

CMPUT 350 - SCII Rushbot

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Motivation

- How human and AI play games?
 - Human reacts faster than AI, but need to come up with counter strategies real quick - complicated
 - AI performs actions by a rule once implemented, but vulnerable to unexpected circumstances
- Problem - Is it really possible to counter different situations?
 - Certainly, it is hard
- Solution
 - Rushbot!!!
 - The simple the better
- Idea
 - Rushing determines the winner in early game
 - If success, mid/late game strategies does not have a chance

Planning

- Comparisons between Terran vs Zerg vs Protoss (biased opinion alert - based on other's summary)
 - Terran
 - Good base defense, can counter rushes easily
 - Strongest damage with cheap cost
 - Zerg
 - Lots of gas intensive army
 - Worst unit/base defense
 - Strategically closer to counterattack
 - Protoss
 - Can mine for resources and build simultaneously
 - Relies much on upgrade
 - Why Terran?
 - Concluding the information above, Terran is the best race to rush
 - Terran is easy to get on with by beginners
 - Concern: Terran has very low mistake tolerance?

Advantages

- Easy to implement and understand
 - strategy is simple
- Less time consumption
 - fast to get the result
- Effective when the opponent has poor defense at the early stage

Disadvantages

- No mid-game, late-game strategy
 - Keep using the same strategy for the entire game
- Weak defense
 - Can be beaten if the opponent rushes earlier than us
- Not specific enough
 - Have some advantages against certain races

Strategy

- Rushing as soon as possible
 - Overwhelm enemy
 - Little to no defense
 - Crippling economy
 - Prioritize troops
 - No upgrades

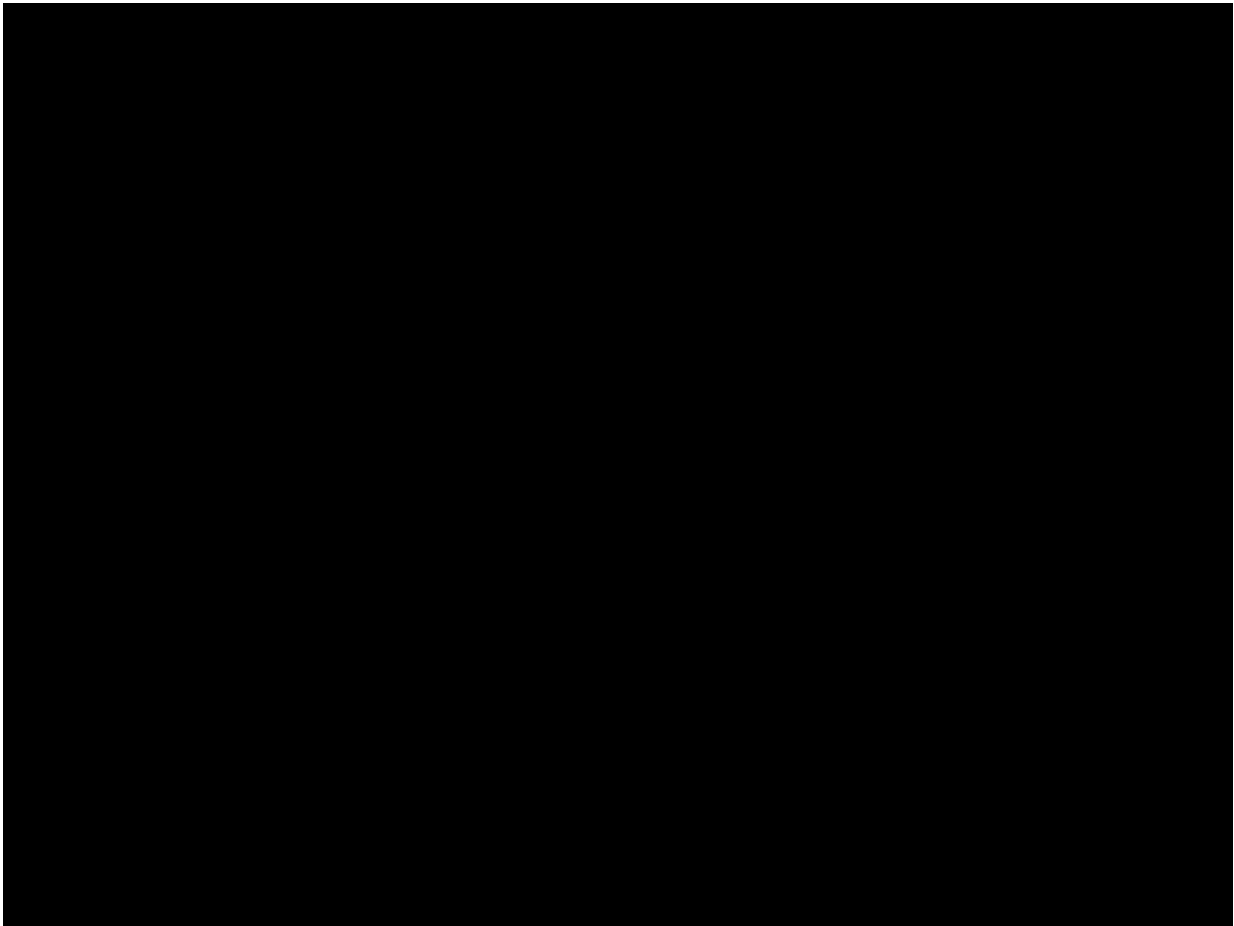
Evaluations

- Optimization
 - High win rates
 - Time consumption
 - Lowest amount of troops needed
 - Different races

Early Design

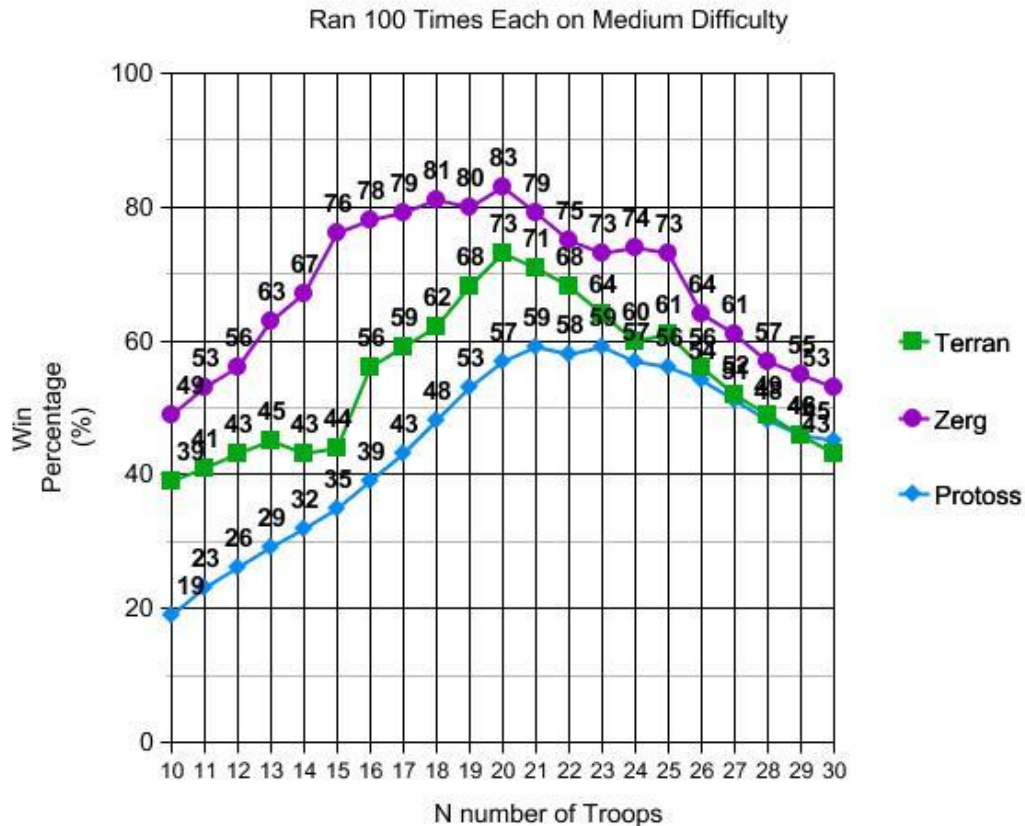
- Generate workers till 15
- Up to 2 barracks
- Only make fast and cheapest units
- Supply Depot
 - Supply capped
- Once enough amount of troops
 - Attack


```
1  #At every time step
2
3  #If the total count of all AI exceeds the max capacity
4  if (ai_count >= max_capacity)
5      #Build a supply depot
6      build_supply_depot()
7  else
8      #If not enough workers are generated
9      if (workers_count < 7 -> 15)
10         #Focus on workers first
11         generate_workers()
12     else
13         #If met quota
14
15         #Try to make troops if possible
16         try_to_make_troops()
17         if (barracks < 2)
18             #Make barracks
19             build_barracks()
20         else
21             #If enough troops
22             if (troops_count >= N)
23                 #Rush
24                 attack()
25             else
26                 #Try to make troops if barrack exists
27                 try_to_make_troops()
```



Results

- Maximum reached when N is 20
- Highest win rate against Zerg



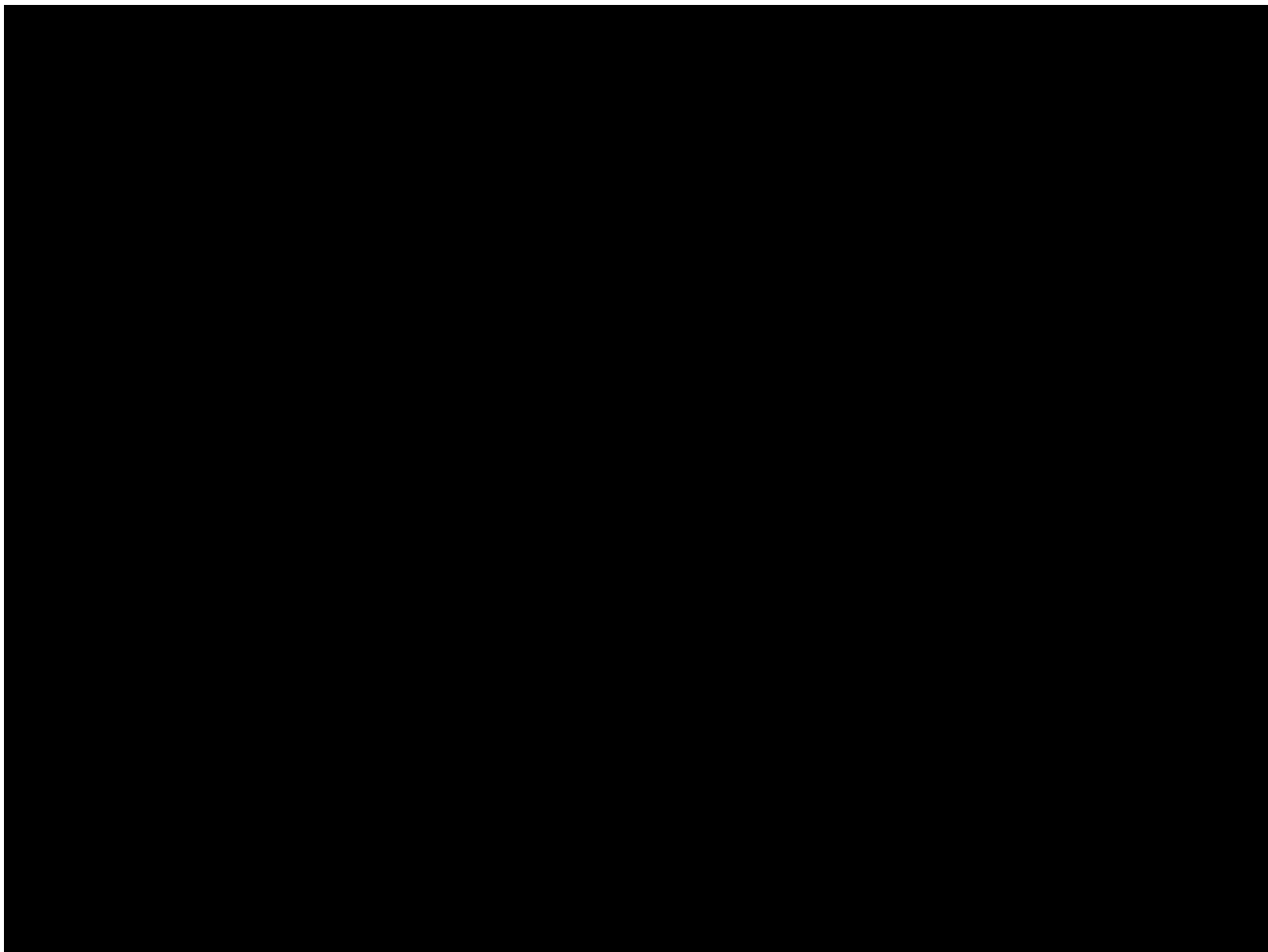
Newer Design

- Based off of
 - Siege Tank rush
 - Quickly focusing on making 3 tanks
 - Our design
 - SCV is constantly built until it reaches 21
 - Build 3 barracks
 - Build 2 factories
 - Build refinery and supply depot if scv available
 - Scout with marine if the factory is not built yet
 - Constantly build marines and tanks
 - Gather the troops outside the base for the first attack
 - If there is more than N tanks and M marines
 - Attack

```

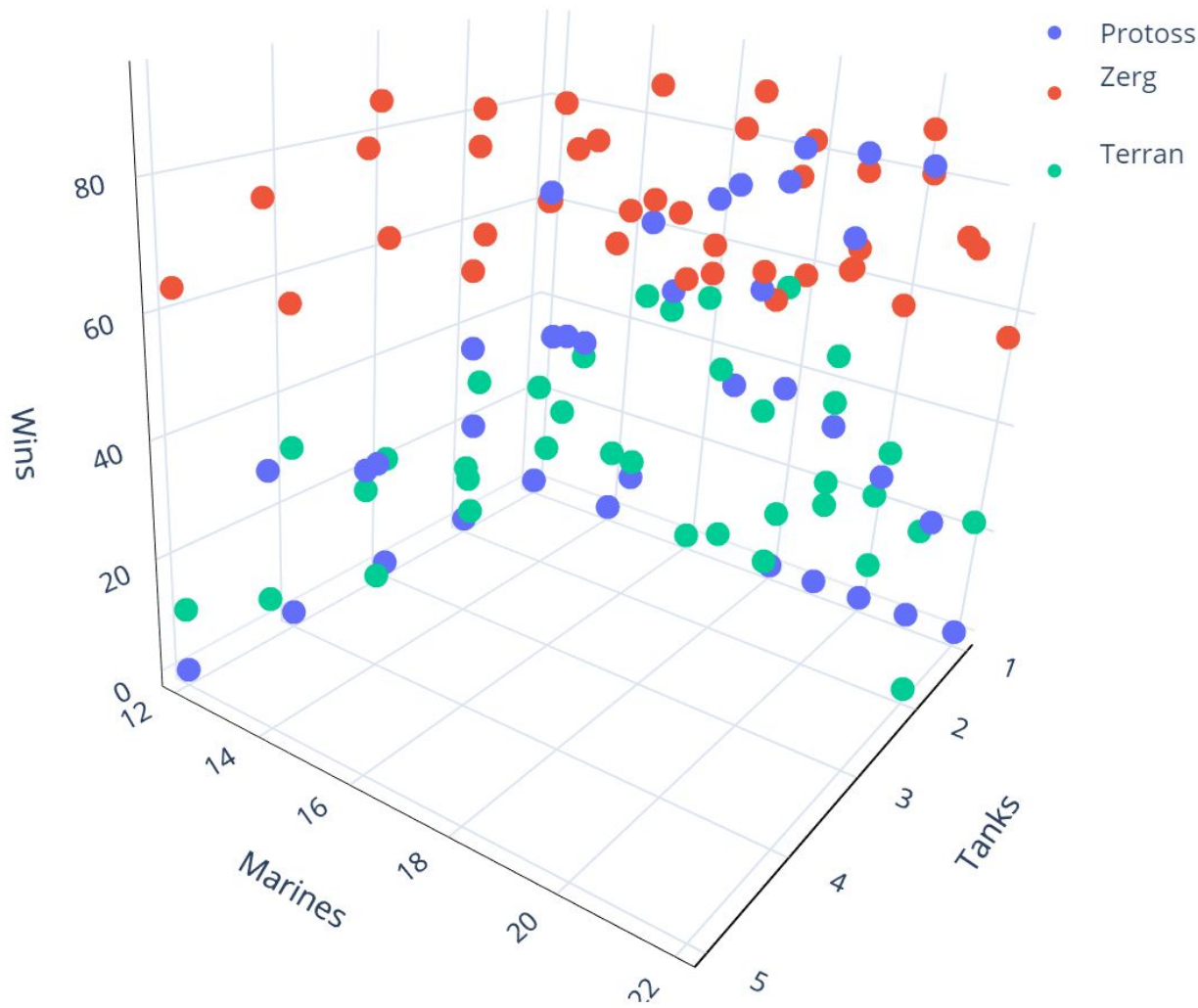
1  #At every time step
2
3  #If the total count of all AI exceeds the max capacity
4  if (ai_count >= max_capacity)
5      #Build a supply depot
6      build_supply_depot()
7  else
8      #If not enough workers are generated
9      if (workers_count < 21)
10         #Focus on workers first
11         generate_workers()
12     else
13         #If met quota
14
15         #Try to make troops if possible
16         try_to_make_marines()
17         try_to_make_tanks()
18
19         #Try to make barracks if not enough
20         if (barracks < 3)
21             #Focus on barracks before factories
22             build_barracks()
23         else
24             #Try to make factories if not enough
25             if (factories < 2)
26                 build_factories()
27
28         #If factories not built yet and at least 1 marine
29         if (factories < 1 and marines_count > 0)
30             scout_with_marine()
31
32         try_to_make_marines()
33         try_to_make_tanks()
34
35         gather_up_troops()
36         #If enough troops
37         if (marines_count >= N and tanks_count >= M)
38             #Rush
39             attack()
40         else
41             #Try to make tanks and marines if building accessible
42             try_to_make_marines()
43             try_to_make_tanks()
44 ..

```



Results

- Unlikely to win when only 1 tank
- Highest chance of winning around 3 tanks and 20 marines



Results - For Zerg

M marines/N tanks	1 Tanks	2 Tanks	3 Tanks	4 Tanks	5 Tanks
12 Marines	6/10	5/10	6/10	5/10	6/10
14 Marines	6/10	8/10	8/10	9/10	8/10
16 Marines	5/10	9/10	8/10	9/10	9/10
18 Marines	5/10	9/10	7/10	9/10	8/10
19 Marines	6/10	8/10	9/10	8/10	9/10
20 Marines	5/10	8/10	8/10	8/10	8/10
21 Marines	7/10	9/10	7/10	7/10	8/10
22 Marines	5/10	7/10	9/10	8/10	8/10

Results - For Protoss

M marines/N tanks	1 Tanks	2 Tanks	3 Tanks	4 Tanks	5 Tanks
12 Marines	0/10	0/10	0/10	0/10	0/10
14 Marines	0/10	4/10	4/10	3/10	4/10
16 Marines	0/10	2/10	5/10	4/10	4/10
18 Marines	0/10	4/10	6/10	6/10	6/10
19 Marines	0/10	4/10	8/10	8/10	9/10
20 Marines	0/10	4/10	9/10	8/10	8/10
21 Marines	0/10	3/10	9/10	9/10	8/10
22 Marines	0/10	3/10	9/10	8/10	8/10

Results - For Terran

M marines/N tanks`	1 Tanks	2 Tanks	3 Tanks	4 Tanks	5 Tanks
12 Marines	2/10	1/10	2/10	3/10	1/10
14 Marines	1/10	2/10	2/10	1/10	2/10
16 Marines	0/10	2/10	4/10	3/10	4/10
18 Marines	1/10	1/10	6/10	6/10	6/10
19 Marines	1/10	1/10	5/10	7/10	5/10
20 Marines	2/10	3/10	7/10	7/10	7/10
21 Marines	1/10	2/10	5/10	6/10	6/10
22 Marines	2/10	0/10	5/10	7/10	6/10

when you discuss about the graph

- Against Protoss & Terran:
 - We need enough time to wait until we have at least 3 tanks(< 3 tanks are too weak to fight against strong units)
 - If rush before <19 marines, we do not have enough time to make 3 tanks.
 - Therefore it is best to rush as soon as we have 3 tanks (around 19 - 20 marines).
- Against Zerg:
 - Because Zerg units are very weak against Marines & Tanks, We had very successful win rate against Zerg.
 - We do not have to worry about the numbers since we are confident we can have a good score against Zerg.
- Take Away from graph:
 - We will choose to rush when we have either 20 marines or 3 tanks.

Future Work

- Add mid-game, late-game strategy
- Add more advanced defense strategy to prevent enemy's rush
- Add different strategies for different enemies