Everglades Agent Behavior Analytics

Group 20 | Project progress update

About us

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What we're going to talk about

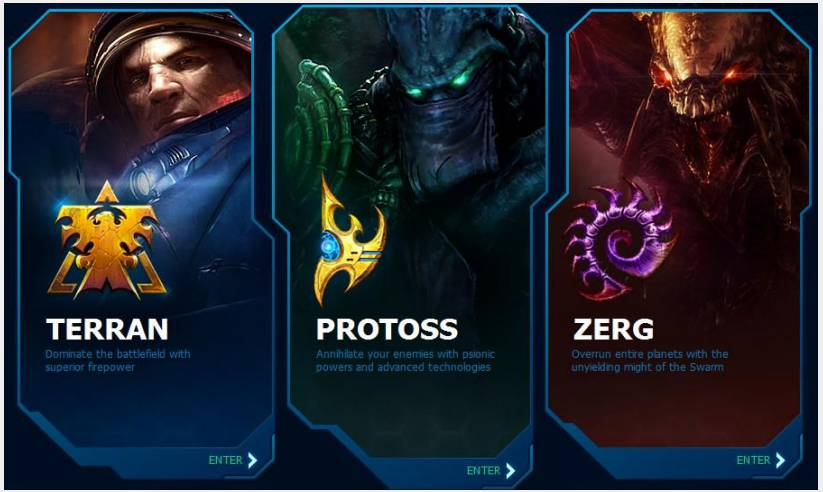
1. Introduction
2. Goals
3. Project breakdown
4. Dataset generation
5. Map insight
6. Data exploration
7. Data preprocessing
8. Predictor
9. Demo

Project Overview

- The Everglades Agent Behavior Analytics project is a project with the goal to set the baseline for accurate analysis of RTS (Real-Time Strategy) data that is used to learn and infer better strategies for the future.
- Due to the current lack of meaningful data, it was important to focus on a similar RTS to get meaningful data.
- Everglades as an RTS game has the goals of having specific unit compositions, strategies, base layouts, and more all features that are present in StarCraft 2 which makes it the perfect Game for effective crossover data.

What is Starcraft 2?

- SC2 is a complex real time strategy game developed by Blizzard that pits players on a variety of maps with one goal: to destroy the enemies base and force them to concede.
- Players can choose between 3 unique races to play as
  - Zerg, Protoss and Terran
- Gameplay has two major components
  - Macro: Building up an economy and army
  - Micro: Attacking and moving your units in a strategic way to reach victory




Workers: 3/3
Workers: 25/16
Workers: 3/3
14:32
Catalyst LE
AlphaStar
177 /200
945 +2015
758 +873
64
113
940
SUPPLY
MINERALS
GAS
WORKERS
ARMY
APM
PRODUCTION
LiquidTLO
147 /172
335 +1595
442 +1030
61
86
1377

Goals

Required:

- Characterize StarCraft 2 match output from a publicly available dataset to determine 5 behaviors that most often lead to wins.
- Propose 5 new metrics to predict agent performance, similar to Sabermetrics.
- Identify 3 map differences affect the output of games with similar strategies.

Nice-to-haves:

- Implement a supervised machine learning classification algorithm that predicts the outcome of a match given the current game state with at least 75% accuracy by late endgame.

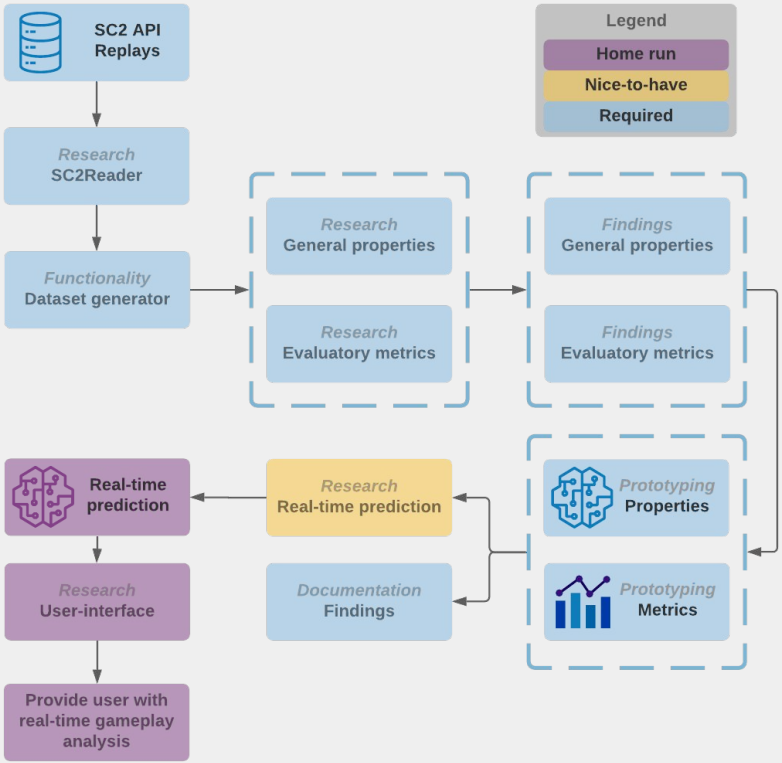
Home Run:

- Develop a real-time analytics engine that runs simultaneously with StarCraft match playback. The engine should be at a minimum to predict odds of winning and describe the agent behaviors.

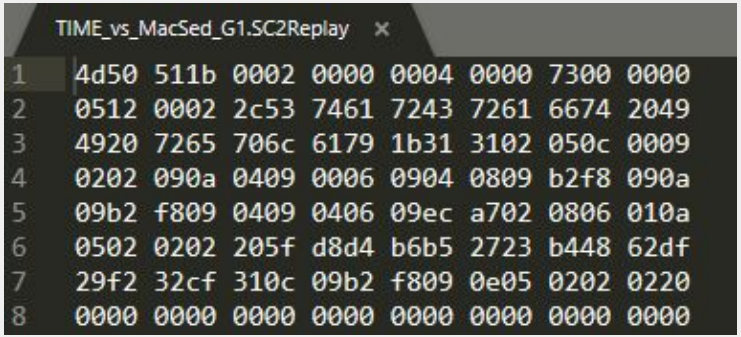
Work Split

Elaine	Data Preprocessing, Significance Testing & Model Training
Ian	Map Scraper/Data Parsing/RTS Research
Manuel	Data Parsing/Data Preprocessing/EDA
Ossama	Neural Networks, Model Training
Thomas	Data Parsing/Collection/RTS Research

Project diagram



Generating the Datasets



The SC2 replay files used in our datasets were generated from past professional 1v1 tournaments.

These files are saved as .SC2REPLAY, a file format originally created by Blizzard.

Raw .SC2REPLAY is unreadable, we need a parser.

sc2reader

- Python supported library developed with the sole intention of parsing .SC2REPLAY files
- The data parsed includes:
  - Player details: Winner/Loser, Race chosen…
  - Map details: Size of map, version of the map…
  - Economies, Unit Classification, and Unit Commands which are key metrics we are parsing out and saving using sc2reader's PlayerStatsEvent

sc2reader's *PlayerStatsEvent* Data

Types of data collected	Why we collect it
Current Worker Count	# of workers means more minerals/vespene collected
Food Used/Available	Food determines how large an army can be
Current Vespene/Mineral Count	Minerals/Vespene is used to create units
Vespene/Minerals Collection Rate	Correlated with # of workers
Vespene/Minerals Lost	Gives more value than just # of units lost
Unit's Born/Died	Allows us to replicate the players army in the dataset
Unit Initialized	Allows us to replicate the players buildings in the dataset
Actions Per Minute	High APM is correlated with higher skilled players

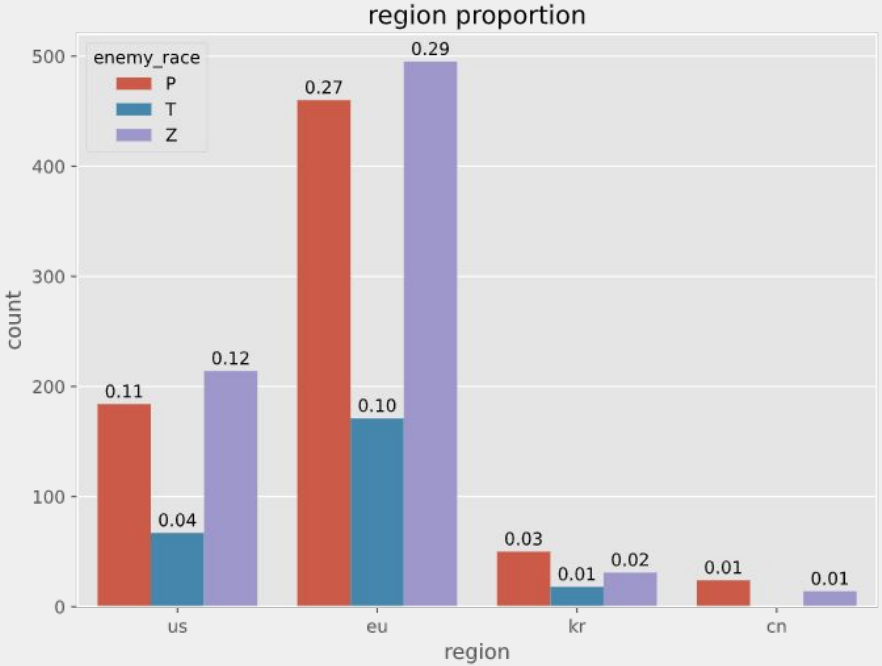
The Datasets

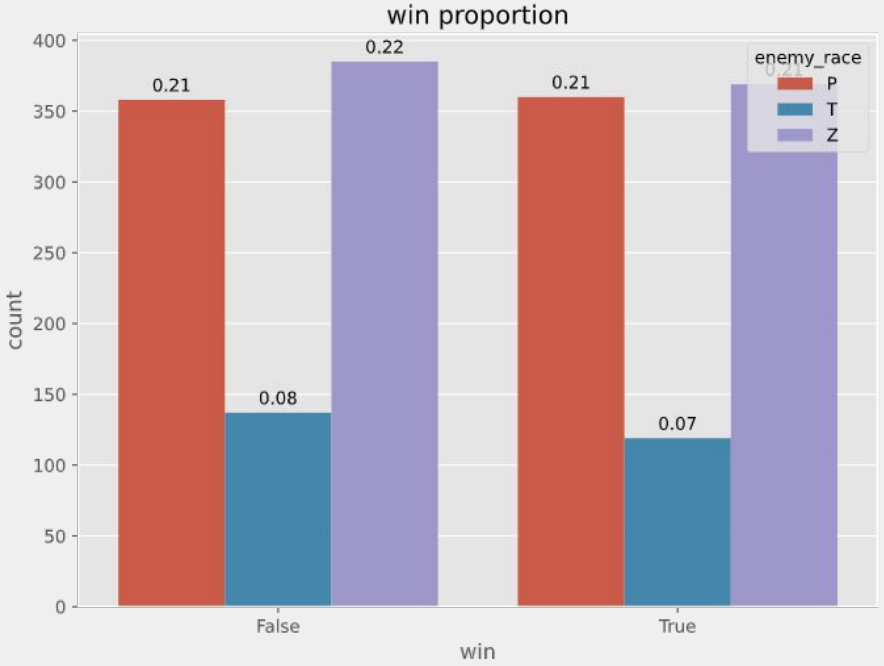
- The replay data was parsed into 3 main datasets based on the race chosen:
    - Terran players only
    - Zerg players only
    - Protoss player only
- With these 3 main datasets, we will be breaking these data sets down further based on:
    - The 6 matchups, e.g. Protoss vs Terran
    - 3 most commonly played maps
- Goal is for the model to be able to accurately predict a players performance based on previous metrics of player's playing the same race.
    - PvT: One model tracking the Protoss player and another tracking the Terran player

TerranStats.csv Example

	match_id	map_nam	region	game_len	race	enemy_ra	ap30s	frame	second	player	workers_	food_use	food_mac	minerals_	minerals_	minerals_	minerals_	minerals_	minerals_	vespene_	vespene_	vespene_	vespene_	vespene_
0	1	World of S	us	437	T	P	0	1	0	Player 1 -	12	12	15	50	0	0	1000	0	0	0	0	0	0	0
1	1	World of S	us	437	T	P	117.6	480	30	Player 1 -	13	14	15	50	727	150	1050	0	0	0	0	0	0	0
2	1	World of S	us	437	T	P	197.4	960	60	Player 1 -	15	16	23	65	727	200	1250	0	0	0	0	0	0	0
3	1	World of S	us	437	T	P	200.2	1440	90	Player 1 -	17	18	23	135	867	275	1350	0	0	0	0	0	0	0
4	1	World of S	us	437	T	P	149.8	1920	120	Player 1 -	18	19	23	405	755	200	1475	0	0	48	179	0	0	0
5	1	World of S	us	437	T	P	156.8	2400	150	Player 1 -	19	20	23	95	867	600	1675	0	0	54	156	50	0	0
6	1	World of S	us	437	T	P	140	2880	180	Player 1 -	20	23	23	170	1091	600	1925	50	0	114	156	0	50	50
7	1	World of S	us	437	T	P	170.8	3360	210	Player 1 -	22	25	31	145	1147	725	2175	100	0	20	156	150	50	50
8	1	World of S	us	437	T	P	169.4	3840	240	Player 1 -	23	26	31	470	1147	650	2300	100	0	104	246	150	50	50
9	1	World of S	us	437	T	P	166.6	4320	270	Player 1 -	25	32	46	120	1147	525	3000	100	0	54	291	125	200	50
10	1	World of S	us	437	T	P	119	4800	300	Player 1 -	28	44	46	110	1399	475	3725	375	0	70	313	125	325	75
11	1	World of S	us	437	T	P	130.2	5280	330	Player 1 -	30	49	54	170	1651	625	4050	500	50	165	358	125	300	50
12	1	World of S	us	437	T	P	126	5760	360	Player 1 -	34	55	62	120	1651	700	4625	775	50	227	313	50	425	175
13	1	World of S	us	437	T	P	135.8	6240	390	Player 1 -	36	61	70	180	2043	750	5175	875	50	147	358	200	475	175
14	1	World of S	us	437	T	P	140	6720	420	Player 1 -	40	62	70	70	2043	675	5600	750	275	45	470	250	400	100
15	1	World of S	us	437	T	P	138.6	7200	450	Player 1 -	43	70	78	85	2351	600	6275	1000	275	25	537	100	600	300
16	1	World of S	us	437	T	P	142.8	7680	480	Player 1 -	45	79	94	317	2183	400	6925	1300	325	195	627	50	700	350
17	1	World of S	us	437	T	P	152.6	8160	510	Player 1 -	46	94	94	96	2379	1050	7275	1600	325	135	649	300	750	400
18	1	World of S	us	437	T	P	142.8	8640	540	Player 1 -	48	104	118	186	2043	675	8125	2150	464	34	627	275	1050	700
19	1	World of S	us	437	T	P	156.8	9120	570	Player 1 -	49	107	126	331	1903	600	8450	2325	664	124	649	250	1125	775
20	1	World of S	us	437	T	P	0	9600	600	Player 1 -	49	109	134	486	1959	550	8600	2375	1114	152	649	200	1325	975
21	4	Ephemerc	us	641	T	T	0	1	0	Player 1 -	12	12	15	50	0	0	1000	0	0	0	0	0	0	0
22	4	Ephemerc	us	641	T	T	191.8	480	30	Player 1 -	13	14	15	45	671	150	1050	0	0	0	0	0	0	0
23	4	Ephemerc	us	641	T	T	183.4	960	60	Player 1 -	15	16	23	120	671	125	1250	0	0	0	0	0	0	0
24	4	Ephemerc	us	641	T	T	240.8	1440	90	Player 1 -	17	18	23	85	727	200	1425	0	0	32	179	0	0	0
25	4	Ephemerc	us	641	T	T	252	1920	120	Player 1 -	18	19	23	340	755	200	1475	0	0	88	156	0	0	0
26	4	Ephemerc	us	641	T	T	205.8	2400	150	Player 1 -	19	20	23	30	811	600	1675	0	0	98	179	50	0	0
27	4	Ephemerc	us	641	T	T	201.6	2880	180	Player 1 -	19	21	23	30	839	650	1875	50	0	4	156	150	50	50
28	4	Ephemerc	us	641	T	T	214.2	3360	210	Player 1 -	20	22	23	105	1035	825	1925	50	50	64	179	150	50	50
29	4	Ephemerc	us	641	T	T	196	3840	240	Player 1 -	22	28	31	80	1007	800	2400	50	50	24	179	100	200	50
30	4	Ephemerc	us	641	T	T	135.8	4320	270	Player 1 -	22	31	46	60	951	500	3000	250	150	120	291	100	200	50
31	4	Ephemerc	us	641	T	T	161	4800	300	Player 1 -	23	36	46	100	1035	250	3500	400	200	82	313	150	250	0
32	4	Ephemerc	us	641	T	T	184.8	5280	330	Player 1 -	25	42	46	10	1595	550	3600	400	200	202	313	150	250	0
33	4	Ephemerc	us	641	T	T	158.2	5760	360	Player 1 -	27	48	54	140	1819	525	4200	750	200	268	335	25	425	150
34	4	Ephemerc	us	641	T	T	176.4	6240	390	Player 1 -	31	59	62	55	1511	450	4825	950	200	95	470	325	450	150

Terran Geographical and Win Proportions

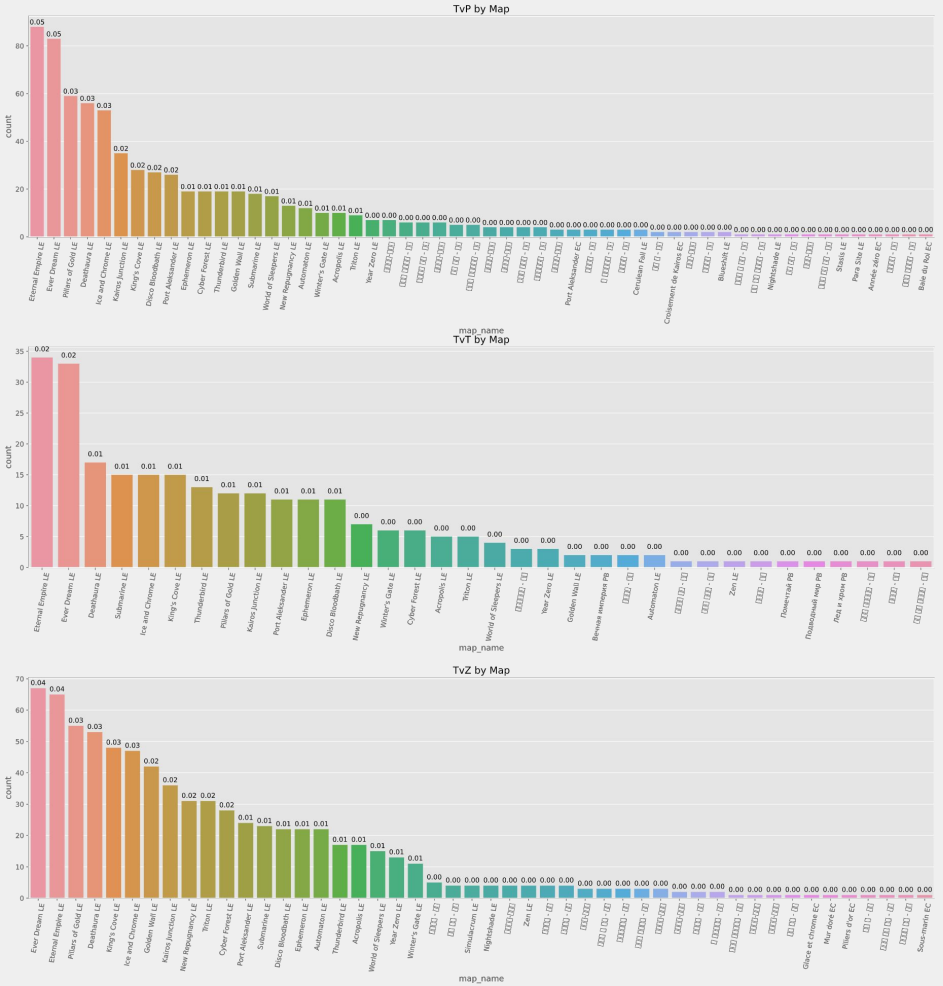




Terran vs Enemy Map Proportions

Map name	Sum	P	T	Z
Eternal Empire LE	138	54	48	36
Ever Dream LE	129	44	46	39
Deathaura LE	103	41	27	35
Ice and Chrome LE	84	33	18	33
Pillars of Gold LE	76	26	27	23

Map usage instances in dataset.



Map Scraper

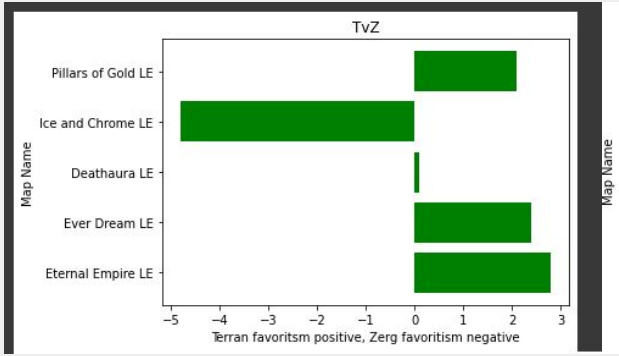
- Important info for setting a baseline win prediction
- Scraper takes info from the liquid gamepedia and pulls info about all tournament games played on the map
- Pulls specific map info for each matchup

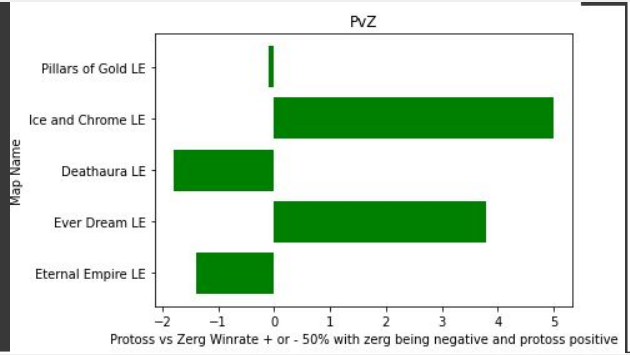
    -Ex. PvZ, PvP, etc.

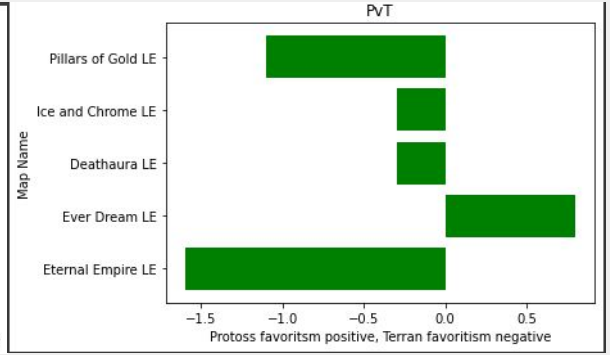
Example CSV Scraper Output

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	map-nam	#-of-Gam	TvZ-total	TvZ-T	TvZ-Z	TvZ%	PvZ-total	PvZ-Z	PvZ-P	PvZ%	PvT-total	PvT-P	PvT-T	PvT%	TvT	ZvZ	PvP		
2	Eternal En	4418	922	487	435	52.80%	1037	504	533	48.60%	1203	582	621	48.40%	427	313	516		
3	Ever Dreai	3673	725	380	345	52.40%	1083	583	500	53.80%	846	430	416	50.80%	232	352	435		
4	Deathaura	3922	808	405	403	50.10%	877	423	454	48.20%	1019	506	513	49.70%	244	353	621		
5	Ice and Ch	1527	314	142	172	45.20%	433	238	195	55.00%	326	162	164	49.70%	90	168	196		
6	Pillars of (	3216	743	387	356	52.10%	785	392	393	49.90%	841	411	430	48.90%	247	277	323		
7																			

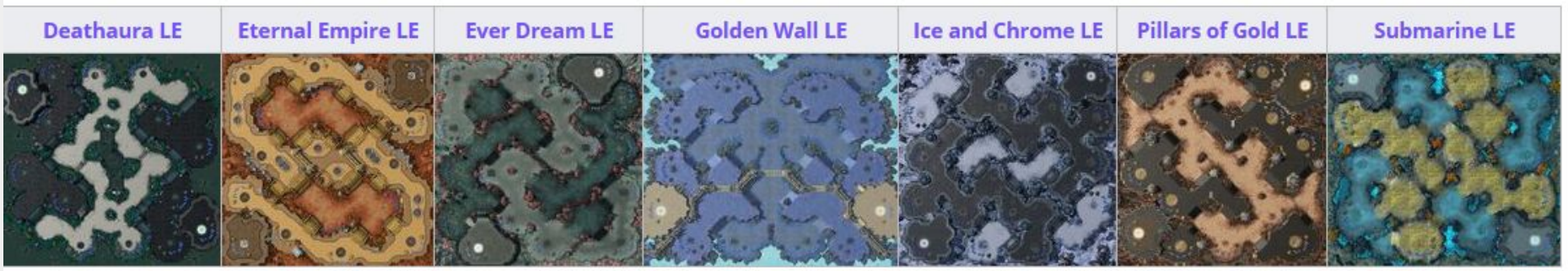
Win Rate Per Matchup







What Makes A Good Map



Picking Maps in SC2

- -4 bans
- -3 picks
- -7 Map pool means all maps are picked or banned

Map Differences That Lead to Wins

Overarching map differences

1. Map Area:
    - Map Width vs Height in pixels
2. Easy Defendable 3rd Base
3. Ledges:
    - Gives differing Units Power
4. Xel'Naga Towers
    - More vision
5. Air Space
    - More space for air attacks
6. Chokepoints
    - Areas with few or tight entrances
7. Map Openness
    - Open Area with no chokes and lots of room for units
8. Outside Factors
    - Anything Unique to a Map not featured on the standard type of maps players are used to

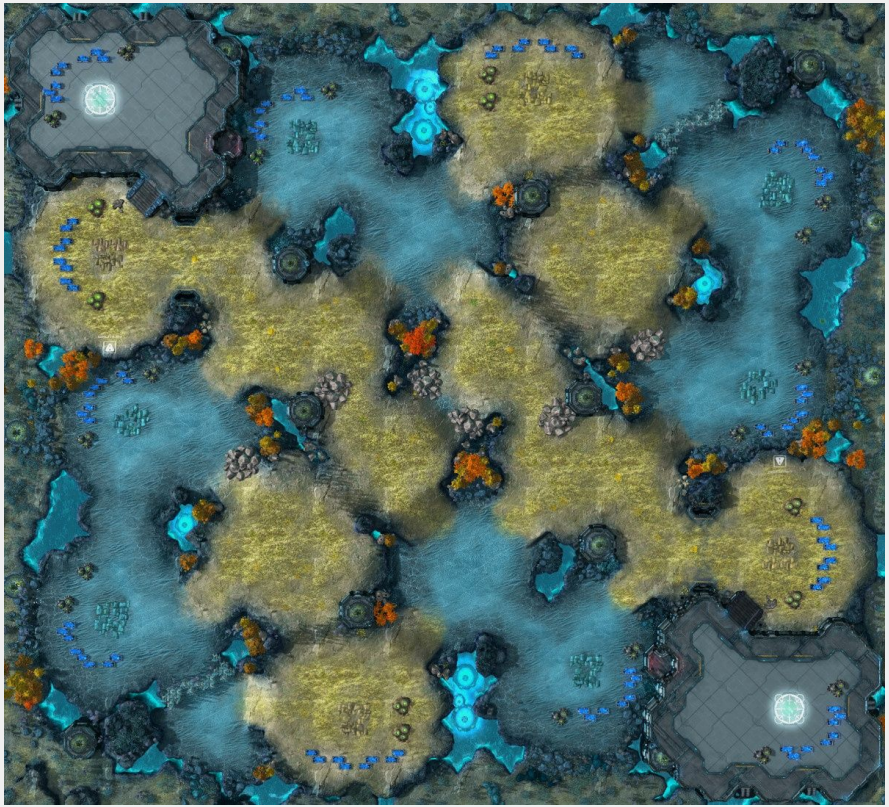
Fair Games

Map	#	Σ			%	Σ			%	Σ			%			
Submarine LE	2305	538	299	239	55.6%	539	282	257	52.3%	547	223	324	40.8%	252	201	228

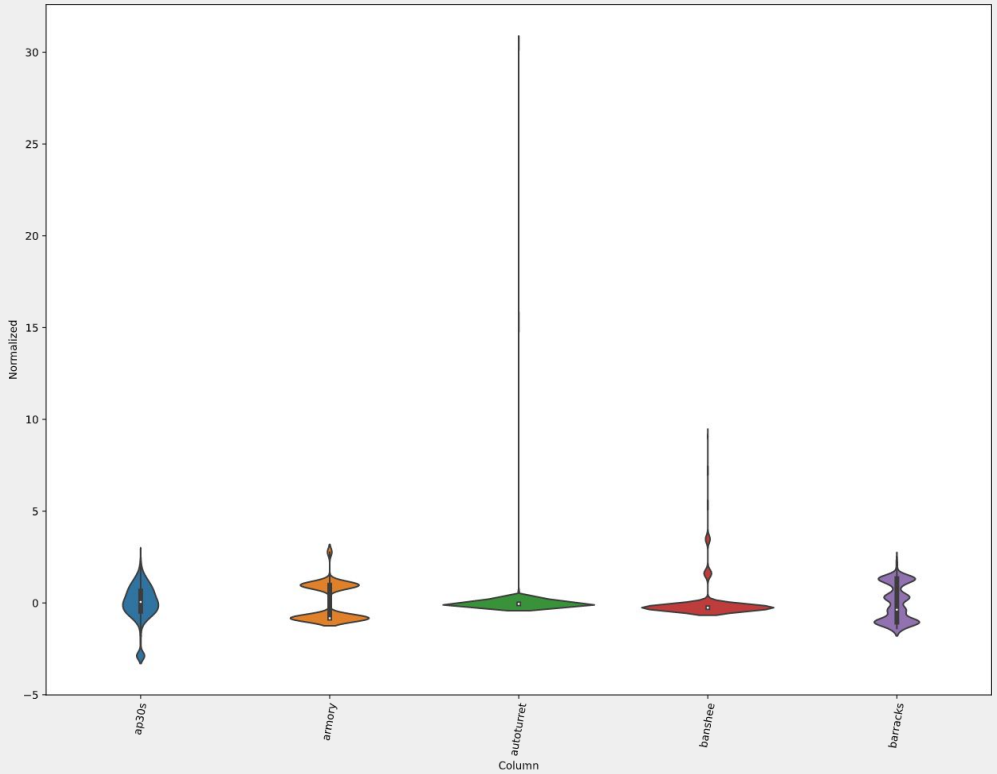
Protoss on Submarine LE

- Abysmal WR
- This is probably why it is underplayed
- One race can skew the favoritism of a map

Submarine LE

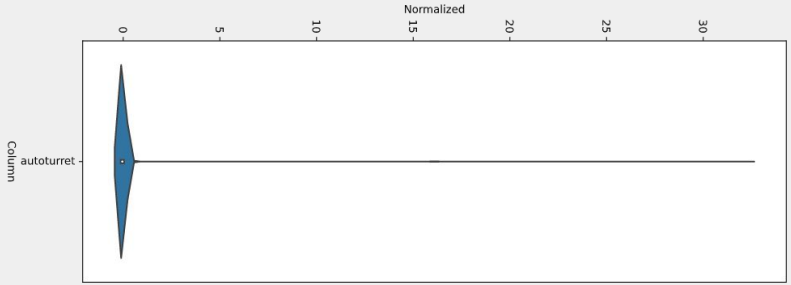


Normalized Terran vs Zerg @ Ever Dream LE



Normalized Terran vs Zerg @ Ever Dream LE

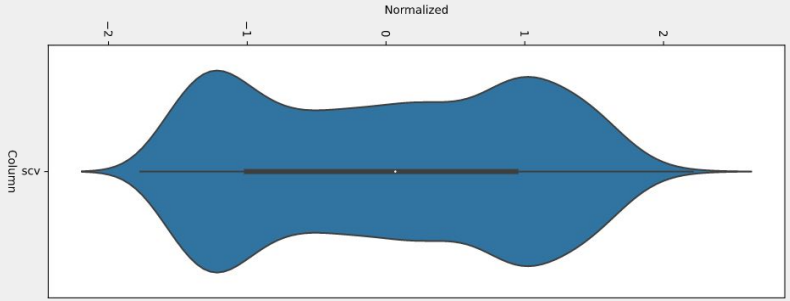
Auto-Turret unit



We have a few features with the same right skewness. This is expected given that many of these units are meant for late game and are used respectively.

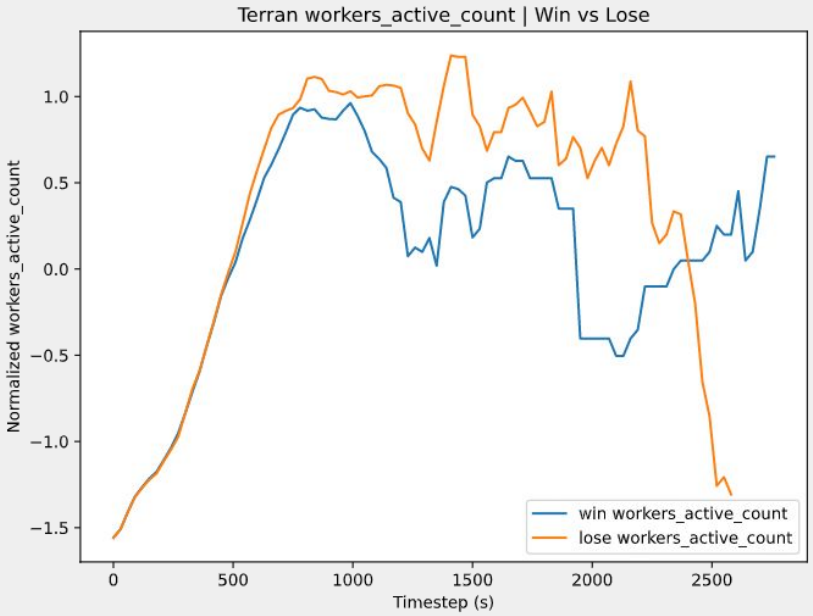
Normalized Terran vs Zerg @ Ever Dream LE

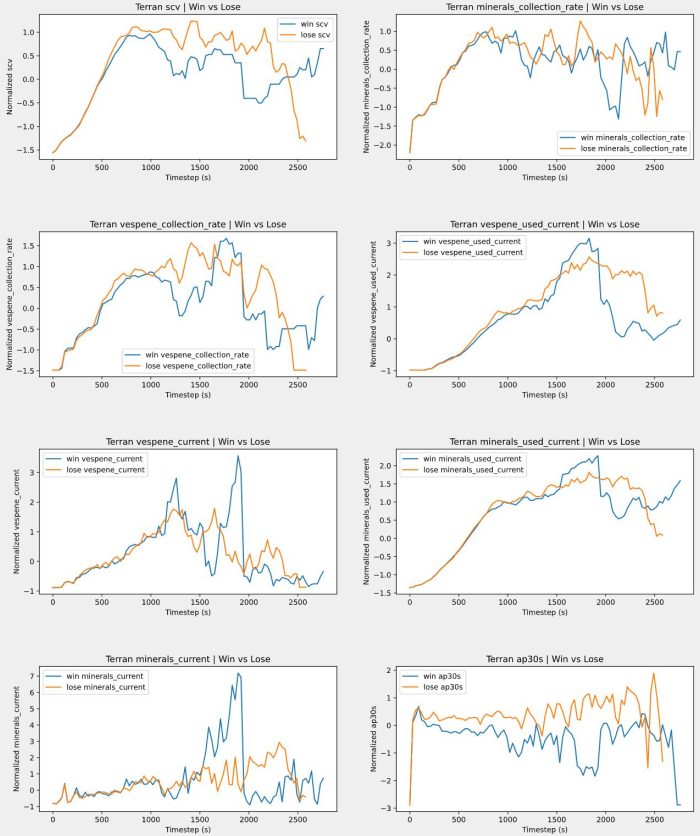
SCV worker



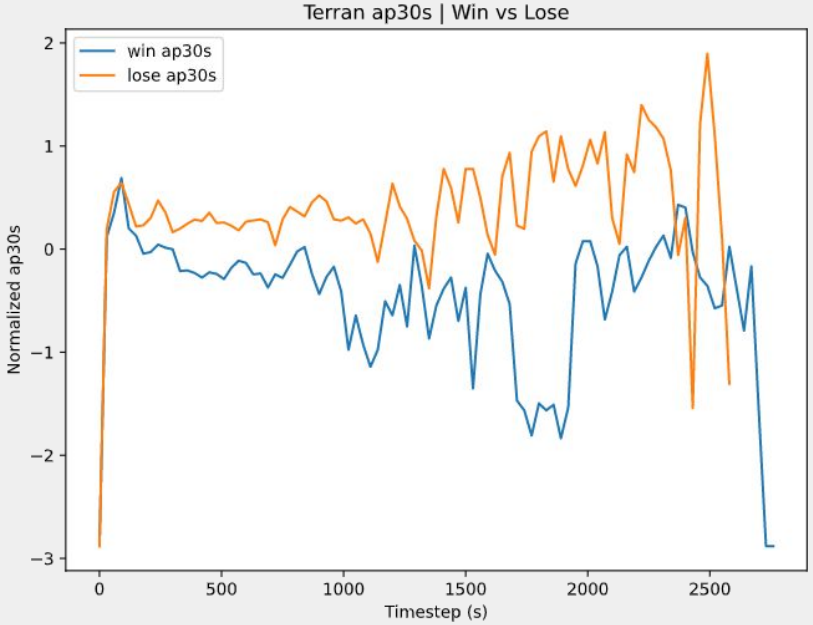
More common units like the SCV show a more normal distribution. Given that these units are required to gather resources and therefore create units we see the latter distribution.

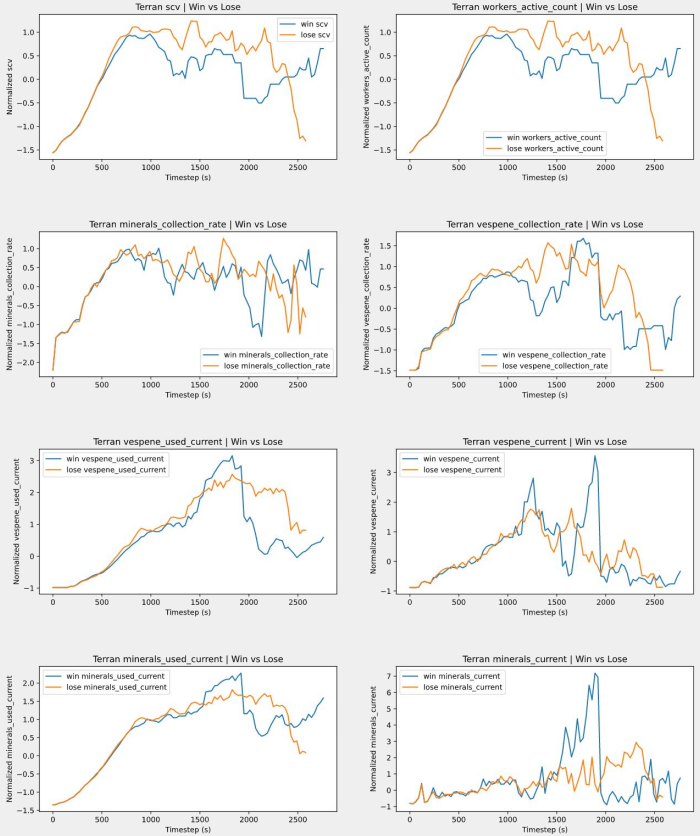
Terran vs Zerg Metrics Comparison





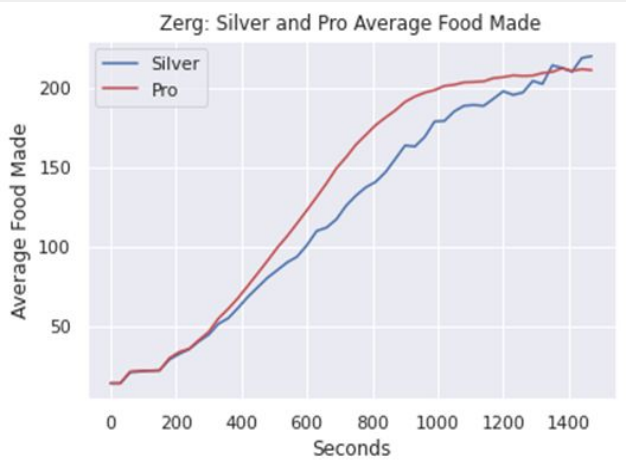
Terran vs Zerg Metrics Comparison

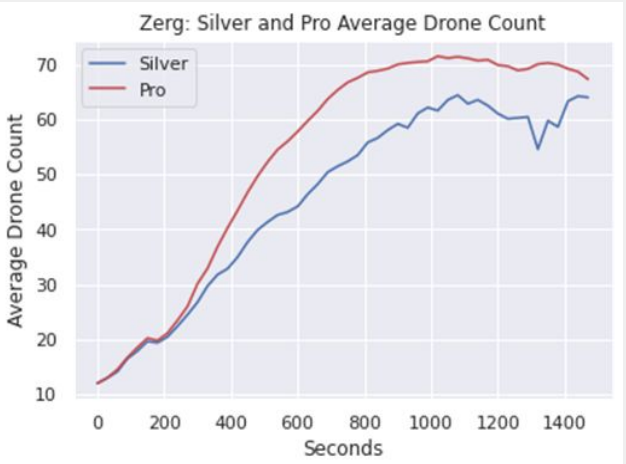


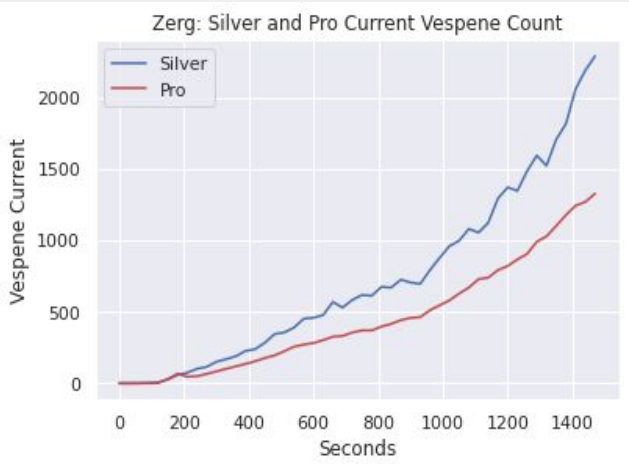


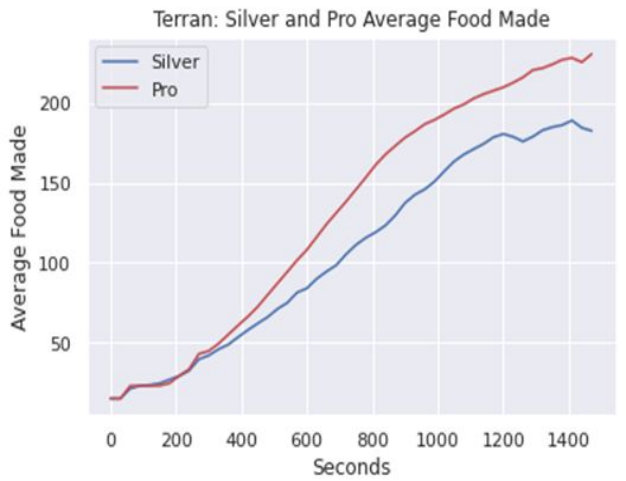
Key Metrics

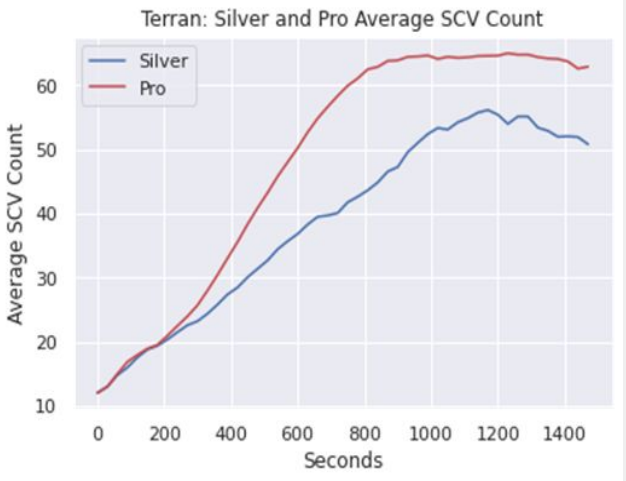
1. Worker #/Workers active:
    - More workers = more materials
2. Number of Command Centers/Hatchery/Nexus:
    - higher number implies expansion
3. Vespene/Minerals used in active forces:
    - Shows the strength of the current army
4. Food made:
    - If value decreases, it implies player's base is being attacked
5. Current Vespene/Minerals Count:
    - Higher the number means more wasted time with resources
6. APM:
    - Correlated with higher skill
7. Certain META Unit Types in Early Game
    - Marine, Zergling

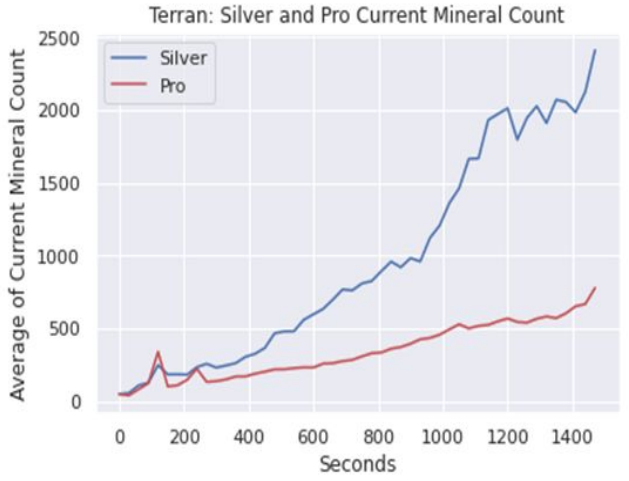

Zerg: Silver and Pro Average Food Made
Silver
Pro
Average Food Made
Seconds

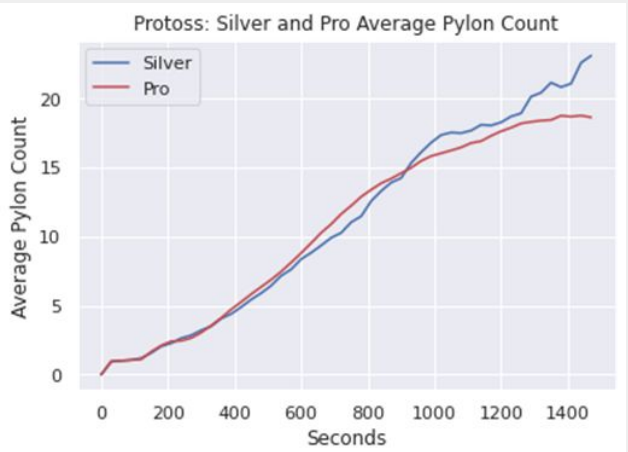

Zerg: Silver and Pro Average Drone Count
Silver
Pro
Average Drone Count
Seconds

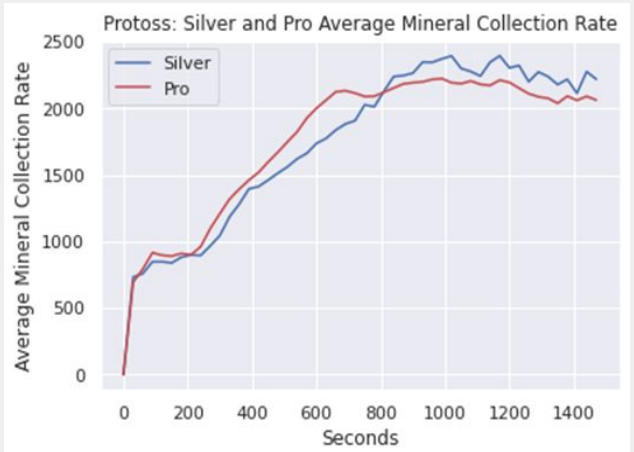

Zerg: Silver and Pro Current Vespene Count
Silver
Pro
Vespene Current
Seconds

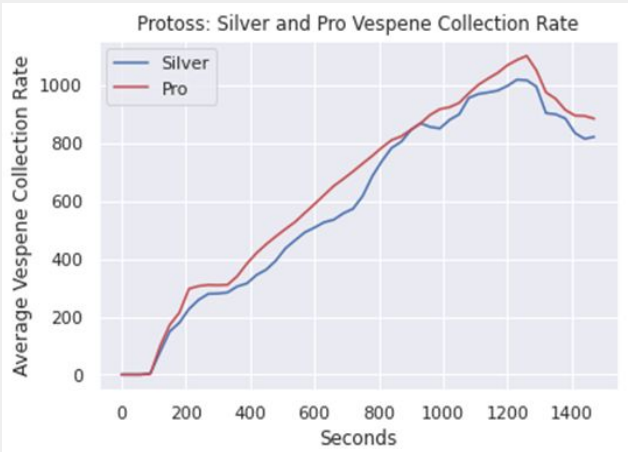

Terran: Silver and Pro Average Food Made
Silver
Pro
Average Food Made
Seconds

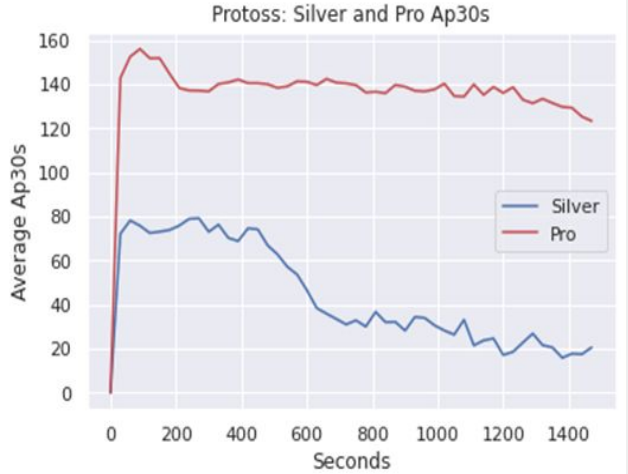

Terran: Silver and Pro Average SCV Count
Silver
Pro
Average SCV Count
Seconds

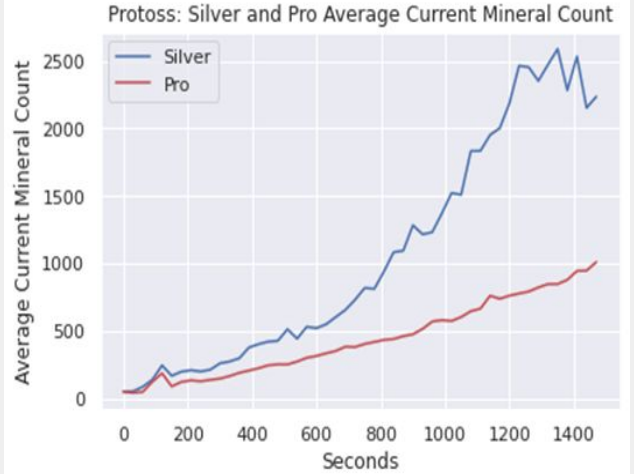

Terran: Silver and Pro Current Mineral Count
Silver
Pro
Average of Current Mineral Count
Seconds

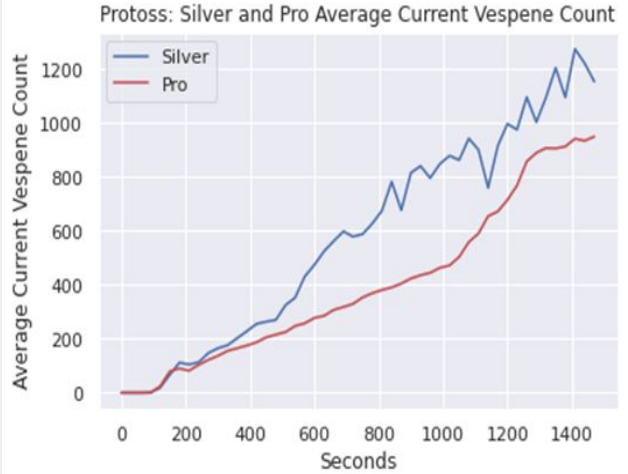

Protoss: Silver and Pro Average Pylon Count
Silver
Pro
Average Pylon Count
Seconds


Protoss: Silver and Pro Average Mineral Collection Rate
Silver
Pro
Average Mineral Collection Rate
Seconds

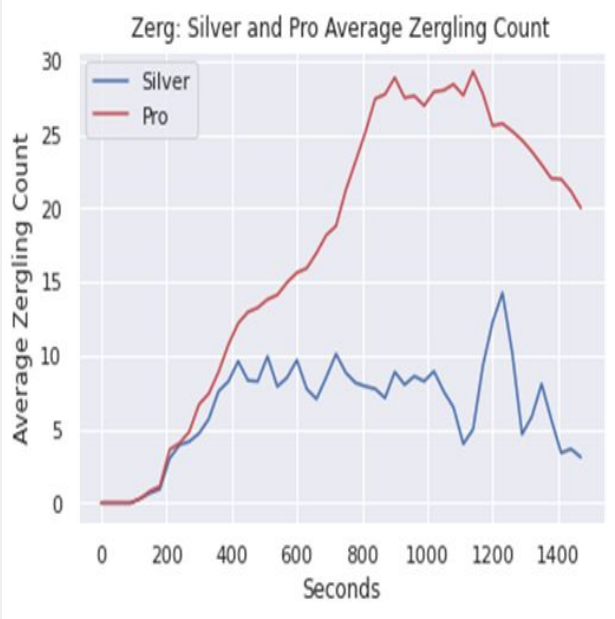

Protoss: Silver and Pro Vespene Collection Rate
Silver
Pro
Average Vespene Collection Rate
Seconds

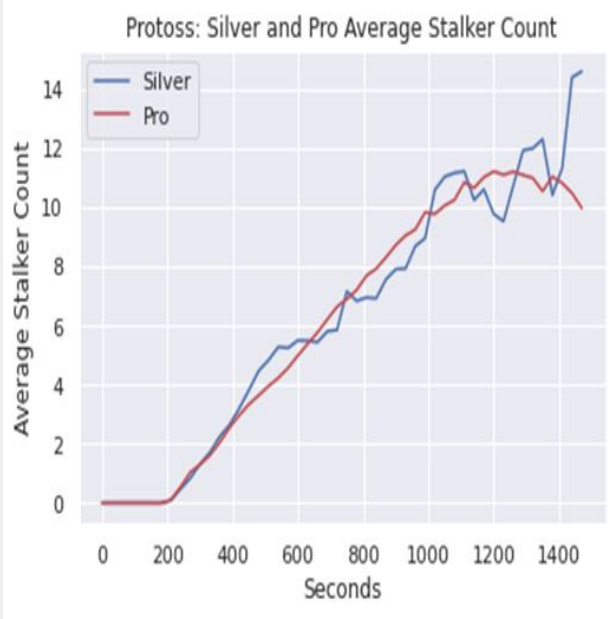

Protoss: Silver and Pro Ap30s
Silver
Pro
Average Ap30s
Seconds

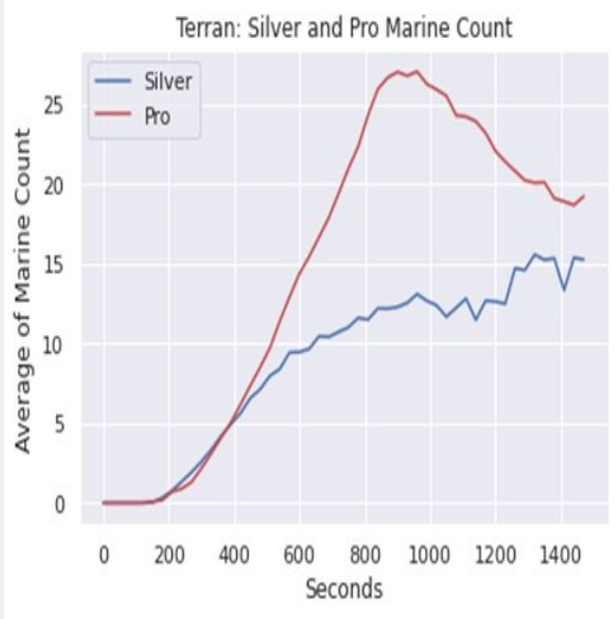

Protoss: Silver and Pro Average Current Mineral Count
Silver
Pro
Average Current Mineral Count
Seconds


Protoss: Silver and Pro Average Current Vespene Count
Silver
Pro
Average Current Vespene Count
Seconds

Key Units Early/Mid Game Comparison

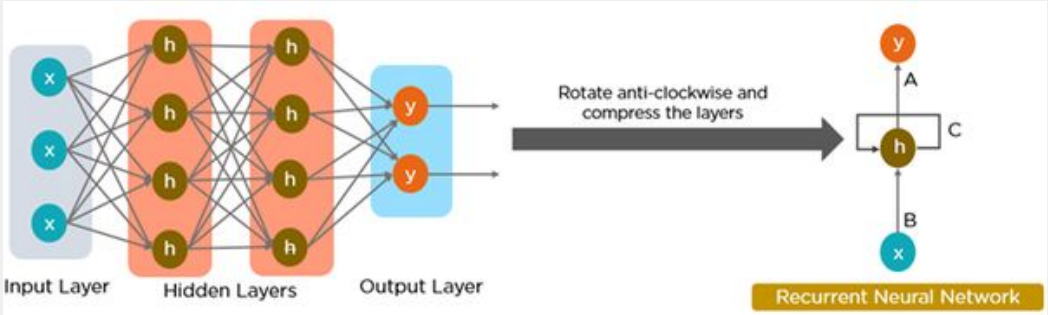






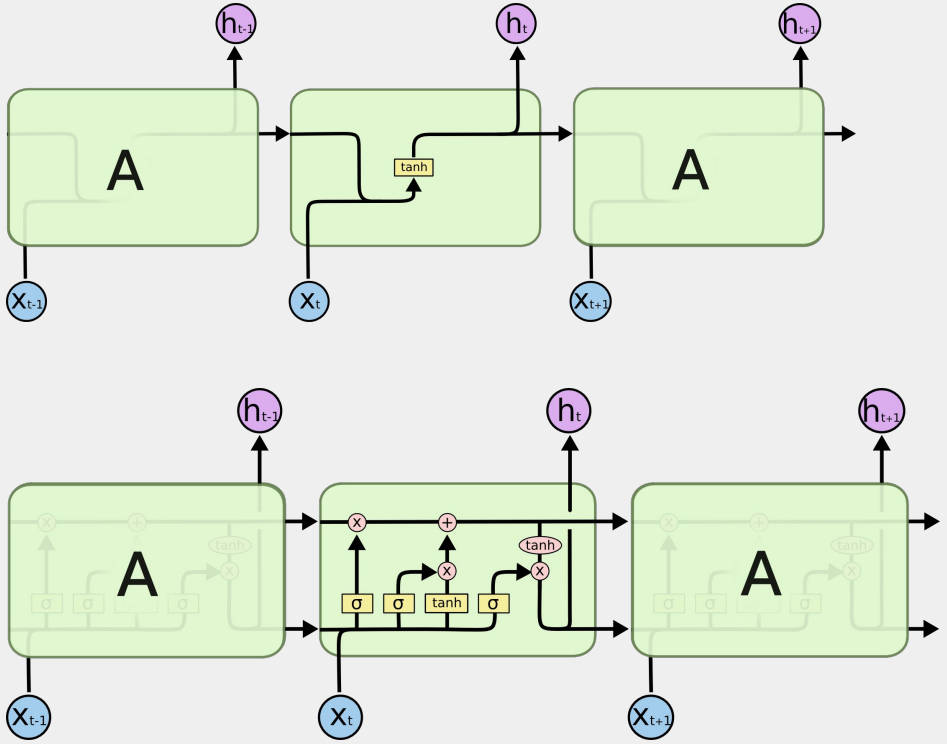
Recurrent Neural Networks

- It is an algorithm that remembers its input, due to an internal memory, which makes it suited for machine learning problems that involve sequential data.



Long Short Term Memory Networks

- LSTMs are explicitly designed to avoid the long-term dependency problem.
- An LSTM has a similar control flow as a recurrent neural network. It processes data passing on information as it propagates forward. The differences are the operations within the LSTM's cells.

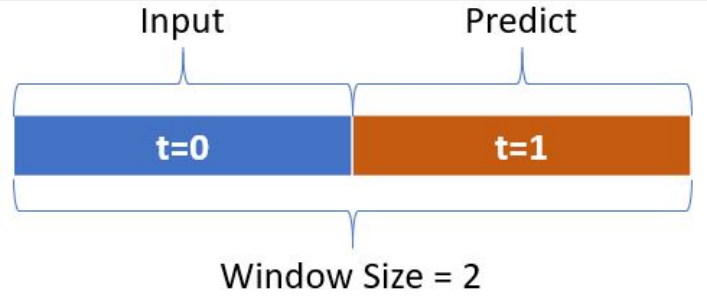


Data Preprocessing

- Data set:
  - Standardized
  - Normalized
  - One Hot Encoding Categorical Variables
  - Remove Unnecessary Variables
  - Split Data Set: 20% Testing, 80% Training -> 20% Validation
- Neural Networks:
  - Simple Recurrent Neural Network
  - Dense Neural Network
  - LSTM (Long-Short Term Memory Network)
  - GRU (Gated Recurrent Unit)

Setting Up for Neural Network

- Sliding Window:



- Tensorflow Keras
- Early-Stopping
- Loss Function: Binary Cross Entropy
- Metric: Binary Accuracy, Precision, and Recall

Baseline Performance

- Zero Rule

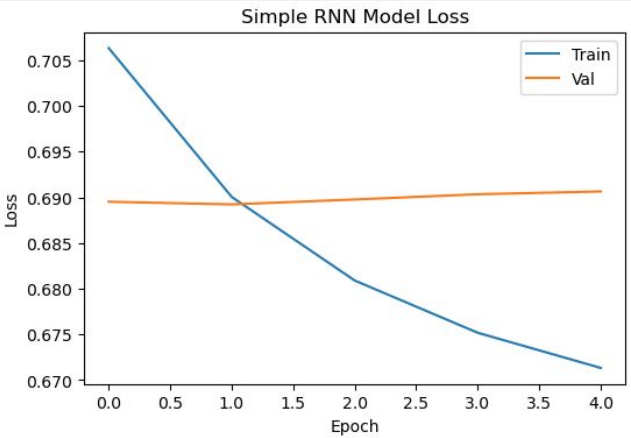
Normalized Terran	0.5511
Standardized Terran	0.5511
Normalized Protoss	0.4902
Standardized Protoss	0.4902
Normalized Zerg	0.4527
Standardized Zerg	0.4527

- Random Prediction

Normalized Terran	0.5017
Standardized Terran	0.5027
Normalized Protoss	0.5046
Standardized Protoss	0.4899
Normalized Zerg	0.5016
Standardized Zerg	0.4951

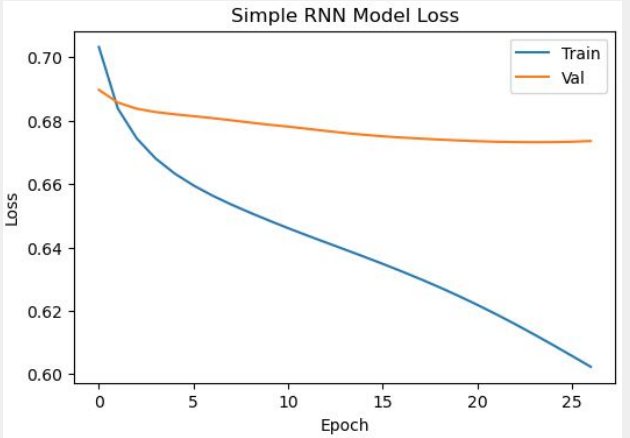
Simple RNN: Terran

Normalized



Metric	Value
Loss Value	0.6906
Binary Accuracy	0.5395
Precision	0.5559
Recall	0.7300

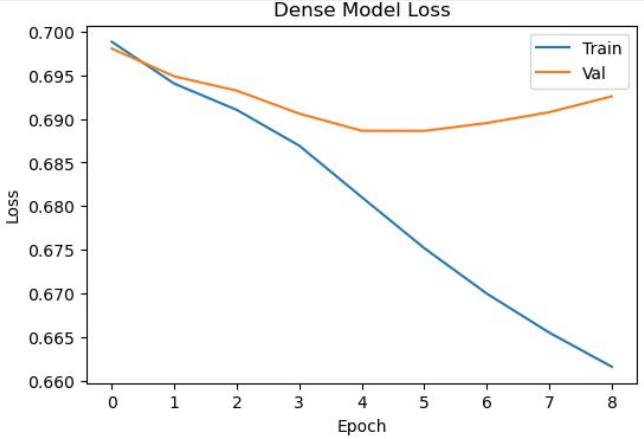
Standardized



Metric	Value
Loss Value	0.6736
Binary Accuracy	0.5832
Precision	0.6105
Recall	0.6294

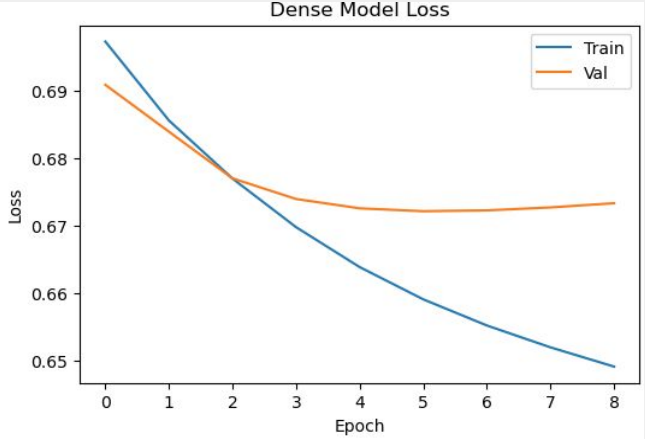
Dense Neural Network: Terran

Normalized



Metric	Value
Loss Value	0.6926
Binary Accuracy	0.5319
Precision	0.5733
Recall	0.5200

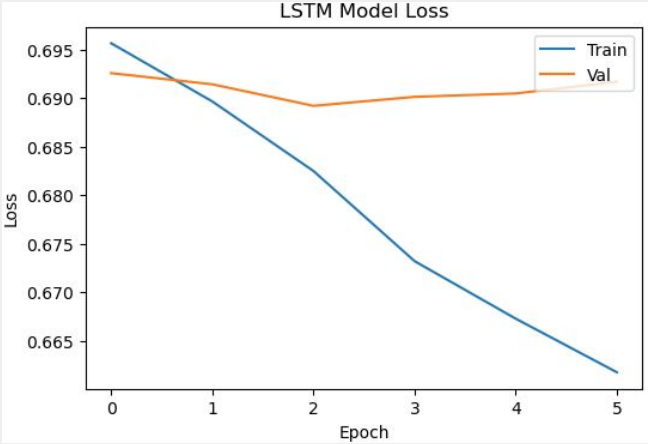
Standardized



Metric	Value
Loss Value	0.6733
Binary Accuracy	0.5727
Precision	0.6157
Recall	0.5545

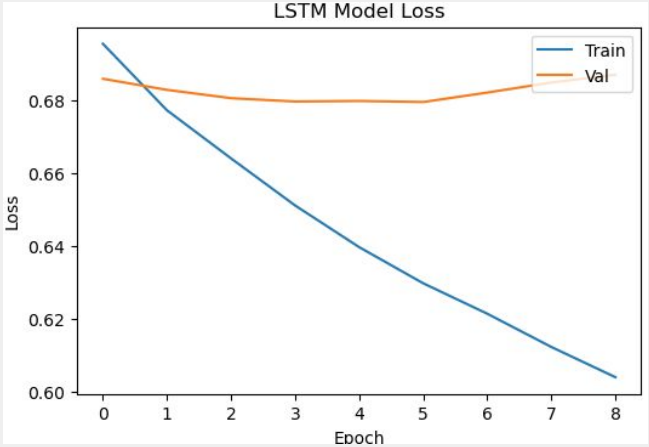
LSTM: Terran

Normalized



Metric	Value
Loss Value	0.6917
Binary Accuracy	0.5348
Precision	0.5781
Recall	0.5115

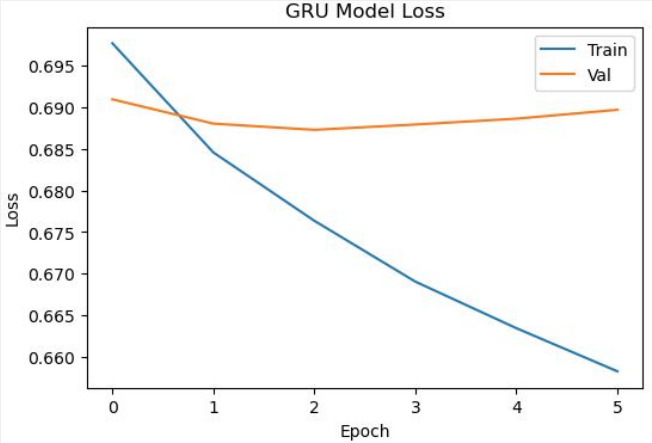
Standardized



Metric	Value
Loss Value	0.6870
Binary Accuracy	0.5724
Precision	0.6093
Recall	0.5791

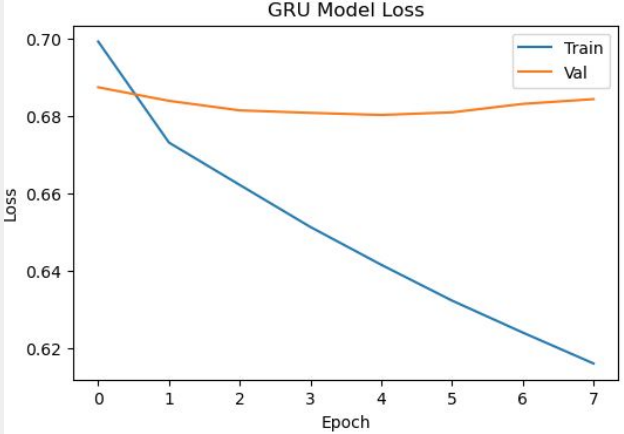
GRU: Terran

Normalized



Metric	Value
Loss Value	0.6897
Binary Accuracy	0.5417
Precision	0.5815
Recall	0.5385

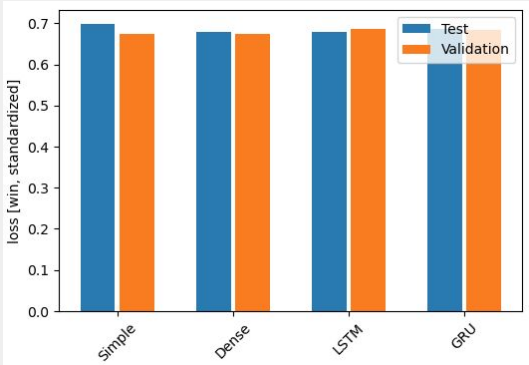
Standardized



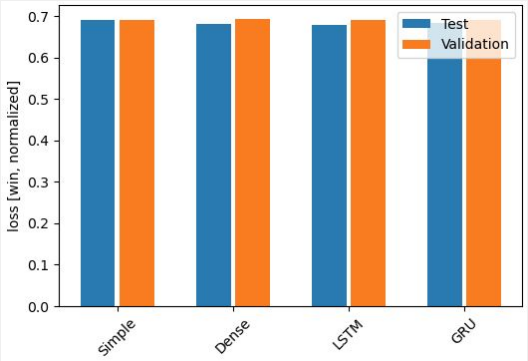
Metric	Value
Loss Value	0.6844
Binary Accuracy	0.5736
Precision	0.6056
Recall	0.6025

Comparing Models: Terran

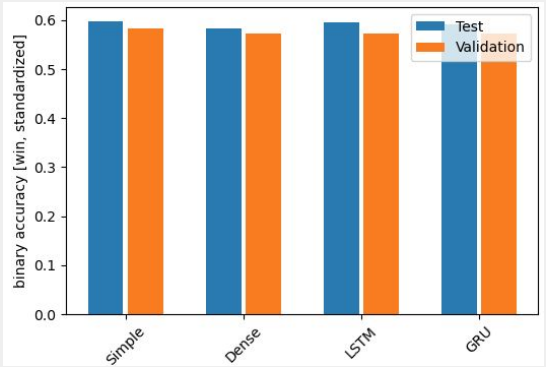
Normalized Loss



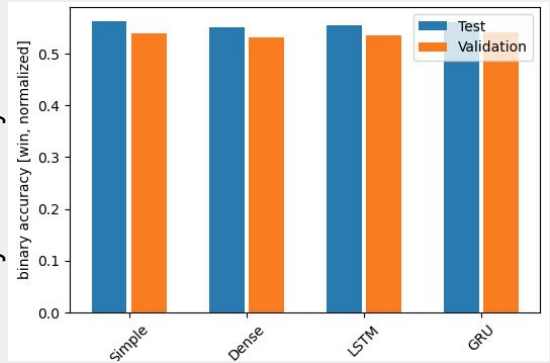
Standardized Loss



Normalized Binary Accuracy



Standardized Binary Accuracy



Comparing Models: Protoss and Zerg

Protoss

Protoss Model (Normalized)	Loss Value	Binary Accuracy	Precision	Recall
Simple RNN	0.6915	0.5538	0.5563	0.5106
DNN	0.6931	0.5362	0.5333	0.5446
LSTM	0.6941	0.5527	0.5536	0.5227
GRU	0.6944	0.5501	0.5496	0.5316

Protoss Model (Standardized)	Loss Value	Binary Accuracy	Precision	Recall
Simple RNN	0.6949	0.5454	0.5465	0.5165
DNN	0.6910	0.5434	0.5711	0.3313
LSTM	0.6878	0.5533	0.5583	0.4898
GRU	0.6949	0.5448	0.5475	0.4916

Zerg

Zerg Model (Normalized)	Loss Value	Binary Accuracy	Precision	Recall
Simple RNN	0.6833	0.5388	0.4943	0.6578
DNN	0.7148	0.5024	0.4738	0.8621
LSTM	0.7025	0.5107	0.4770	0.7979
GRU	0.7063	0.5067	0.4748	0.8074

Zerg Model (Standardized)	Loss Value	Binary Accuracy	Precision	Recall
Simple RNN	0.6888	0.5494	0.5036	0.5873
DNN	0.7053	0.5433	0.4969	0.4252
LSTM	0.6983	0.5414	0.4967	0.7106
GRU	0.6990	0.5384	0.4949	0.7723

Match of the Day:

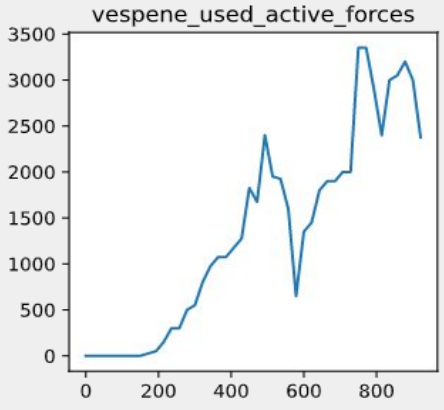
Scarlett (Zerg) vs **Stats** (Protoss)

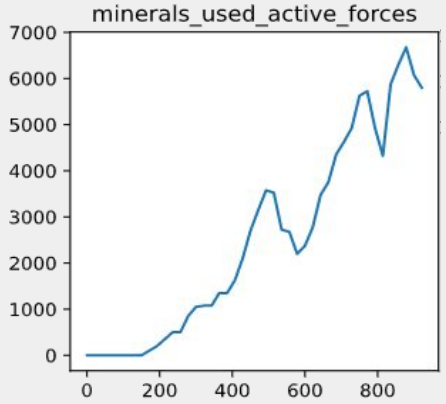
Parsing the replay

match_id	map_nam	region	game_len	race	enemy_ra	ap30s	frame	second	player	workers_a	food_use	food_mad	minerals_	minerals_	minerals_	minerals_	minerals_	minerals_	vespene_
273	Eternal En	us	926	P	Z	0	1	0	Player 1 - Stats (Protoss)	12	12	15	50	0	0	1000	0	0	0
273	Eternal En	us	926	P	Z	116.2	480	30	Player 1 - Stats (Protoss)	13	14	15	35	643	150	1050	0	0	0
273	Eternal En	us	926	P	Z	124.6	960	60	Player 1 - Stats (Protoss)	15	16	23	5	783	200	1250	0	0	0
273	Eternal En	us	926	P	Z	196	1440	90	Player 1 - Stats (Protoss)	17	18	23	85	979	275	1350	0	0	0
273	Eternal En	us	926	P	Z	165.2	1920	120	Player 1 - Stats (Protoss)	19	20	23	415	923	200	1525	0	0	16
273	Eternal En	us	926	P	Z	137.2	2400	150	Player 1 - Stats (Protoss)	20	21	23	50	895	675	1725	0	0	60
273	Eternal En	us	926	P	Z	168	2880	180	Player 1 - Stats (Protoss)	22	23	23	175	951	700	1900	0	0	116
273	Eternal En	us	926	P	Z	182	3360	210	Player 1 - Stats (Protoss)	24	27	31	155	923	700	2250	0	0	53
273	Eternal En	us	926	P	Z	177.8	3840	240	Player 1 - Stats (Protoss)	27	33	46	50	1035	350	2900	100	0	94
273	Eternal En	us	926	P	Z	140	4320	270	Player 1 - Stats (Protoss)	31	39	46	150	1343	350	3350	200	0	110
273	Eternal En	us	926	P	Z	200.2	4800	300	Player 1 - Stats (Protoss)	35	46	54	90	1483	475	3800	350	0	76

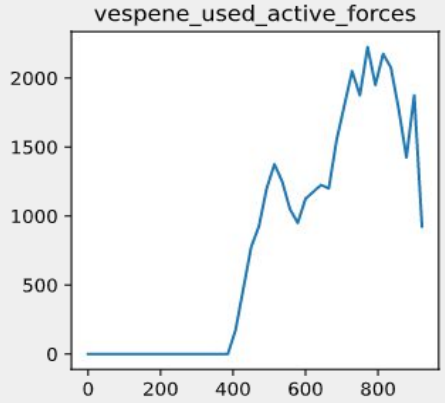
match_id	map_nam	region	game_len	race	enemy_ra	ap30s	frame	second	player	workers_a	food_use	food_mad	minerals_	minerals_	minerals_	minerals_	minerals_	minerals_	vespene_
273	Eternal En	us	926	Z	P	0	1	0	Player 2 - Scarlett (Zerg)	12	12	14	50	0	0	1050	0	0	0
273	Eternal En	us	926	Z	P	166.6	480	30	Player 2 - Scarlett (Zerg)	13	14	14	50	699	150	1100	0	0	0
273	Eternal En	us	926	Z	P	154	960	60	Player 2 - Scarlett (Zerg)	15	16	22	235	811	50	1300	0	0	0
273	Eternal En	us	926	Z	P	280	1440	90	Player 2 - Scarlett (Zerg)	16	18	22	90	867	450	1350	0	0	0
273	Eternal En	us	926	Z	P	313.6	1920	120	Player 2 - Scarlett (Zerg)	16	18	22	75	895	775	1350	0	0	0
273	Eternal En	us	926	Z	P	389.2	2400	150	Player 2 - Scarlett (Zerg)	19	20	22	275	867	650	1575	0	0	36
273	Eternal En	us	926	Z	P	145.6	2880	180	Player 2 - Scarlett (Zerg)	21	26	28	100	895	450	2275	0	0	92
273	Eternal En	us	926	Z	P	127.4	3360	210	Player 2 - Scarlett (Zerg)	22	30	36	185	1119	450	2475	50	0	4
273	Eternal En	us	926	Z	P	128.8	3840	240	Player 2 - Scarlett (Zerg)	25	32	36	110	1399	550	2925	350	0	4
273	Eternal En	us	926	Z	P	148.4	4320	270	Player 2 - Scarlett (Zerg)	28	42	44	90	1483	800	3225	400	0	8
273	Eternal En	us	926	Z	P	142.8	4800	300	Player 2 - Scarlett (Zerg)	36	46	52	130	1707	700	3875	550	0	44

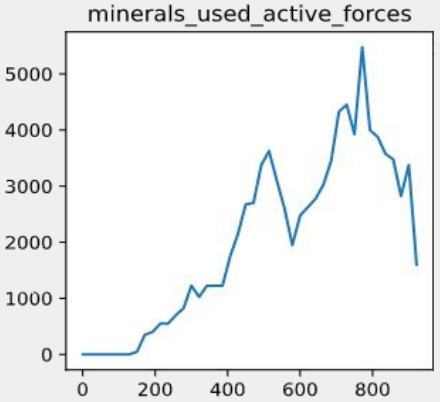
Protoss



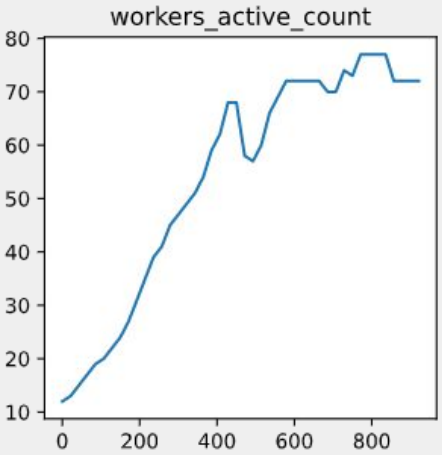


Zerg

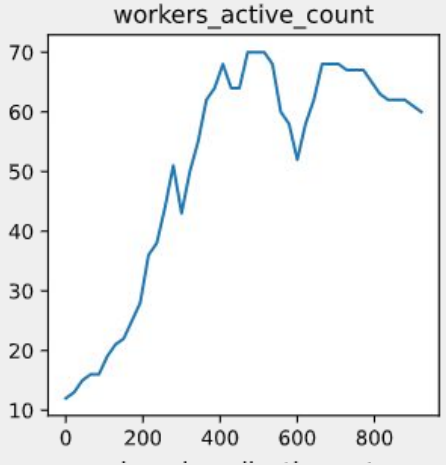




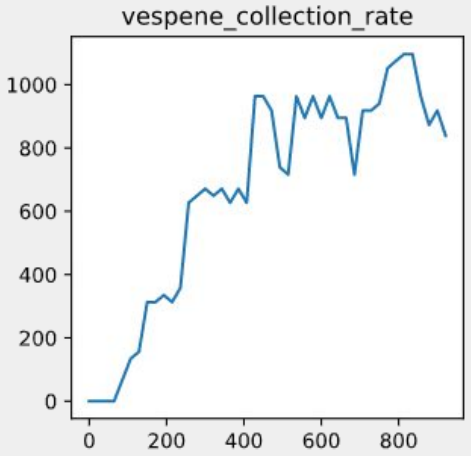
Protoss



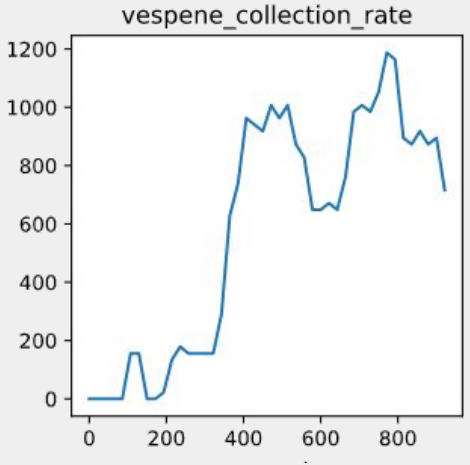
Zerg



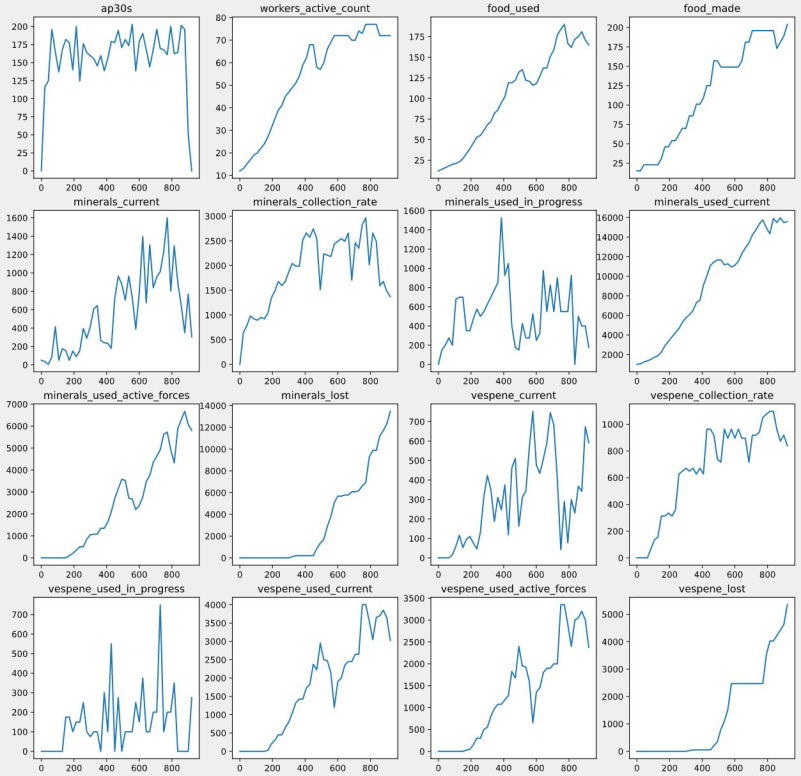
Protoss



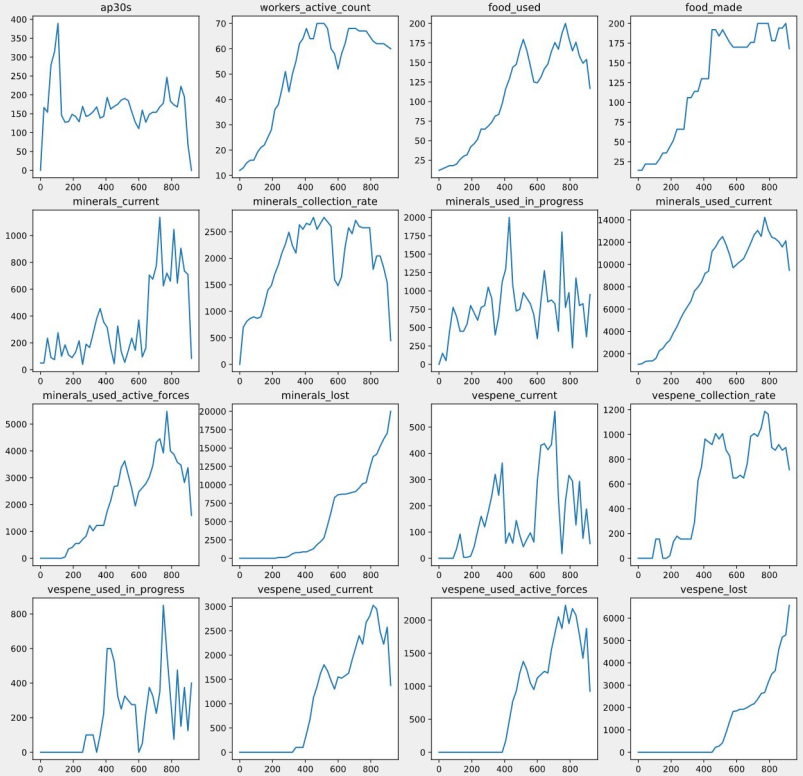
Zerg



Protoss

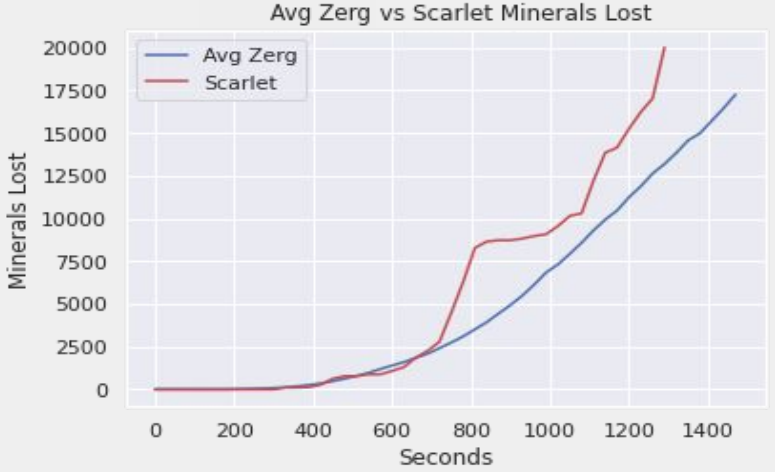


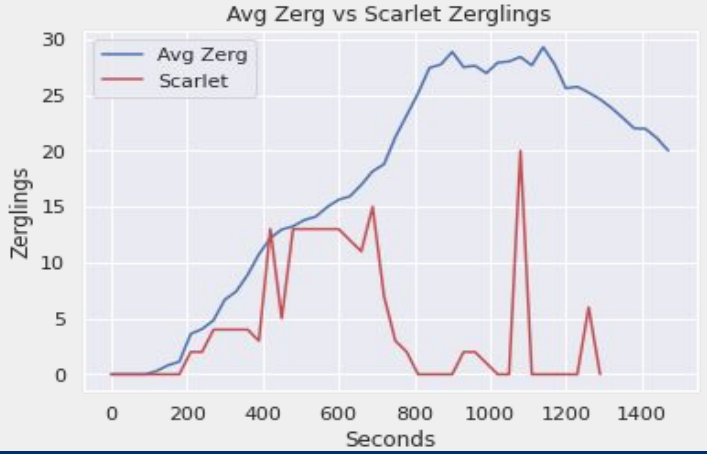
Zerg



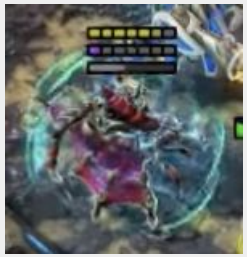
Each Player vs Average Pro Stats


Avg Zerg vs Scarlet Queens
Avg Zerg
Scarlet
Queens
Seconds
0
1
2
3
4
5
6
7
0
200
400
600
800
1000
1200
1400


Avg Zerg vs Scarlet Minerals Lost
Avg Zerg
Scarlet
Minerals Lost
Seconds
0
2500
5000
7500
10000
12500
15000
17500
20000
0
200
400
600
800
1000
1200
1400


Avg Zerg vs Scarlet Zerglings
Avg Zerg
Scarlet
Zerglings
Seconds
0
5
10
15
20
25
30
0
200
400
600
800
1000
1200
1400

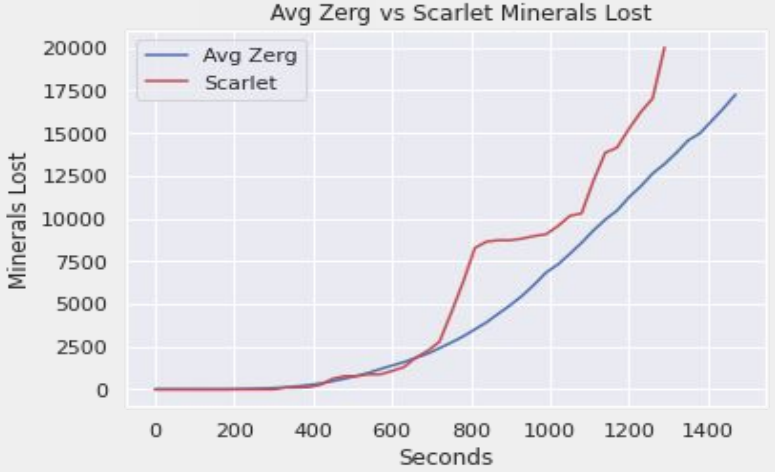

Avg Zerg vs Scarlet Hatchery
Avg Zerg
Scarlet
Hatchery
Seconds
1
2
3
4
5
6
0
200
400
600
800
1000
1200
1400

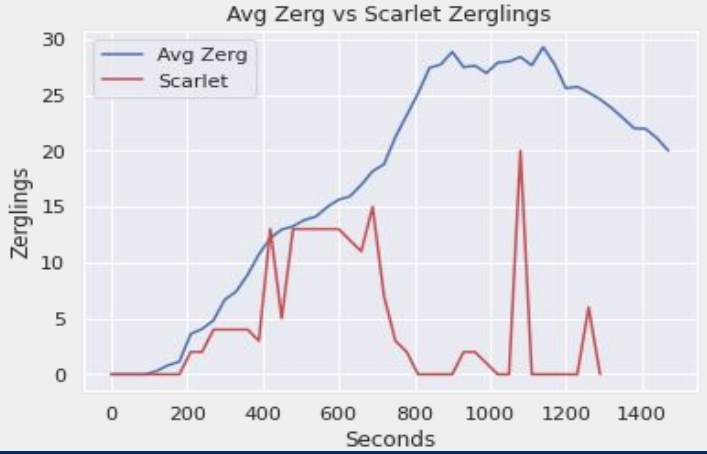


Queen

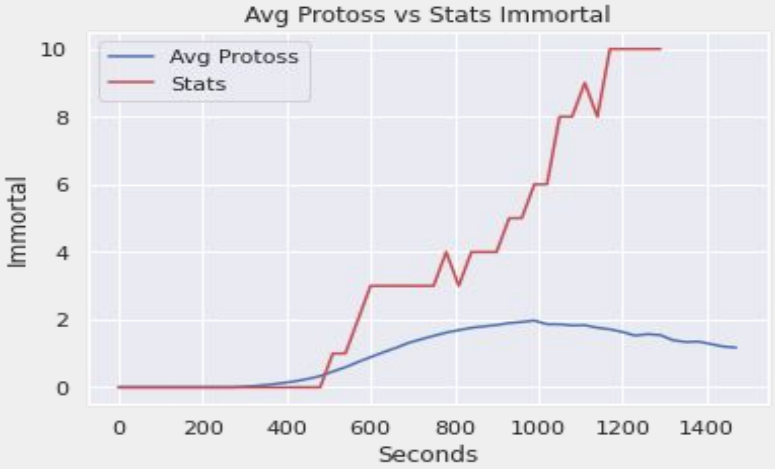
Immortal

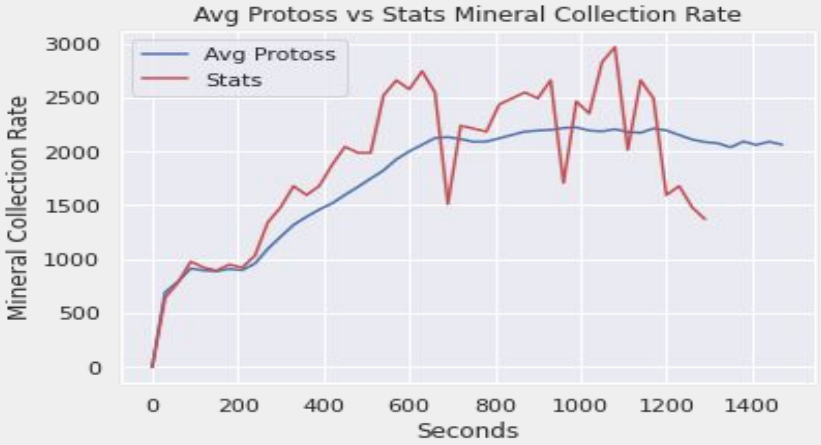

Avg Zerg vs Scarlet Queens
Avg Zerg
Scarlet
Queens
Seconds
0
1
2
3
4
5
6
7
0
200
400
600
800
1000
1200
1400

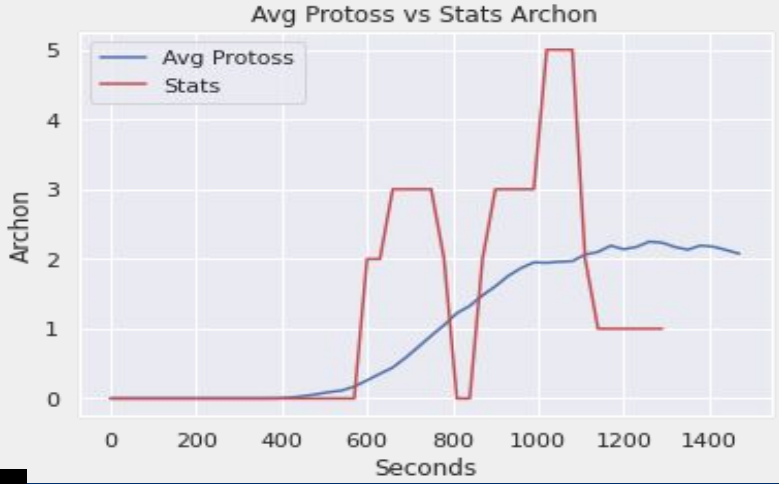

Avg Zerg vs Scarlet Minerals Lost
Avg Zerg
Scarlet
Minerals Lost
Seconds
0
2500
5000
7500
10000
12500
15000
17500
20000
0
200
400
600
800
1000
1200
1400

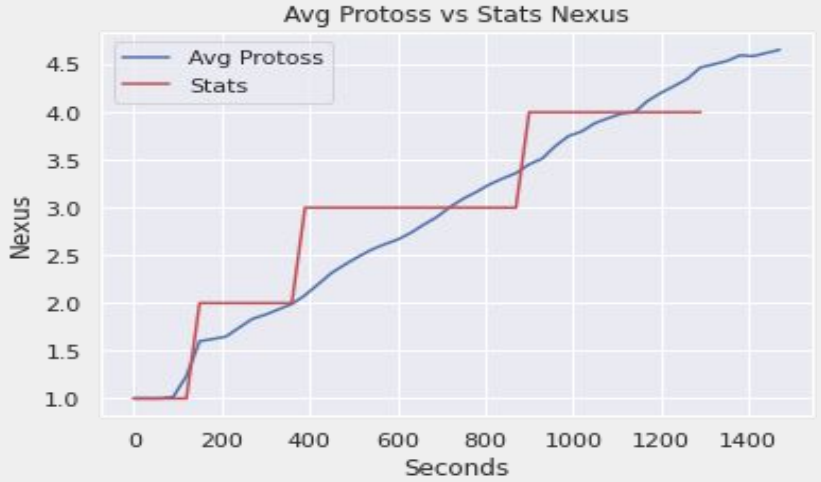

Avg Zerg vs Scarlet Zerglings
Avg Zerg
Scarlet
Zerglings
Seconds
0
5
10
15
20
25
30
0
200
400
600
800
1000
1200
1400


Avg Zerg vs Scarlet Hatchery
Avg Zerg
Scarlet
Hatchery
Seconds
1
2
3
4
5
6
0
200
400
600
800
1000
1200
1400

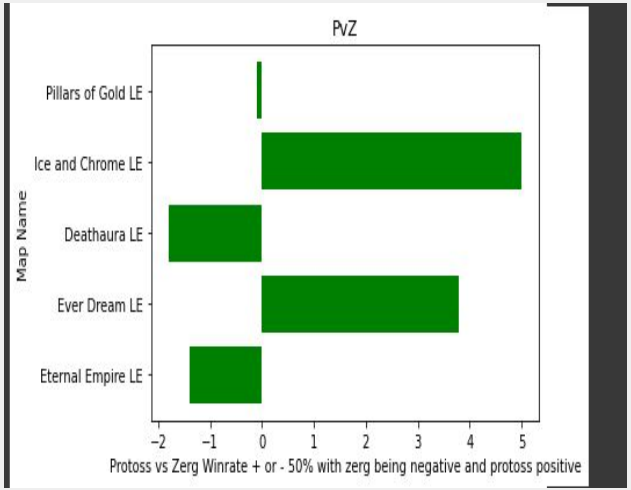

Avg Protoss vs Stats Immortal
Avg Protoss
Stats
Immortal
Seconds
0
2
4
6
8
10
0
200
400
600
800
1000
1200
1400


Avg Protoss vs Stats Mineral Collection Rate
Avg Protoss
Stats
Mineral Collection Rate
Seconds
0
500
1000
1500
2000
2500
3000
0
200
400
600
800
1000
1200
1400


Avg Protoss vs Stats Archon
Avg Protoss
Stats
Archon
Seconds
0
1
2
3
4
5
0
200
400
600
800
1000
1200
1400

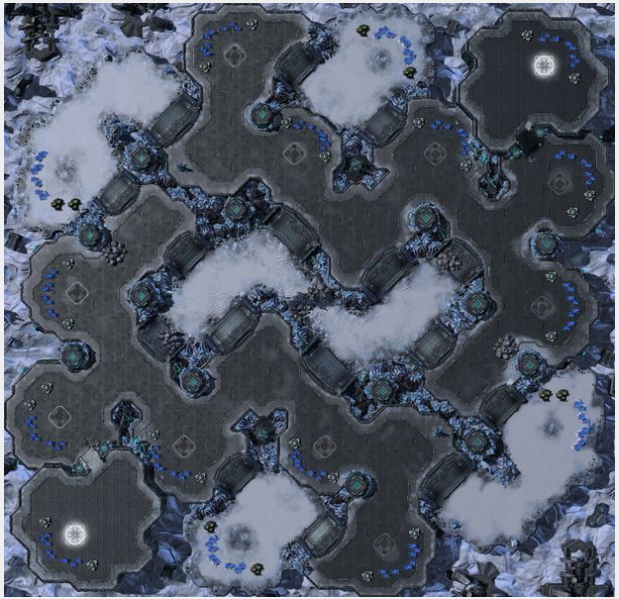

Avg Protoss vs Stats Nexus
Avg Protoss
Stats
Nexus
Seconds
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
0
200
400
600
800
1000
1200
1400

Eternal Empire LE



- Open nature of Maps
- Ramps and Chokepoints
- Xel'Naga(Vision Towers)
- Amount of "Safe" Bases

Eternal Empire LE
(Current Map)



Ice and Chrome LE

Prediction of match

Future Work

- Implement an algorithm that can take these professional replay averages to predict what the META looks like
- Implement an algorithm that can detect if a low ranking player is a smurf
    - Aka a high level player intentionally playing on a low ranked account
- Further improve the model predictor