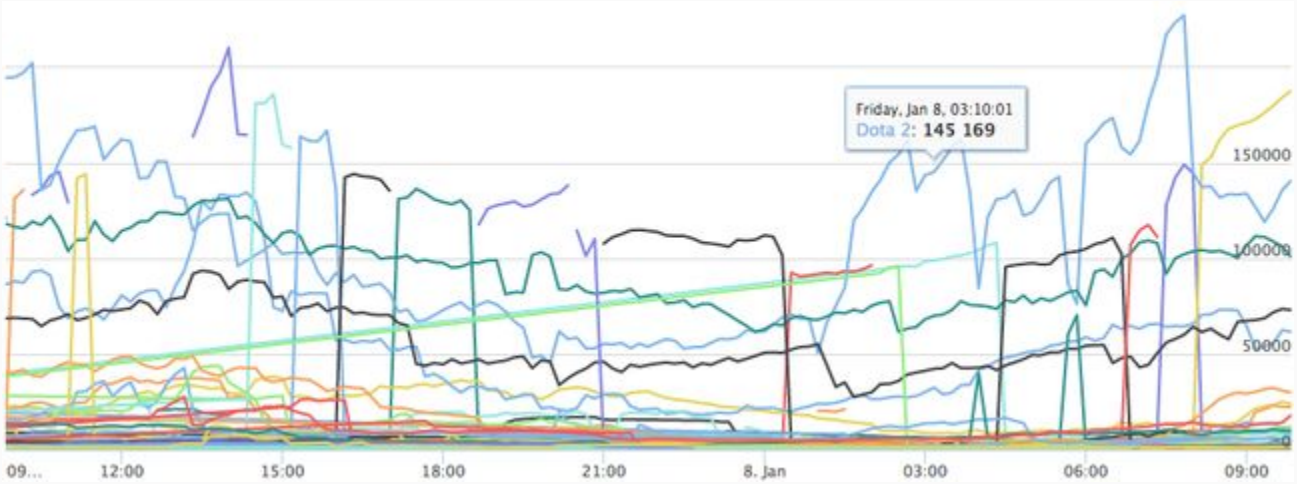
Predicting MOBA Balance Outcomes

Trevor Fisher

What’s a MOBA?

- The most-played and most-viewed genre in eSports
- Market leaders are League of Legends and Dota 2



https://stats.twitchapps.com/

What’s a MOBA?

- Typically 5v5 team PC games where players cooperate to tackle objectives
- Before each game, 10 characters are chosen from a pool of 50-120
- Characters are chosen according to perceived strength, which fluctuates
- Periodic “Balance Patches” are released to address strength disparities

GAMEPLAY UPDATE 6.86

GENERAL

- **Added Arcane Rune**
  + Show details
- Creep bounty increases by 1 gold per normal upgrade cycle [?]
- Siege damage against heroes increased from 75% to 85% [?]
- Hero base HP increased from 150 to 180
- Creeps now arrive slightly closer to the top dire tower and bottom Radiant tower
- Random Draft hero pool increased from 24 to 50
- Added Random Draft to Ranked Matchmaking
- Random Draft now uses the same picking mechanics as Ranked All Pick

Balance patch outcomes

Core Question:

Can I predict how professional players will respond to balance patches?

HERO	P+B	PICK	BAN	WIN	LOSE	WIN%	P+B %	
	**468**	76	**392**	43	33	56	98.5	
	463	**257**	206	132	125	51	97.4	
	443	168	**275**	95	73	56	93.2	
	432	211	221	94	117	44	90.9	
	415	157	**258**	81	76	51	87.3	
	415	217	198	120	97	55	87.3	▲1
	402	**238**	164	123	115	51	84.6	
	384	**227**	157	115	112	50	80.8	
	379	215	164	114	101	53	79.7	▲1
	313	119	194	63	56	52	65.8	▲1
	301	65	236	34	31	52	63.3	▲1

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HERO	P+B	PICK	BAN	WIN	LOSE	WIN%	P+B %	
	405	215	190	107	108	49	91.0	
	389	224	165	116	108	51	87.4	
	346	138	208	74	64	53	77.7	
	343	202	141	107	95	52	77.0	▲1
	322	199	123	105	94	52	72.3	
	313	124	189	63	61	50	70.3	
	301	68	233	37	31	54	67.6	

Data sourcing

Historical data for professional games:

- hero pick/ban%
- hero win rates
- same-team hero pairings
- hero head-to-head performances
- hero item preferences

Hero and patch information:

- raw text of patch notes
- hero roles
- hero abilities (stopwords)

Patch notes NLP

- Over the past 10 patches, there have been about 1200 hero changes
- I labeled ~100 of these as +/-, and predicted the rest with a boosting model

Challenges:

- Language used in writing patch notes has changed since 2012
- “Increased” is not always positive, and “Reduced” is not always negative
- Many changes are numerical and not caught by NLP

Hero interactions

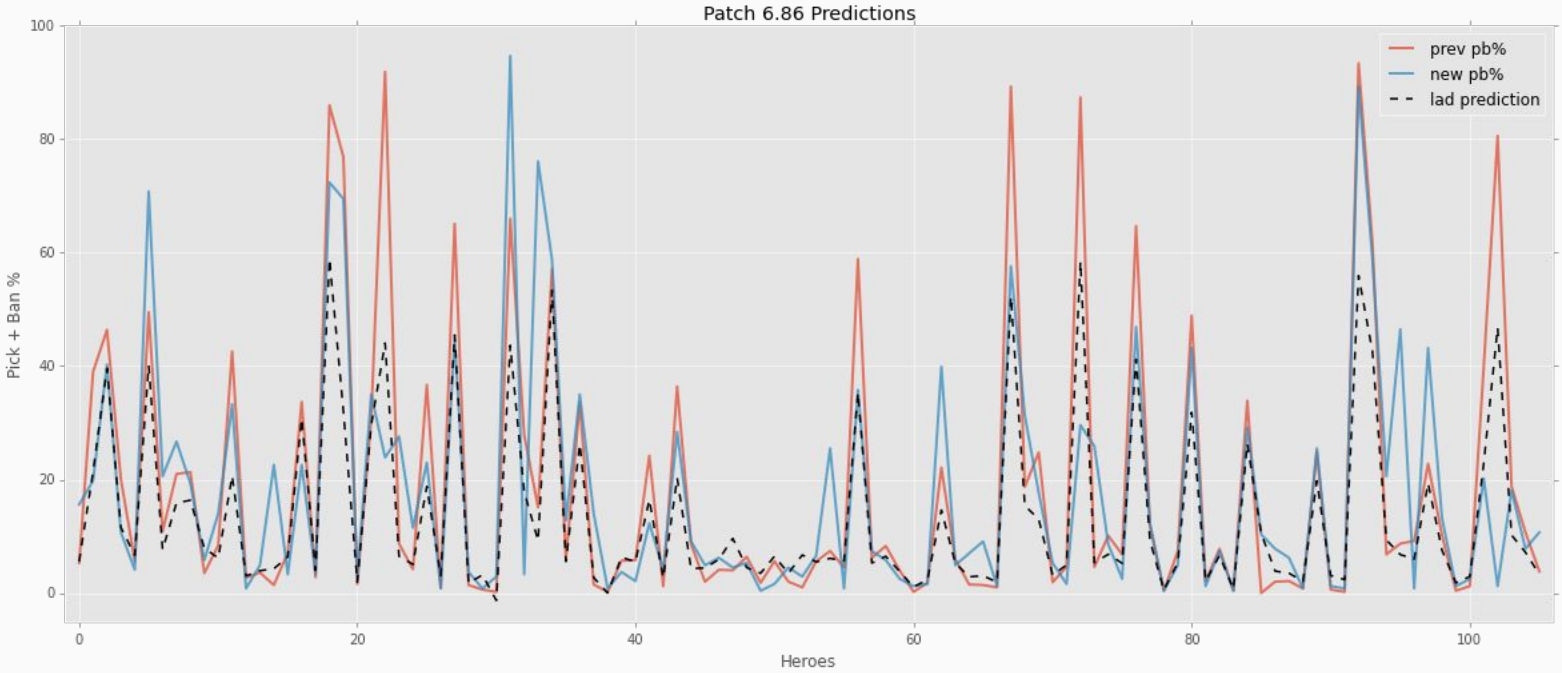
• Individual changes are important, but Heroes can also benefit significantly from improvements to synergistic partners

• Similarly, Heroes can benefit or suffer from changes to their “counterpicks”

Modeling

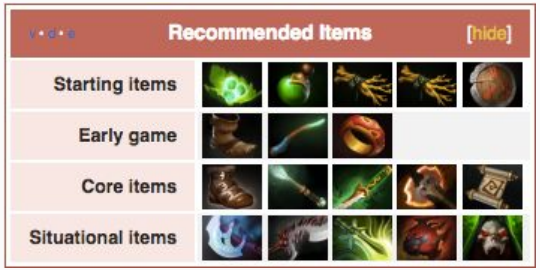
- Target: new pick+ban rate (%)
- Core features:
  - previous pick+ban rate
  - previous win rate
  - number of changes to hero
  - probability that changes made to hero will improve hero
  - average size of numeric changes made to hero
  - composite measure of +/- change to hero's common pairings
  - composite measure of +/- change to hero's common opponents
- Models: Random Forest Regressor, Gradient Boosting Regressor

Model results



Next steps

- Hero-item interactions (another round of NLP!)



- Identify heroes that benefit from overall gameplay/map changes
- Scrape/NLP player attitudes to identify untapped potential preemptively
- Explore other use cases