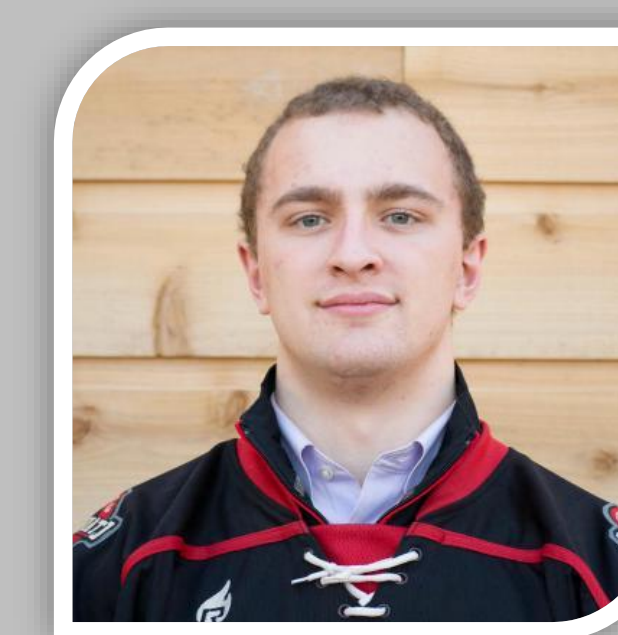
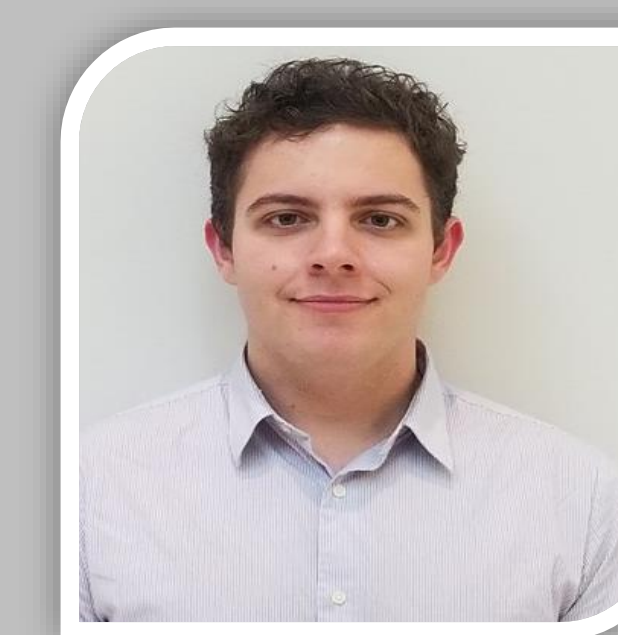


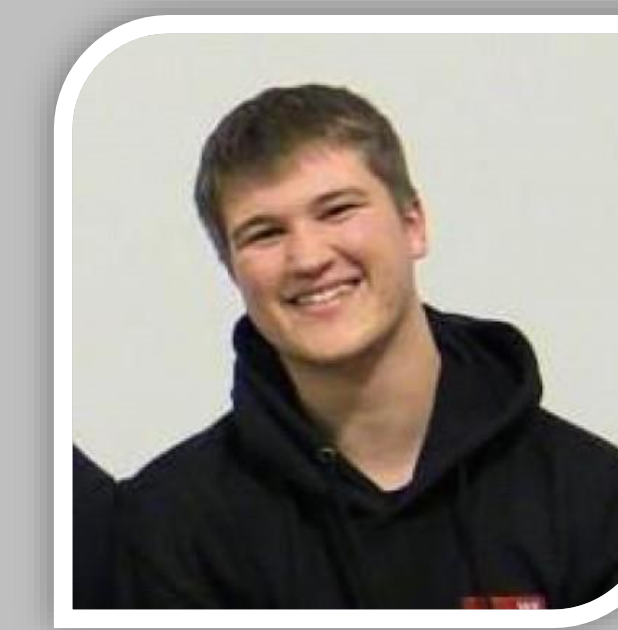
STARCRRAFT 2 AI



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Background

Starcraft2 is a real-time, player versus player, strategy game that has two players fighting each other for victory. Real time strategy games are an interesting challenge for AI due to the presence of delayed rewards, high complexity action space, and incomplete game state knowledge (unlike Chess or Go).

Interest in Problem

We wanted to pursue a topic that was related to a hobby we all shared (playing video games). Creating a AI was interesting to us because there are a variety of methods for approaching the problem and each of us had varying domain knowledge about Starcraft2. Furthermore, Blizzard and Deepmind recently released tools to aid in the development of Starcraft2 AI agents.

Important Challenges

The challenges related to our project include:

- Long term rewarding
- Long term stochasticity
- Managing Action Input Space
- Real Time Action Selection

To account for some of these challenges, we developed a deep action critic model.

Model

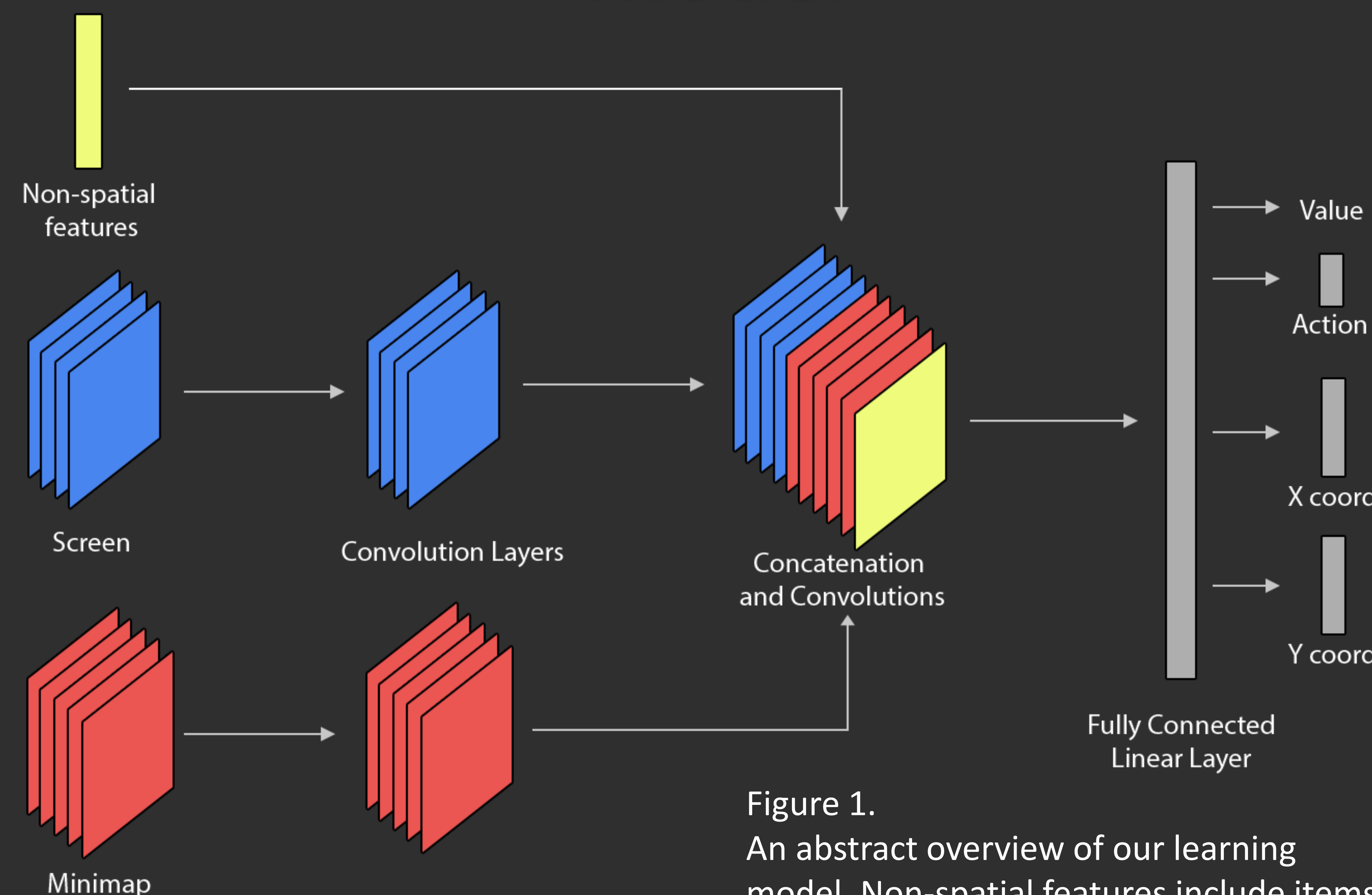


Figure 1.
An abstract overview of our learning model. Non-spatial features include items such as unit count and current resources.

Input

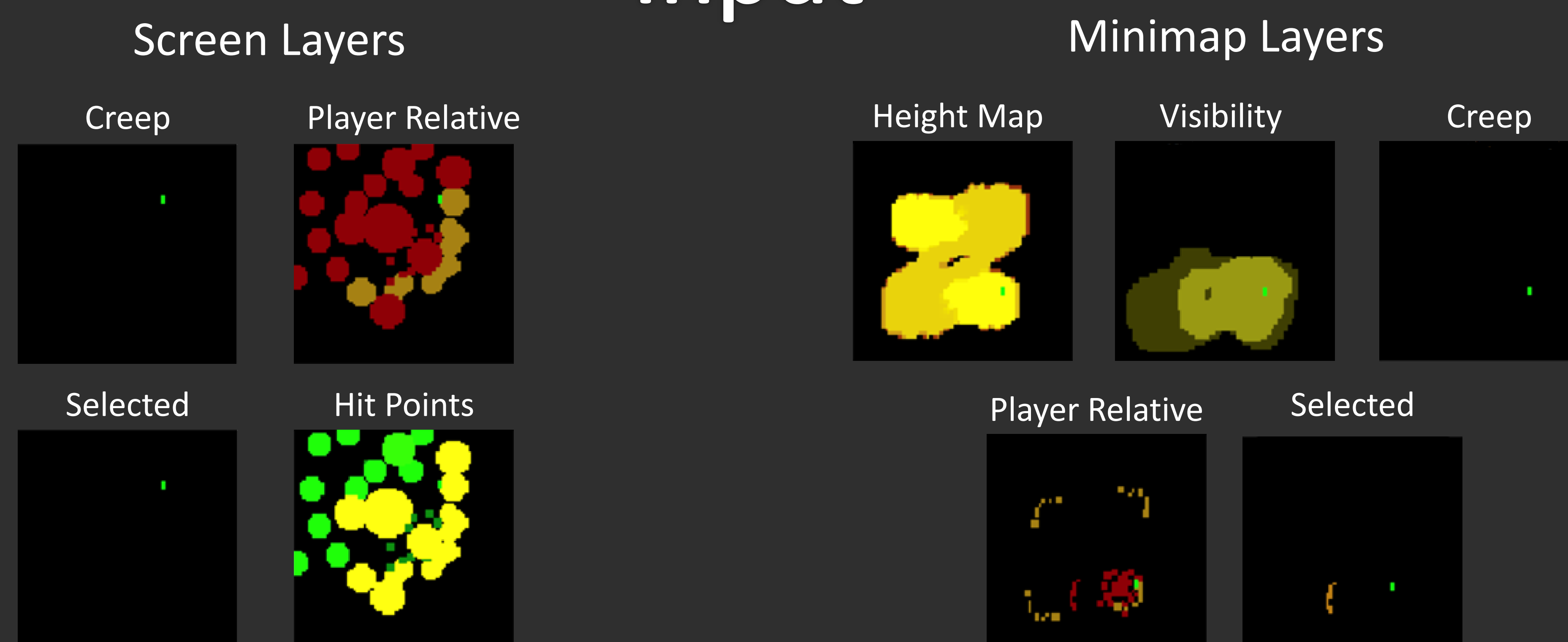


Figure 2.
Raw spatial inputs we feed our neural net. Each layer contains different information for a given screen region.

Results

AI Type	Win Rate vs. Very Easy Random AI
Random Action	50%
Network with Training	84%

Milestone Achievements

- 10/31 – Develop scripted dumb AI.
- 12/05 – Develop Q-learned model capable of defeating Very Easy AI.
- 1/13 – Update to a deep-learned model with better success than Q-learned.
- 2/5 – Update to sparse and intermittent reward systems.
- 3/10 – Included new units and abilities in action space
- 3/16 – LSTM model implemented

Future Work

- Expand action space to the full possibility of Terran's actions.
- Train against multiple maps.
- Train AI to change camera location.
- Train AI to play as other races.
- Train against higher difficulty Blizzard AIs.

