GOLEM

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RECAP

- General description of the game ‘DOTA 2’ and its mechanics.
- Introduction to GOLEM, general working of the system.
- Advantages and Disadvantages of the proposed system
- Modules, algorithms and explanation of the timeline of the project

PROTOCOL BUFFER PARSING

- Protocol Buffers is a method of serializing structured data.
- Player data which needs to read as test cases are stored in the protocol buffer format as game entity data.
- This data is parsed using a protobuf parser , which we have written in Golang.
- This data is then moved to SQL tables so that it can be easily accessed

PROTOCOL BUFFER FUNCTIONS

- **CMsgDOTACombatLogEntry**

  Reads combatLog data in the game , these are actions such as damage inflicted ,heal, spells used, items used and location and time of these events.

- **CDOTAMatchMetadataFile**

  Provides the end of game data and entity key relations which helps us identify each entity in the game.

- **CSVCMsgPacketEntities**

  alerts about any changes that happened to high level entities (heros, creeps, towers) and low level entities (trees, wards , animations)

SQL DESIGN AND IMPLEMENTATION

- The data obtained from parsing the protocol buffer files needs to stored in a structured format.
- We have chosen SQL as the structured format, as we need fast access to this data to send the commands to the bot every 33ms.
- The data is read by the machine learning algorithms from SQL, this data is the test cases it uses to decide its output.

TENSORFLOW / MACHINE LEARNING

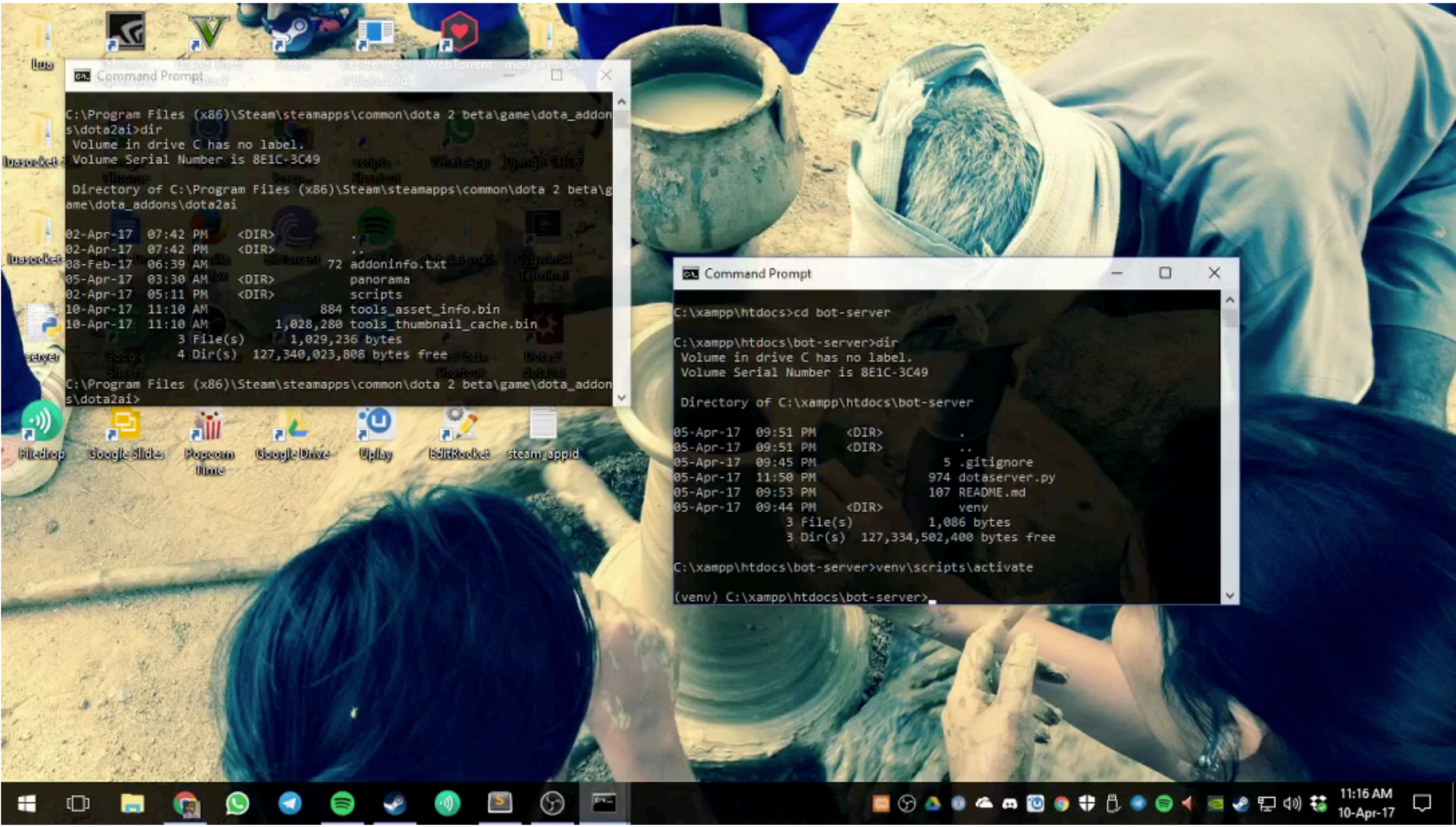
- The machine learning algorithms such as :-

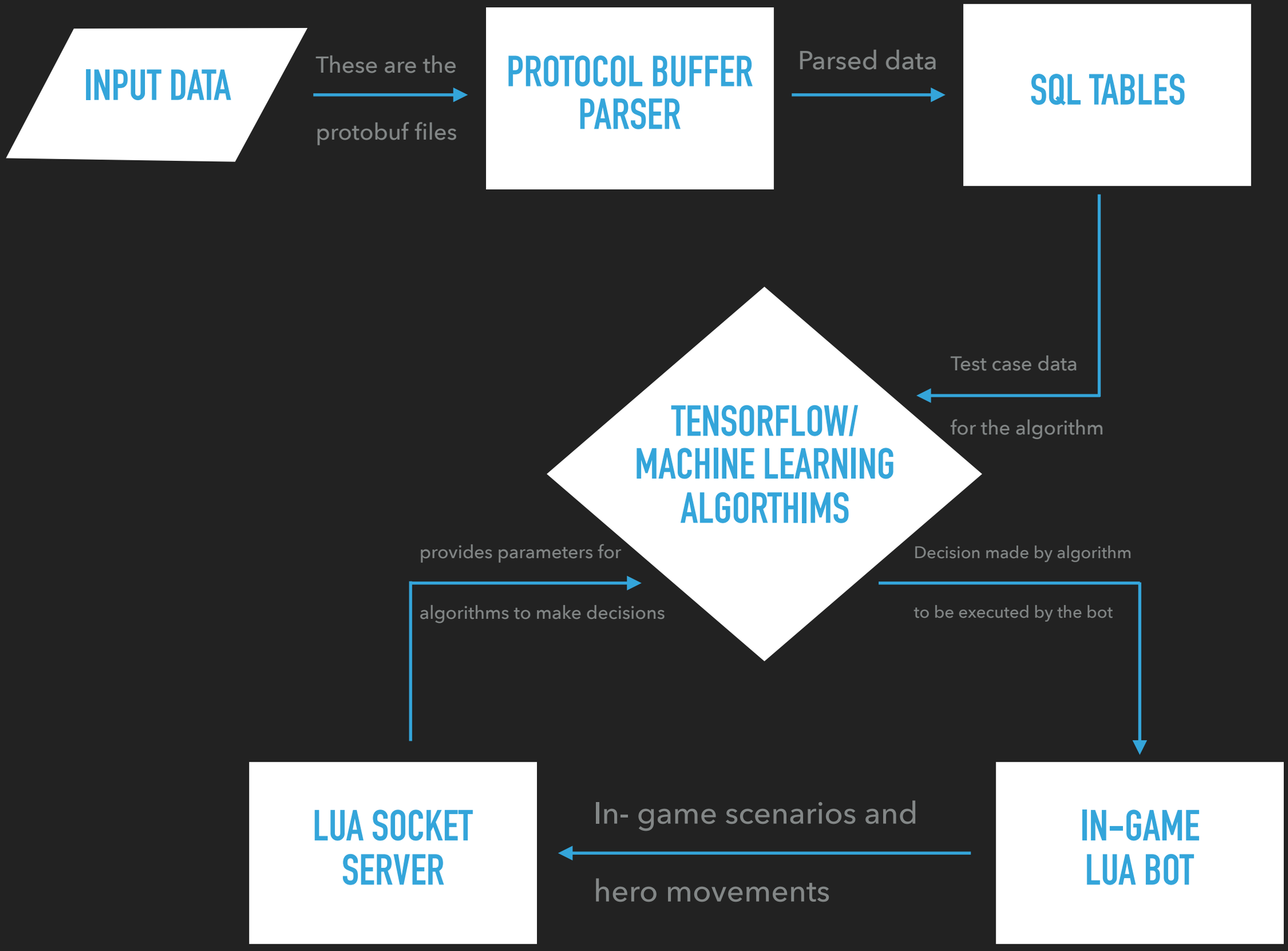
1. **Neural Networks** - These compute multiple decisions that need to be every tick and gives out the list of commands that need to be executed in that tick.
2. **Markov Decision Trees** - Probably to move to every step is calculated as a function of action and a Markov Decision table is calculated.
3. **Markov Reward Function** - Probably of every action is computed and a reward function is applied to it, to calculate how favorable the step is.

- These algorithms are implemented in Googles TensorFlow, which is written in Python

LUA PROGRAMMING

- Lua is used to read the game data in which the bot is currently playing and give the bot commands to execute
- These commands are decided by the machine learning algorithms and sent to the bot by the Lua network platform
- Network platform is integrated into the game using sockets and uses HTTP requests to fetch and provide data to the bot.


Command Prompt
C:\Program Files (x86)\Steam\steamapps\common\dota 2 beta\game\dota_addons\dota2ai>dir
Volume in drive C has no label.
Volume Serial Number is 8E1C-3C49
Directory of C:\Program Files (x86)\Steam\steamapps\common\dota 2 beta\game\dota_addons\dota2ai
02-Apr-17 07:42 PM <DIR> .
02-Apr-17 07:42 PM <DIR> ..
08-Feb-17 06:39 AM 72 addoninfo.txt
05-Apr-17 03:30 AM <DIR> panorama
02-Apr-17 05:11 PM <DIR> scripts
10-Apr-17 11:10 AM 884 tools_asset_info.bin
10-Apr-17 11:10 AM 1,028,280 tools_thumbnail_cache.bin
3 File(s) 1,029,236 bytes
4 Dir(s) 127,340,023,808 bytes free
C:\Program Files (x86)\Steam\steamapps\common\dota 2 beta\game\dota_addons\dota2ai>
Command Prompt
C:\xampp\htdocs>cd bot-server
C:\xampp\htdocs\bot-server>dir
Volume in drive C has no label.
Volume Serial Number is 8E1C-3C49
Directory of C:\xampp\htdocs\bot-server
05-Apr-17 09:51 PM <DIR> .
05-Apr-17 09:51 PM <DIR> ..
05-Apr-17 09:45 PM 5 .gitignore
05-Apr-17 11:50 PM 974 dotaserver.py
05-Apr-17 09:53 PM 107 README.md
05-Apr-17 09:44 PM <DIR> venv
3 File(s) 1,086 bytes
3 Dir(s) 127,334,502,400 bytes free
C:\xampp\htdocs\bot-server>venv\scripts\activate
(venv) C:\xampp\htdocs\bot-server>
Fitedrop
Google Slides
Popcorn time
Google Drive
Uplay
EditRocket
steam_appid
11:16 AM
10-Apr-17


INPUT DATA
These are the
protobuf files
PROTOCOL BUFFER PARSER
Parsed data
SQL TABLES
Test case data
for the algorithm
TENSORFLOW/ MACHINE LEARNING ALGORTHIMS
provides parameters for
algorithms to make decisions
Decision made by algorithm
to be executed by the bot
LUA SOCKET SERVER
In- game scenarios and
hero movements
IN-GAME LUA BOT