

WHICH WAY IS THE WIND BLOWING?

FORECAST ENROLLMENT WITH PROJECTION MODELS

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AIR Forum 2018

 **University at Buffalo** The State University of New York



Introduction to the University at Buffalo



- Flagship university in the State University of New York System
- Member of the Association of American Universities
- Headcount: 21,020 undergraduates; 9,628 graduates (2017)
- Degrees awarded: ~8,700 annually
- More than 110 undergraduate and 300 graduate/professional programs



Testing the Weather

Having an idea of what the fall enrollment counts of returning students will be in advance helps university planning:

- Course demand
- Housing
- Campus Services

How can we help predict the future?



Additional Uses

- Knowing how many returning students can make (or break) the case for additional resources
- Financial Planning
- Space Planning
- Program Changes
- Staffing



Why Returning Students? What About New Students?

Admissions Analysis

- New Undergraduates (Freshman and Transfer) analysis
- New Graduates/Professionals



Comparing Success of Retention Programs

New Student success initiatives developed in recent years

- Are they working?
- What could be improved?



Does UB's Finish In Four Have an Impact?

Finish in Four Information

- Has this impacted retention?
- Has this impacted returning student numbers?



Predicting the Future

Ratio-driven historical models provide a way to predict future returning enrollment patterns based upon prior performance. These models are easy to create in Microsoft Excel.

Three types of ratio-driven models were created:

- Historical Model (most recent data)
- Historical 3 Year Average Model
- 3-year Weighted Average Model



Historical Model

Simplest model: fall to fall retentions by degree level, unit, enrollment status, and residency for the most recent year.

RATIONALE:

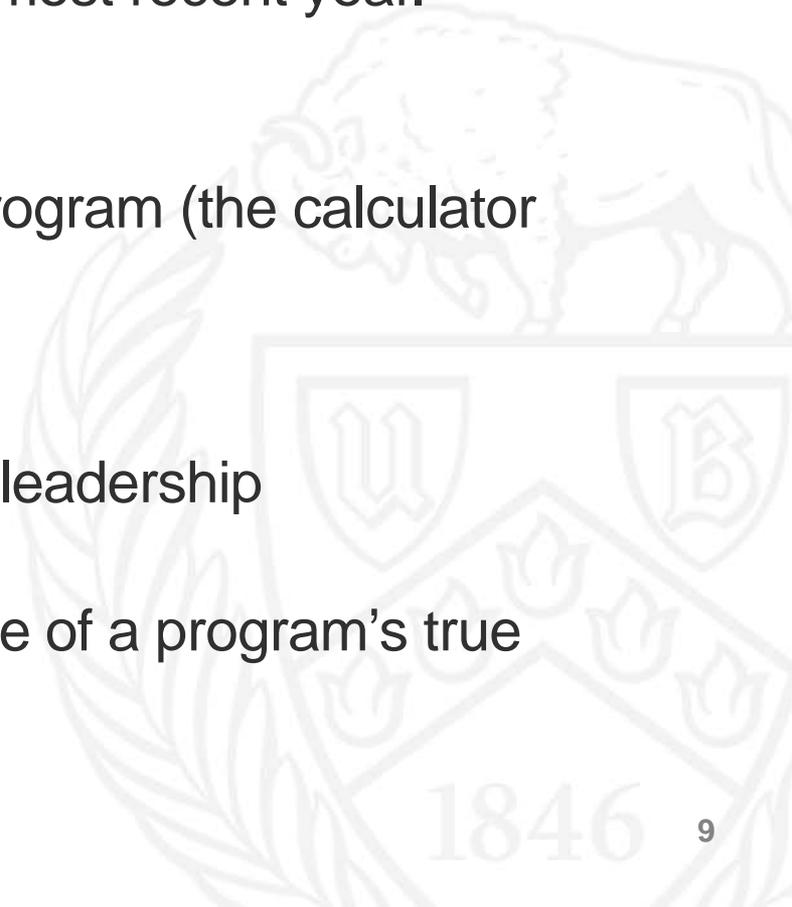
Presume no growth nor decline in any program (the calculator makes those adjustments)

PROS:

Uses familiar, recent numbers for senior leadership

CONS:

One year of change may not be indicative of a program's true nature



Historical 3 Year Average Model

Uses fall to fall retentions by degree level, unit, enrollment status, and residency for the most recent 3 years and averaged rates.

RATIONALE:

Three years of averaged rates should provide a more informative picture of enrollments and retentions.

PROS:

Three years of data provides a more balanced picture

CONS:

Equal weighting may discount recent changes

3 Year Weighted Model

Uses fall to fall retentions by degree level, unit, enrollment status, and residency for the most recent 3 years and weighted the retention rates according to this formula:

Most recent year: **50%**

Two Prior Years: **25% Each**

RATIONALE

Three years of weighted trends should provide a more informative picture of enrollments and retentions, with the most recent changes being weighted more heavily.

PROS:

Weighting most recent data allows for changes to impact the model

CONS:

Some small changes may not be as obvious

Creating the Models

Historical Average Model

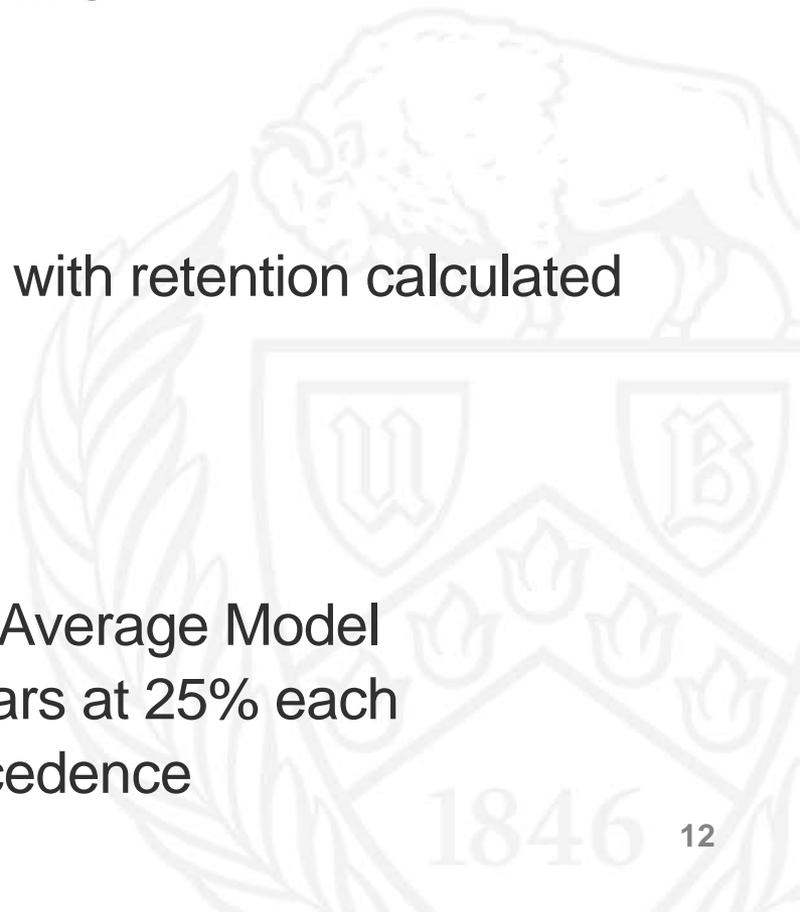
- Includes only most recent prior 2 fall terms
- Useful for quick assessment

Historical 3 Year Average Model

- Includes each of the 4 prior fall terms, with retention calculated separately for each fall to fall.
- Retention rates are equally weighted

3 year Weighted Average Model

- Same dataset as the 3 year Historical Average Model
- Last year is weighted at 50%, prior years at 25% each
- Allows for recent changes to take precedence



Collecting the Data

- Collected enrollment counts by level (undergraduate, graduate, and professional) and program (type of degree earned) for each of the last 4 fall terms to provide retention information
- Collected degrees awarded for each of the last 3 academic years
- Determined retention percentages and counts in each category
- Used Fall to Fall counts to be able to project a year in advance what enrollments might look like. The majority of our students enter in the Fall, although we did examine spring entrants to determine if they should be counted separately.

Excel Formulas Used

Historical Model: `=AVERAGE(A2:B2)`

Historical 3 Year Average Model: `=AVERAGE(A2:C2)`

3 year Weighted Average Model: `=(((A2*0.25)+(B2*0.25)+(C2*0.5)))`

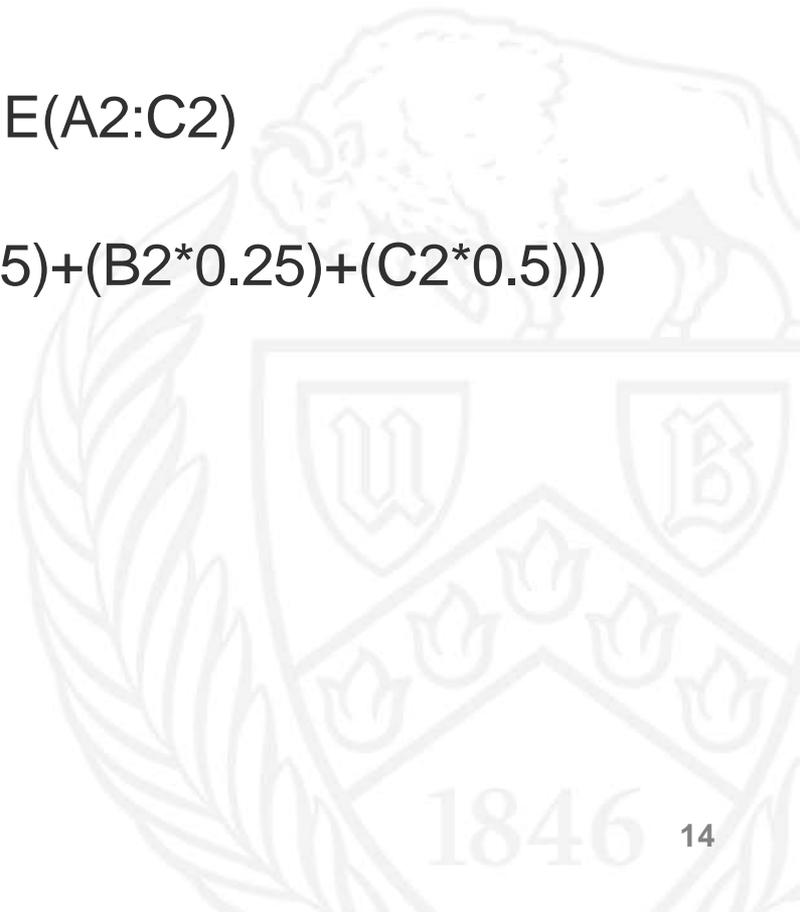


Tableau Setup

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Career	Unit	DegLevel	Program	EnrollStatus	Residency	NonReturners	Returners	RetRate	Total Students	TuitRate	PreviousYear	3YrAvg	3YrWeighted
2	GRAD	SAP	Masters	Architctr & Plng Adv Cert	Part Time	IS	0	1	1	1	2718	100%	100%	100%
3	UGRD	SAP	Bachelor	Architctr & Plng Bachelor	Full Time	IS	18	327	0.947826	345	3235	95%	94%	94%
4	UGRD	SAP	Bachelor	Architctr & Plng Bachelor	Full Time	OOS	5	32	0.864865	37	11855	86%	88%	88%
5	UGRD	SAP	Bachelor	Architctr & Plng Bachelor	Part Time	IS	3	8	0.727273	11	1618	73%	82%	80%
6	UGRD	SAP	Bachelor	Architctr & Plng Bachelor	Part Time	OOS	0	2	1	2	5928	100%	100%	100%
7	GRAD	SAP	Masters	Architctr & Plng Comb Masters	Full Time	IS	1	4	0.8	5	5435	80%	84%	83%
8	GRAD	SAP	Masters	Architctr & Plng Comb Masters	Full Time	OOS	0	1	1	1	11105	100%	100%	100%
9	GRAD	SAP	PhD	Architctr & Plng Doctoral	Full Time	IS	0	3	1	3	5435	100%	100%	100%
10	GRAD	SAP	PhD	Architctr & Plng Doctoral	Full Time	OOS	0	3	1	3	11105	100%	100%	100%
11	GRAD	SAP	PhD	Architctr & Plng Doctoral	Part Time	OOS	0	3	1	3	5553	100%	100%	100%
12	GRAD	SAP	Masters	Architctr & Plng Masters	Full Time	IS	5	76	0.938272	81	5435	94%	94%	94%
13	GRAD	SAP	Masters	Architctr & Plng Masters	Full Time	OOS	4	27	0.870968	31	11105	87%	88%	88%
14	GRAD	SAP	Masters	Architctr & Plng Masters	Part Time	IS	1	10	0.909091	11	2718	91%	94%	93%

The above is a snippet of the final Excel file ready for loading into Tableau.

Using Parameters

Parameters were used to allow the user to toggle between various models and retention percentages.

Let's view this in Tableau...



Select which Model to View

Tableau Demonstration



Various Models have an Impact



Enough about Students. Show me the Money!

Students drive tuition revenue. Here's how the forecasting models impact tuition revenue:



Winds Change Tuition Revenue

Tuition rates are set at the CURRENT rate. However, we have added in the ability to adjust tuition by entering the additional dollar amount per credit hour for potential increases, as seen here:



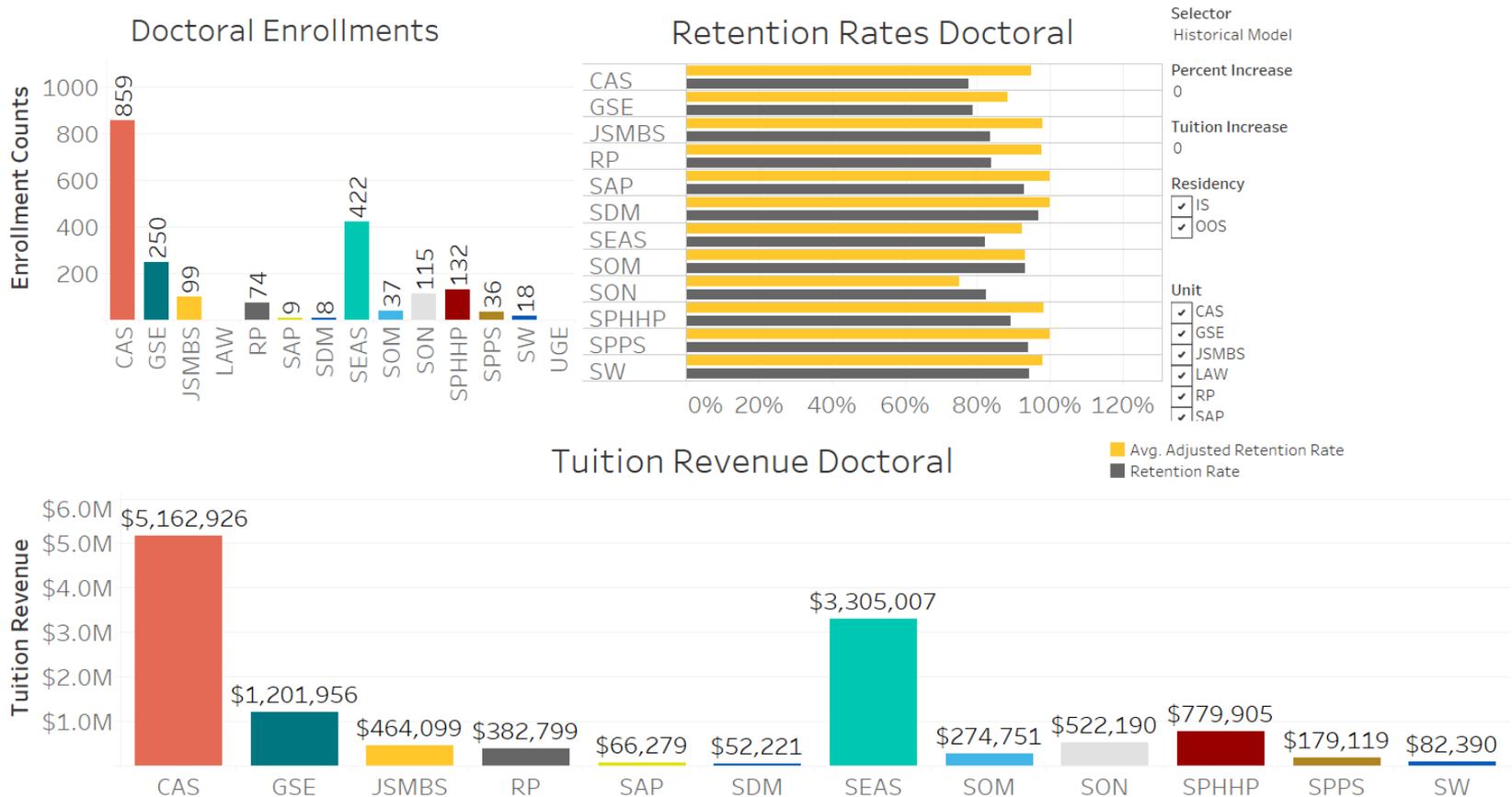
Filtering by Level

- Undergraduate
- Masters
- Doctoral

Each of these groups will retain at different rates, which is why we provide the ability to look at returning students by each of these groups.



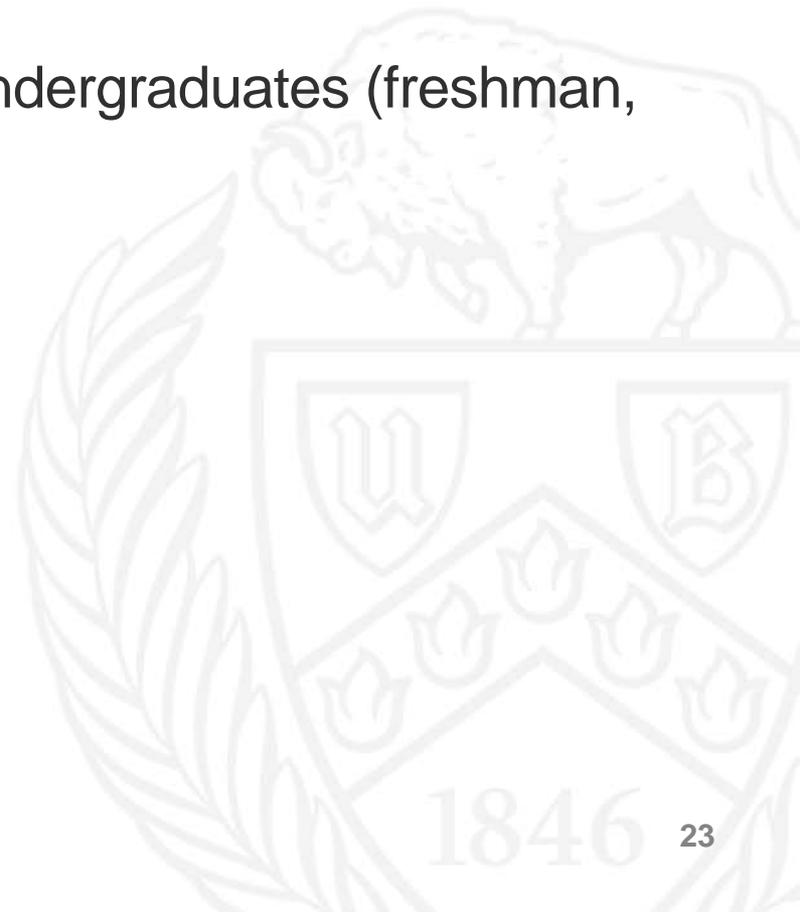
Printing or Exporting the Finished Result



Historical Model: Fall 2016 to Fall 2017 Retention Rate..

Further Suggestions

- Forecasting Graduation Rates
- Further refinement: year by year for undergraduates (freshman, sophomore, junior, senior)
- Fall to Spring enrollments
- Spring Entrants
- Filtering by special student groups



Questions or Comments?

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