

An entry-level StarCraft II AI program

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Introduction

- My project is to combine the knowledge of artificial intelligence and machine learning to write an AI program about the RTS game *StarCraft 2*.
- Language: Python



What is StarCraft II?

- *StarCraft II* is a Real-Time Strategy (RTS) game by *Blizzard*, released in 2010.
- The main objective of the game is to build an army and defeat the opposing armies.
- There are three races in the game to pick before starting a game. Each race is wildly different from the others, and players have completely different units and playstyles for each of them.



Terran



Protoss



Zerg

Why is StarCraft II?

- As a representative work of RTS game, *StarCraft II* is one of the main competition items of e-sports due to its strong competitiveness.
- It has been a major challenge for artificial intelligence due to its complexity.













Why is StarCraft II?

- *StarCraft II* also has a ladder system and competition for AI programs.
 - One of ladder system is the *SC2 AI Arena* ladder, which provides an environment where Scripted and Deep Learning AIs fight in *StarCraft II*.
 - Matches are run 24/7 and streamed to various live-stream platforms.
- Its “Fog of War” mechanism and huge strategy space are extremely challenging for AI.



<https://sc2ai.net/>

| Competitions | | | |
|----------------------------|--|-----|--------|
| Sc2 AI Arena 2022 Season 2 | | | |
| Rank | Name | DIV | ELO |
| 1 |  Eris | 1 | 2478 → |
| 2 |  MicroMachine | 1 | 2186 ↗ |
| 3 |  EvilZoe | 1 | 2174 → |
| 4 |  Zoe | 1 | 2174 → |
| 5 |  Dysnomia | 1 | 2149 ↘ |
| 6 |  negativeZero | 1 | 2139 → |
| 7 |  Ketroc | 1 | 2101 → |
| 8 |  sharkbot | 1 | 1960 → |
| 9 |  BenBotBC | 1 | 1930 ↗ |
| 10 |  DominionDog | 1 | 1916 → |

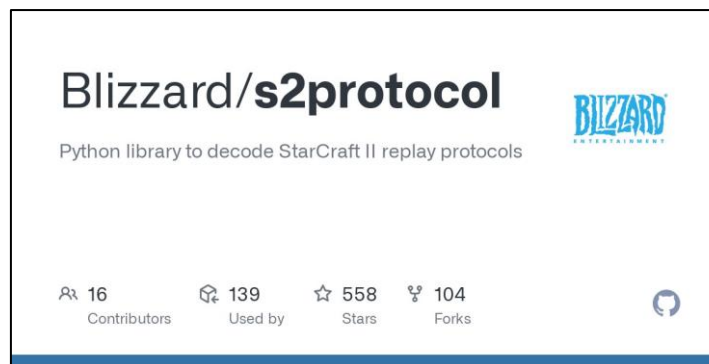
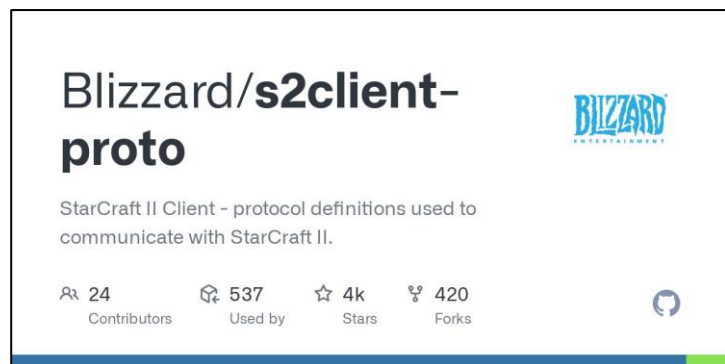
Why is StarCraft II?

- In 2019, *Deepmind's* achievements in *StarCraft II* AI were published in *Nature*.
- Nowadays, *StarCraft II* AI is still an important aspect of artificial intelligence applied to strategy games.

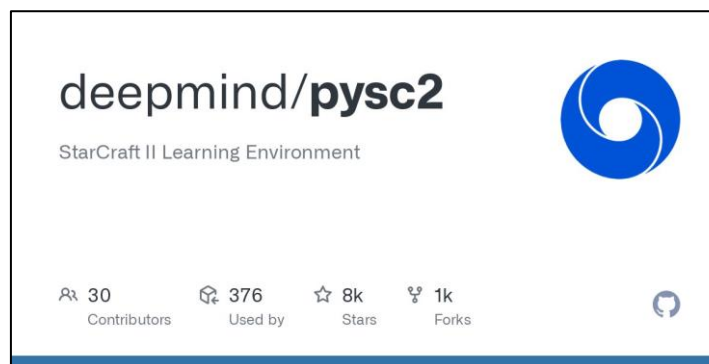
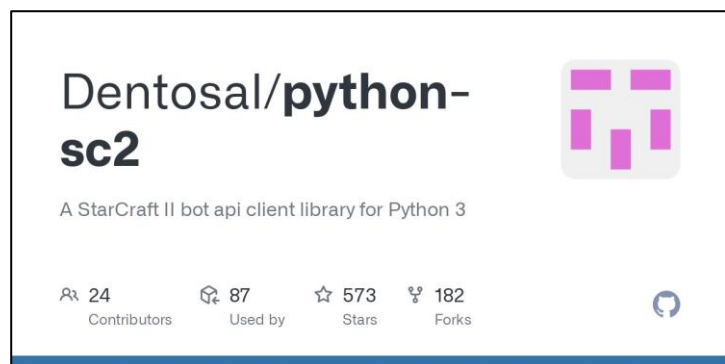


How to implement?

- *Blizzard* has two open source Python libraries for *StarCraft II*.



- There are also several open source Python libraries about API and learning environment.



How to implement?

- *StarCraft II* has a lot of variables and states. Building placement, construction process, timing and combat operations are all extremely complex issues, so it is impossible to get good results by completely hard coding.
- Q-learning will be too complicated for these problems.
- My idea is to use a simple neural network (e.g. CNN) to simplify the problems, and then try a more complex solution when the initial practice works.
- AI can play against the game's built-in bots for data, build its own datasets.

Thanks!