Enrollment Projection Methodology Amidst Chaos

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Markov Chain: Pig in the Python
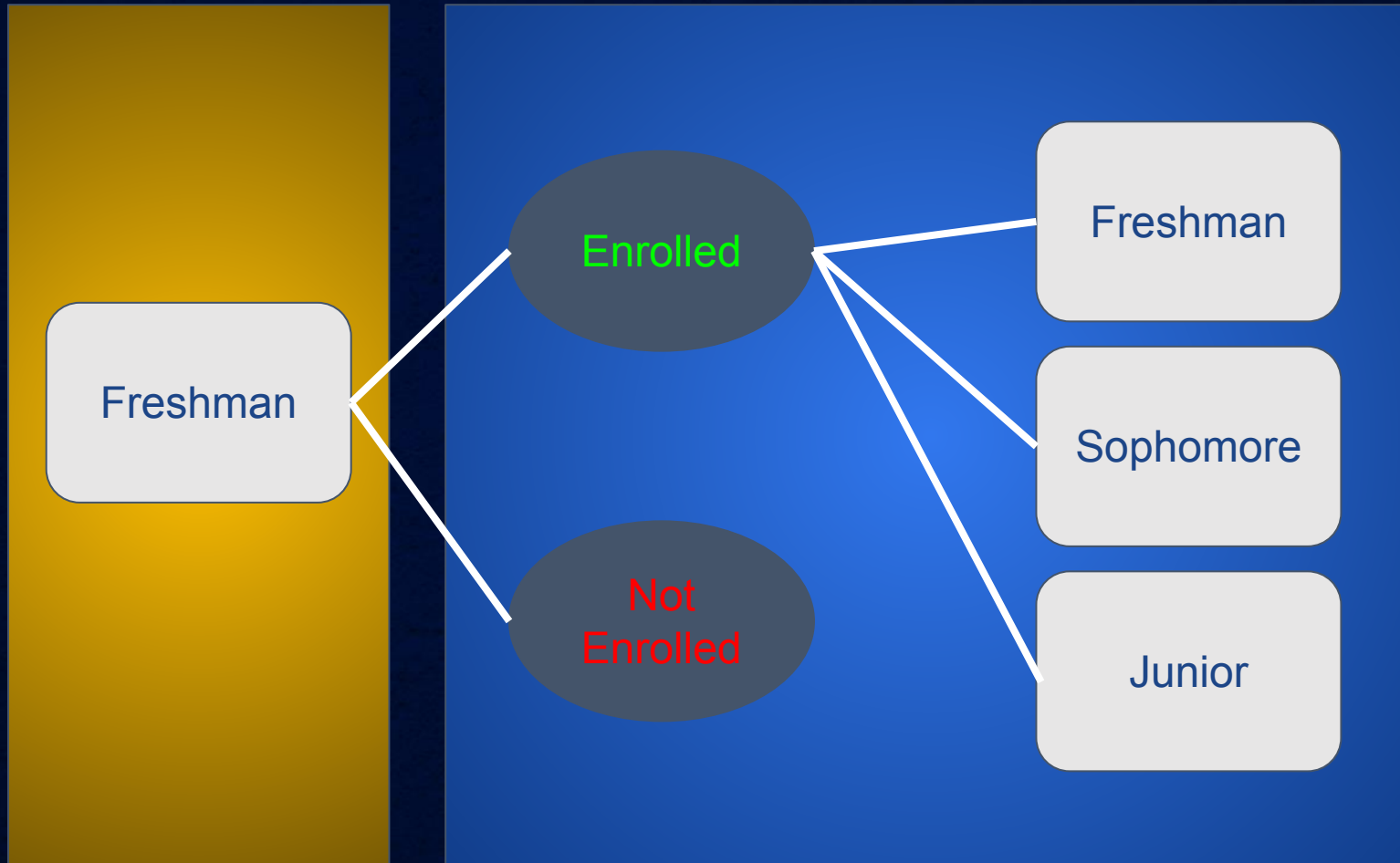
Markov Chain Methodology

- Move unusual classes through the pipeline

- Similar to a cohort survival model

- Based on <u>one year's data</u> which is especially useful when trend data is disrupted

- <u>Assumes</u> the same behavior of continuing students from one year to the next

- Model new students separately and add to the model for a total projection

Probability Matrix

Counts

Fall 2020 \ Fall 2021	FR	SO	JR	SR	NE
FR	1355	2720	166		2006
SO	1	599	3005	345	1027
JR		2	615	3371	870
SR				1474	4051

Percentages

Fall 2020 \ Fall 2021	FR	SO	JR	SR	NE
FR	0.22	0.44	0.03	0.00	0.32
SO	0.00	0.12	0.60	0.07	0.21
JR	0.00	0.00	0.13	0.69	0.18
SR	0.00	0.00	0.00	0.27	0.73

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Fall 2020 to Fall 2021 Model

Row Labels	Freshman	Sophomore	Junior	Senior	NotEnrl
02-Freshmen	21.69%	43.54%	2.66%	0.00%	32.11%
03-Sophomore	0.02%	12.04%	60.38%	6.93%	20.63%
04-Junior	0.00%	0.04%	12.66%	69.39%	17.91%
05-Senior	0.00%	0.00%	0.00%	26.68%	73.32%

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Model to Projection

Fall 2020 to Fall 2021 Model

Class F20	Headcount F20	Continuing	Not Enrolled	Lost		Continuing			
					DE	Fresh	Soph	Jun	Sen
Freshman	6248	4242	2006			1355	2720	166	
Sophomore	4978	3951	1027			1	599	3005	345
Junior	4871	4001	870				2	615	3371
Senior	5799	1748	4051						1474

Markov Chain

Row Labels	01-Dual Enro	02-Freshma	03-Sophom	04-Junior	05-Senior
02-Freshme	0.00%	21.69%	43.53%	2.66%	0.00%
03-Sophom	0.00%	0.02%	12.03%	60.37%	6.93%
04-Junior	0.00%	0.00%	0.04%	12.63%	69.21%
05-Senior	0.00%	0.00%	0.00%	0.00%	25.42%

Fall 2021 to Fall 2022 Projection

Class F21	Headcount F21	Continuing	Not Enrolled	Lost		Continuing			
					DE	Fresh	Soph	Jun	Sen
Freshman	6988	4744	2244		0	1515	3042	186	0
Sophomore	4668	3705	963		0	1	562	2818	324
Junior	4709	3868	841		0	0	2	595	3259
Senior	5642	1701	3941		0	0	0	0	1434

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Projected to Actual

Fall 2022 Projected

Row Labels	Freshman	Sophomore	Junior	Senior	NotEnrl
02-Freshmen	21.69%	43.54%	2.66%	0.00%	32.11%
03-Sophomore	0.02%	12.04%	60.38%	6.93%	20.63%
04-Junior	0.00%	0.04%	12.66%	69.39%	17.91%
05-Senior	0.00%	0.00%	0.00%	26.68%	73.32%

Fall 2022 Actual

Row Labels	Freshman	Sophomore	Junior	Senior	NotEnrl
Freshman	24.98%	37.74%	2.59%	0.04%	34.67%
Sophomore	0.02%	14.96%	58.10%	5.05%	21.87%
Junior	0.00%	0.00%	13.20%	68.44%	18.36%
Senior	0.00%	0.00%	0.03%	29.37%	70.59%

Difference Fall 2021 to 2022 Actual

Row Labels	Freshman	Sophomore	Junior	Senior	NotEnrl
02-Freshmen	3.29%	-5.80%	-0.07%	0.04%	2.56%
03-Sophomore	0.00%	2.92%	-2.28%	-1.88%	1.24%
04-Junior	0.00%	-0.04%	0.54%	-0.95%	0.45%
05-Senior	0.00%	0.00%	0.03%	2.69%	-2.73%

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References

Enrollment Projection Using Markov Chains: Detecting Leaky Pipes and the Bulge in the Boa. The AIR Professional File, Fall 2019. Article 147

Bradley, Samantha (2017). Predicting Student Enrollment Using Markov Chain Modeling in SAS. Southern Association for Institutional Research.

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Questions?