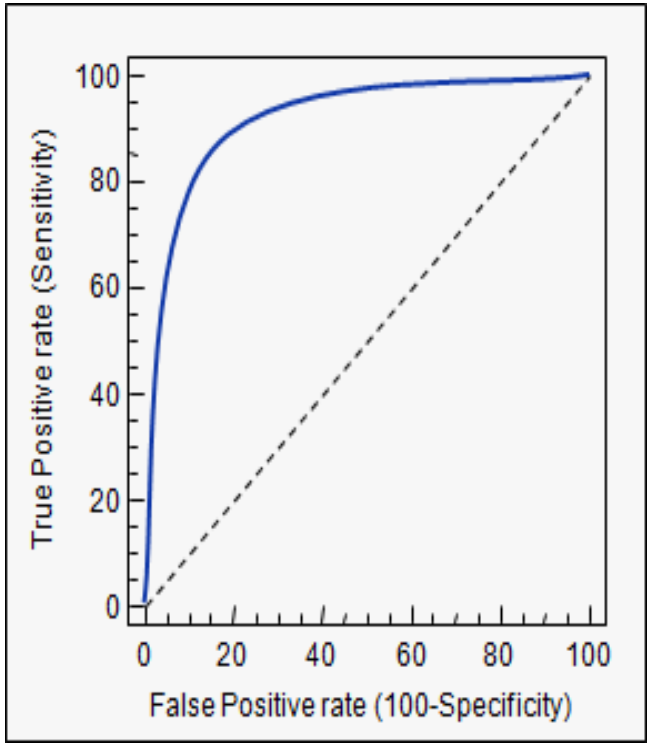
- 2005: 81%
- 2017: 62%

**at least 50 awards*

Source: NAFSA, 2018; IMF, 2018

Challenges for Enrollment Management

Challenges: Understanding Model Specification



MODEL FIT:
$\chi^2(3) = 116.16$, $p = 0.00$
Pseudo-R^2 (Cragg-Uhler) = 0.49
Pseudo-R^2 (McFadden) = 0.33
AIC = 240.23, BIC = 254.51

Standard errors: MLE

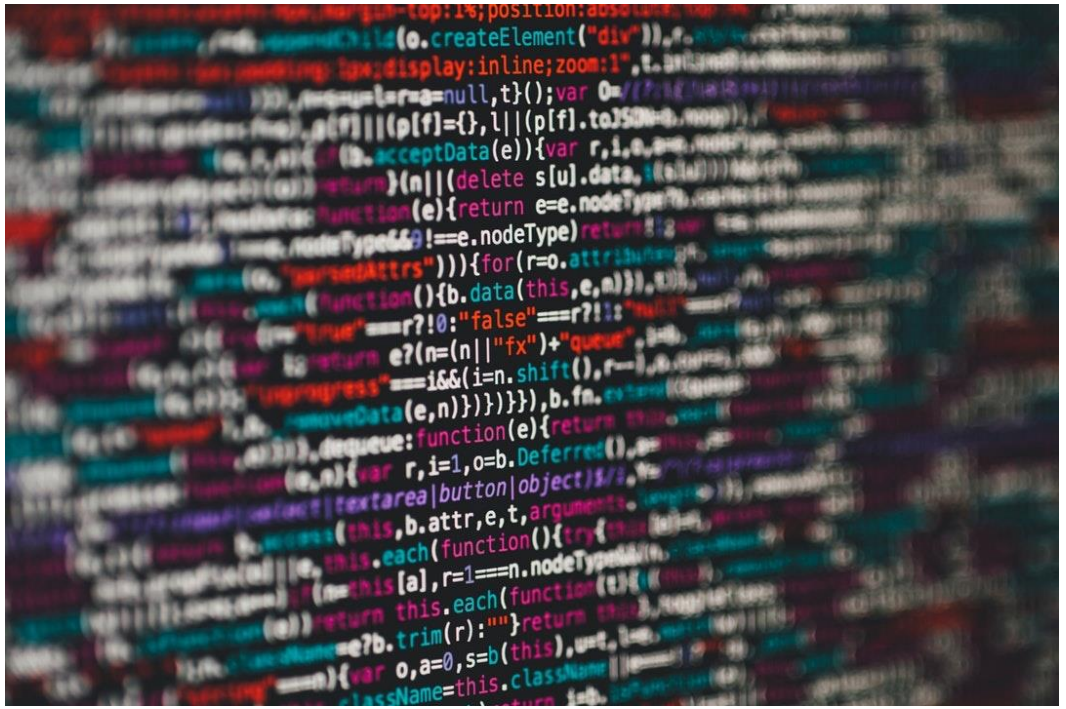
	Est.	S.E.	z val.	p	
(Intercept)	2.41	0.43	5.59	0.00	***
sexmale	-2.95	0.35	-8.42	0.00	***
ses_factorMed	-1.08	0.50	-2.18	0.03	*
ses_factorLow	-1.87	0.43	-4.35	0.00	***

Accuracy 77.4%

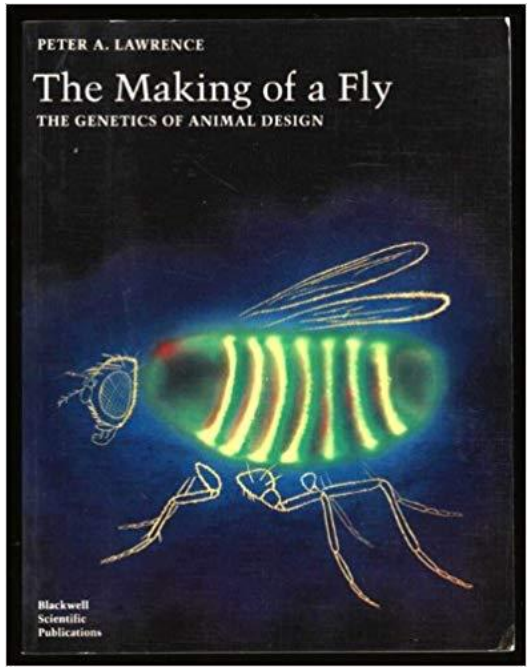
Challenges: Bias in Model Specification

Humans

Computers



Challenges: AI Going Awry



Challenges: Uncertain Public Policy

Challenges: How Does Your Campus Use Predictive Results?

- What are you predicting?
  - Retention or Attrition?
- How are you utilizing that information?
- Are use cases in line with institutional policies?
- If asked, can you explain use to your publics?
- Will they understand?

Challenges: Are You Minding Your Data?

- How is data being stored?
  - Do you have "shadow" systems?
- Is it being measured consistently over time?
- Do you have data governance policies?
- Do you have a data dictionary?
- Do you have help on campus?

Parting Thoughts

Scarce Resources Demand Efficient Allocation

- Predictive analytics are the best way to allocate your scarce institutional resources
- They have error
- They are built by humans
- A good model will always be better than guessing
- Tend to your data. Plant your tree

What Automates and What Doesn't

Can Automate

- Scheduling
- Processing
- Answering
- Certifying
- Data Entry
- Initial Packaging

Cannot Automate

- Trust
- Expertise
- Flexibility
- Passion
- Engagement
- Counseling

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Thank You

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Image Sources: github.com/capturelabs/nasfaa
Podcast: https://tinyurl.com/wl-nasfaa

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