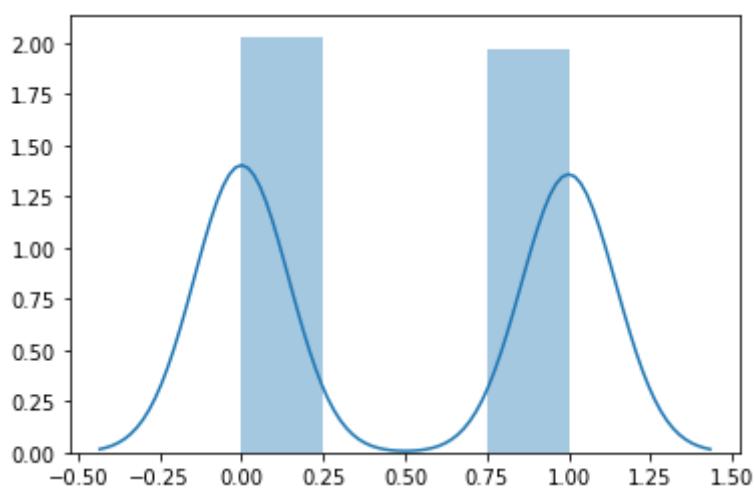
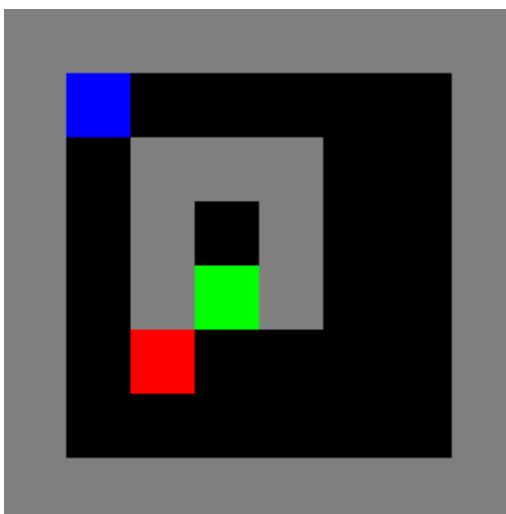
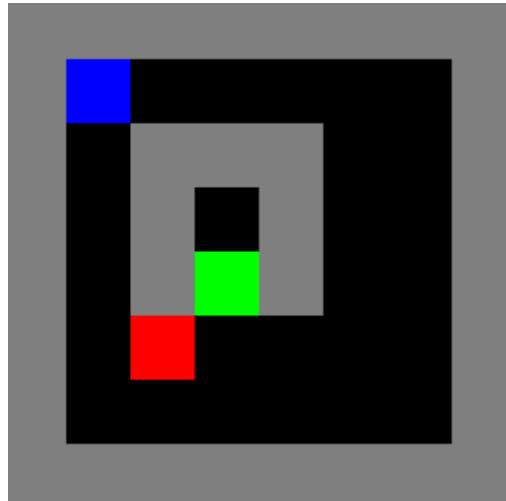
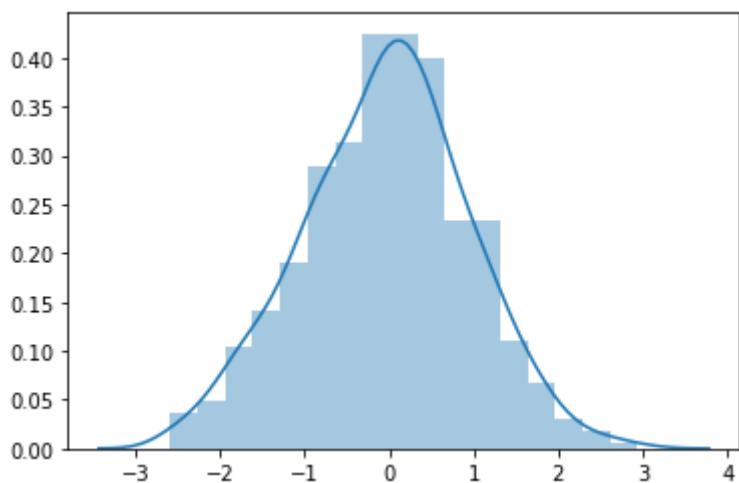
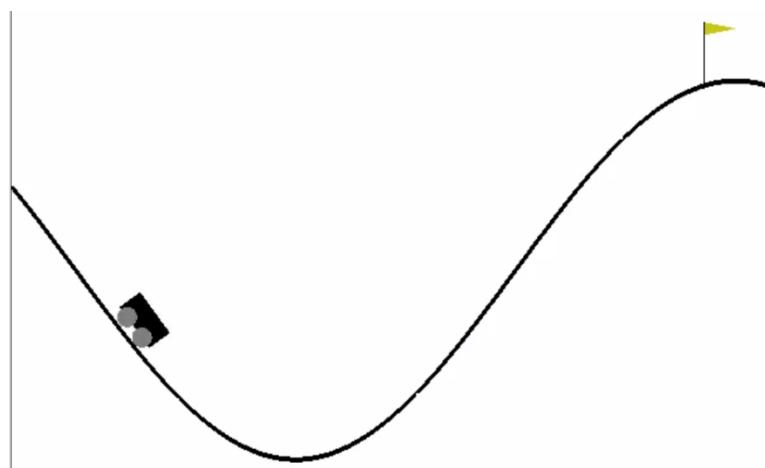
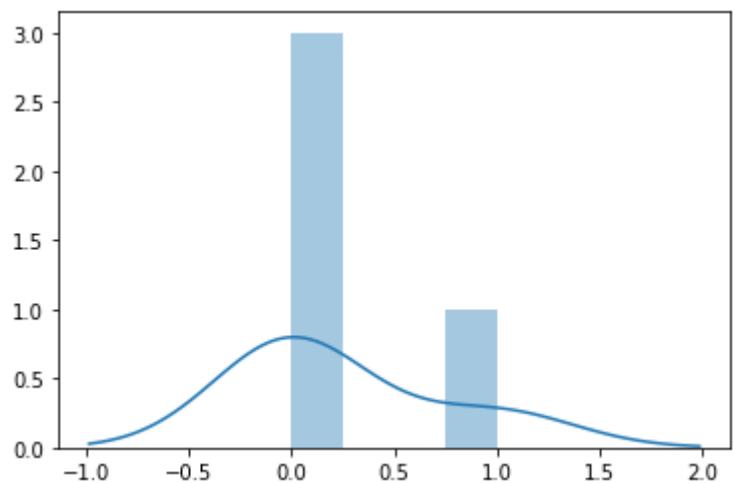
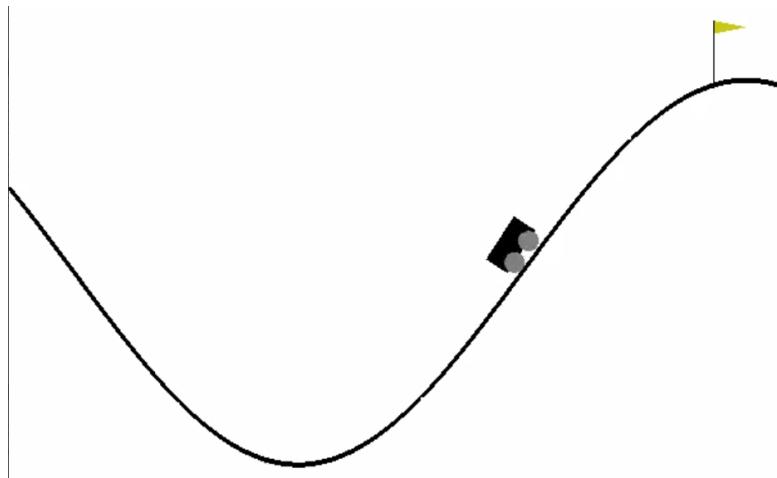
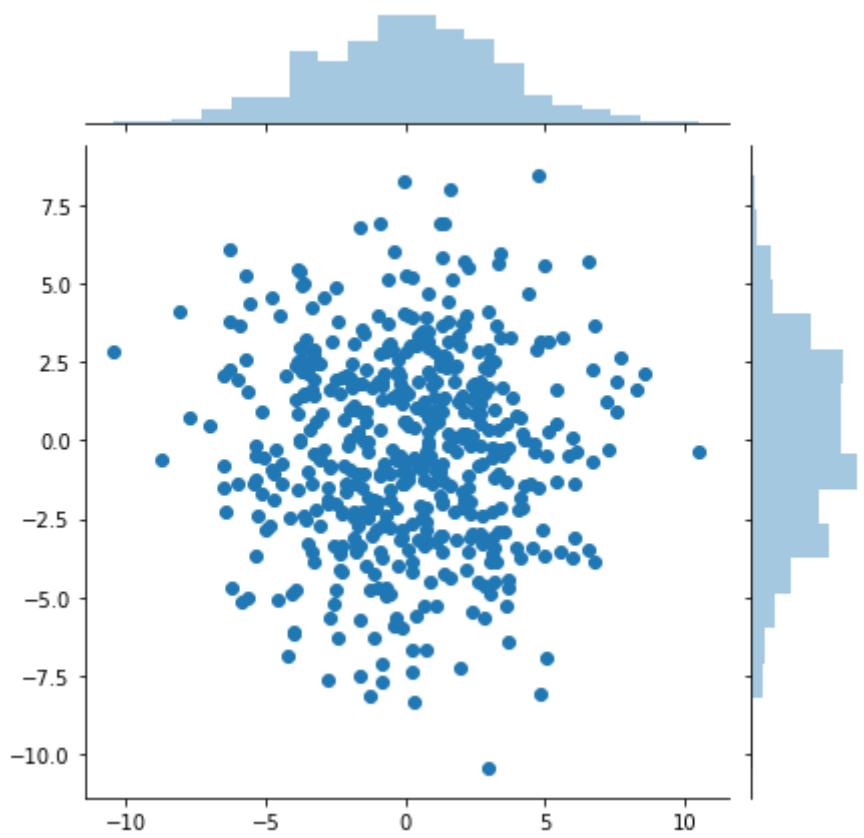


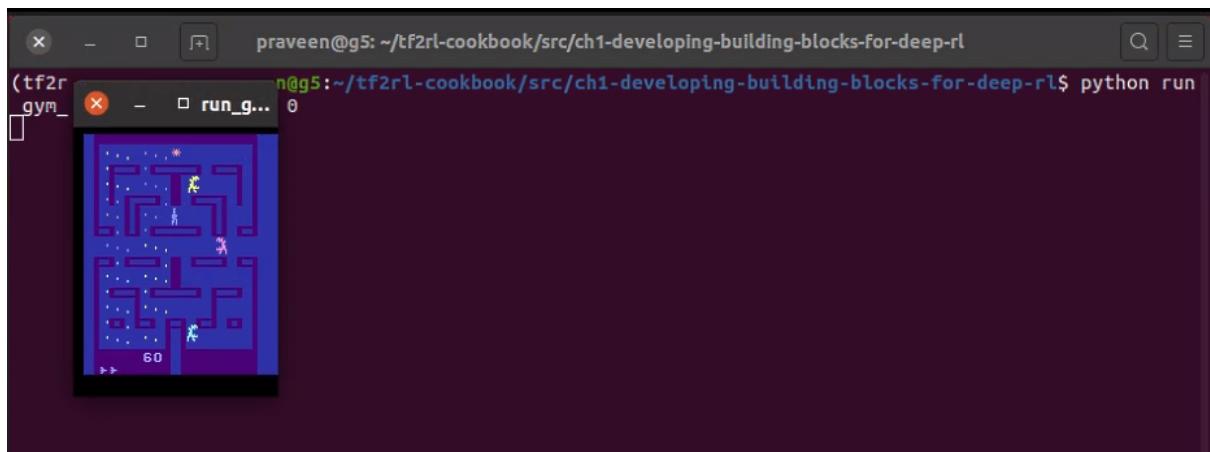
# Chapter 1: Developing Building Blocks for Deep Reinforcement Learning Using TensorFlow 2.x







```
Acrobot-v1
AirRaid-ram-v0
AirRaid-ram-v4
AirRaid-ramDeterministic-v0
AirRaid-ramDeterministic-v4
AirRaid-ramNoFrameskip-v0
AirRaid-ramNoFrameskip-v4
AirRaid-v0
AirRaid-v4
AirRaidDeterministic-v0
AirRaidDeterministic-v4
AirRaidNoFrameskip-v0
AirRaidNoFrameskip-v4
Alien-ram-v0
Alien-ram-v4
Alien-ramDeterministic-v0
Alien-ramDeterministic-v4
Alien-ramNoFrameskip-v0
Alien-ramNoFrameskip-v4
Alien-v0
Alien-v4
AlienDeterministic-v0
AlienDeterministic-v4
AlienNoFrameskip-v0
AlienNoFrameskip-v4
Amidar-ram-v0
Amidar-ram-v4
Amidar-ramDeterministic-v0
Amidar-ramDeterministic-v4
Amidar-ramNoFrameskip-v0
Amidar-ramNoFrameskip-v4
Amidar-v0
Amidar-v4
AmidarDeterministic-v0
```



```

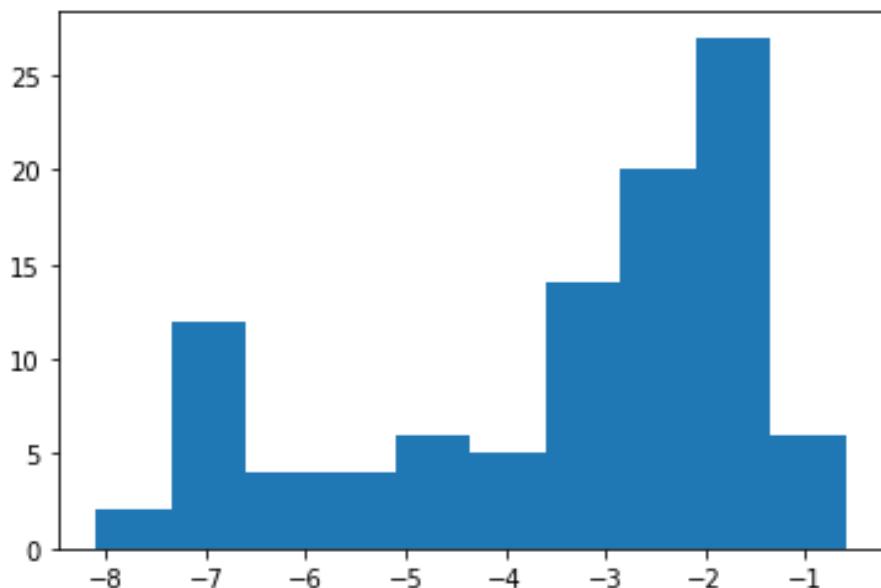
praveen@g5: ~/tf2rl-cookbook/src/ch1-developing-building-blocks-for-deep-rl
l-cookbook/src/ch1-developing-building-blocks-for-deep-rl$ python neural_agent.py
(tf2r
ral_a
 0%]
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oad d
or d
2020-
: UNK
2020-
es no
2020-
ructi
2020-
89995
2020-
0 ini
2020-
0: Host, Default Version
EpReward:-2.90 steps:100 done:True info:{'status': 'Max steps reached'}
10%| [ 1/10 [00:02<00:20,  2.27s/it]
EpReward:-3.10 steps:100 done:True info:{'status': 'Max steps reached'}
20%| [ 2/10 [00:03<00:16,  2.04s/it]

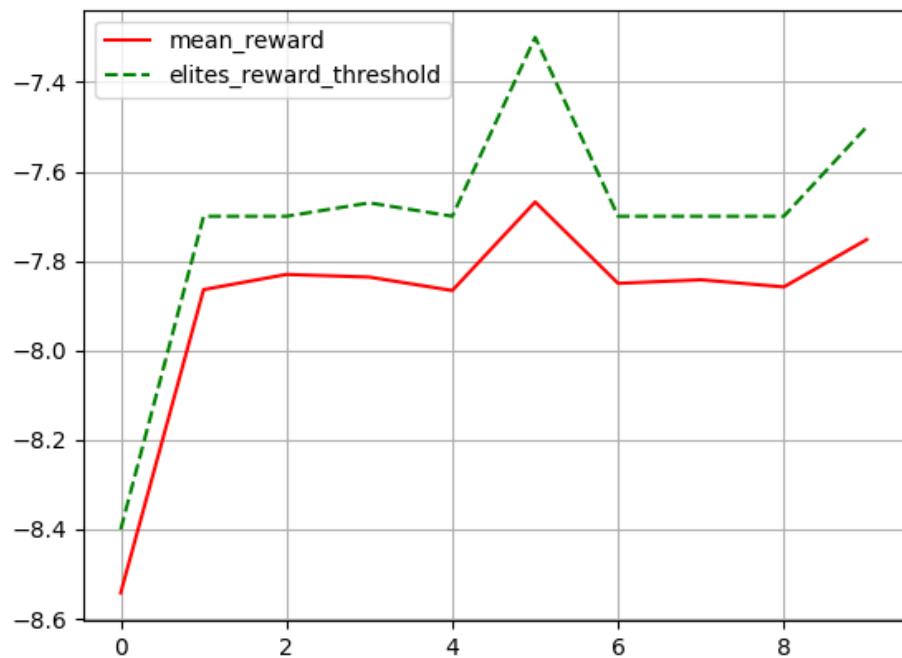
```

```

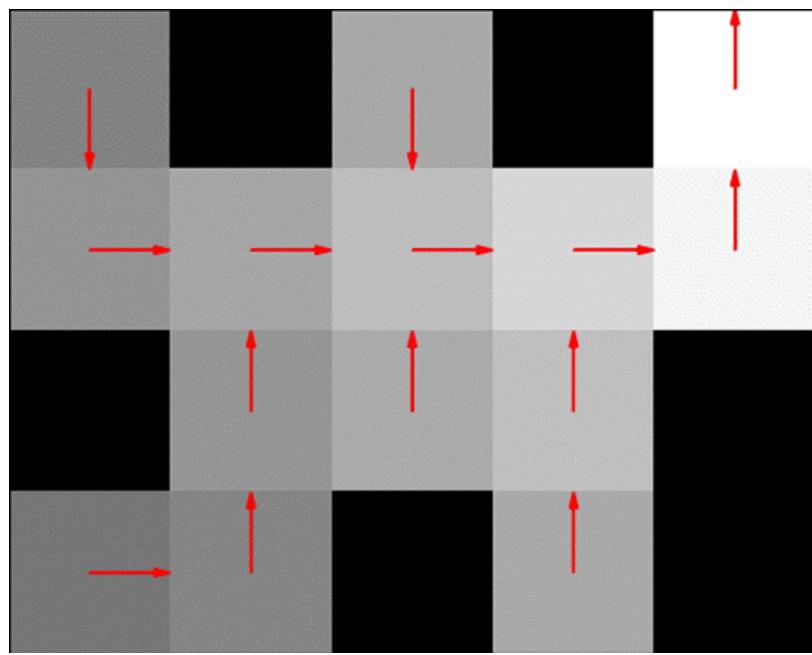
praveen@g5: ~/tf2rl-cookbook/src/ch1-developing-building-blocks-for-deep-rl
l-cookbook/src/ch1-developing-building-blocks-for-deep-rl$ python neural_agent.py
(tf2r
ral_a
 0%]
2020-
oad d
or d
2020-
: UNK
2020-
es no
2020-
ructi
2020-
89995
2020-
0 ini
2020-
0: Host, Default Version
EpReward:-2.90 steps:100 done:True info:{'status': 'Max steps reached'}
10%| [ 1/10 [00:02<00:20,  2.27s/it]

```

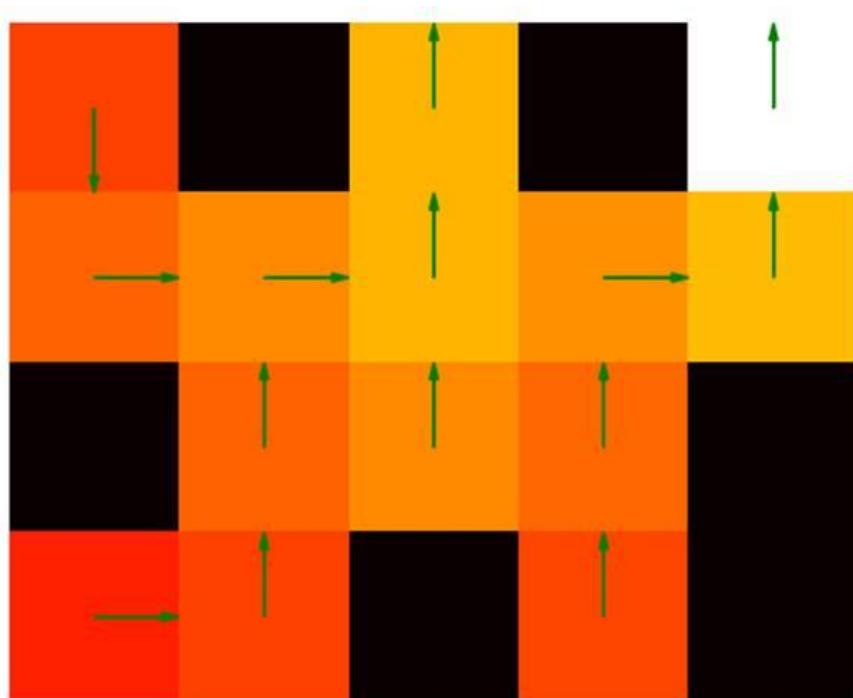


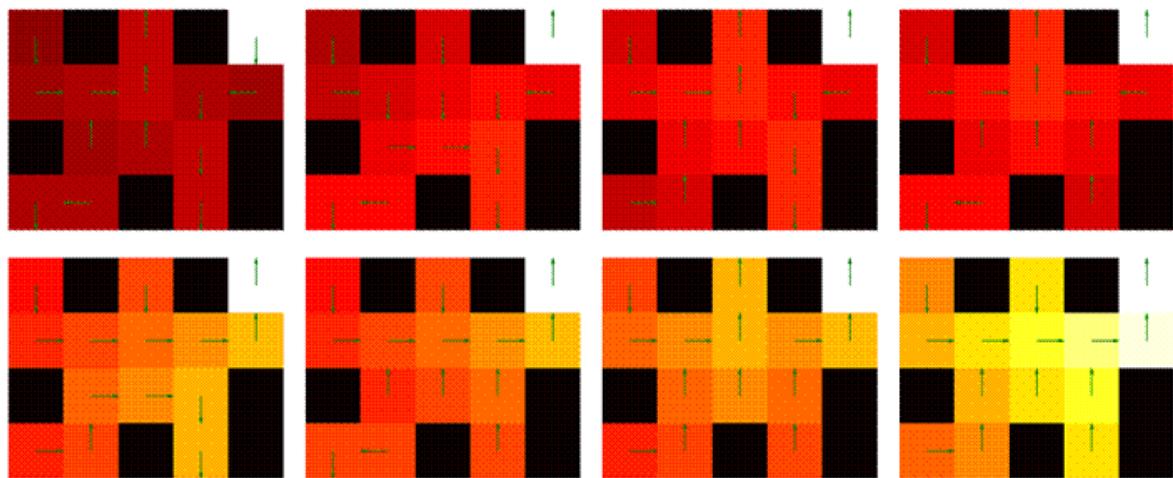


## Chapter 2: Implementing Value-Based, Policy-Based, and Actor-Critic Deep RL Algorithms



```
(tf2rl-cookbook) praveen@g5:~/tf2rl-cookbook/src/c  
h2-value-based-policy-gradients-and-actor-critic-m  
ethods/envs$ python maze.py  
SWFG  
00000  
WOOOW  
FOWFW  
step#:1 action:RIGHT reward:0.0 done:False  
SWFG  
00000  
WOOOW  
FOWFW  
step#:2 action:UP reward:0.0 done:False  
SWFG  
00000  
WOOOW  
FOWFW  
step#:3 action:UP reward:0.0 done:False  
SWFG  
00000  
WOOOW  
FOWFW  
step#:4 action:DOWN reward:0.0 done:False  
SWFG  
00000  
WOOOW  
FOWFW  
step#:5 action:RIGHT reward:0.0 done:False  
SWFG  
00000  
WOOOW  
FOWFW  
step#:6 action:RIGHT reward:0.0 done:False  
SWFG  
00000  
WOOOW  
FOWFW  
step#:7 action:DOWN reward:0.0 done:False  
SWFG  
00000  
WOOOW  
FOWFW
```

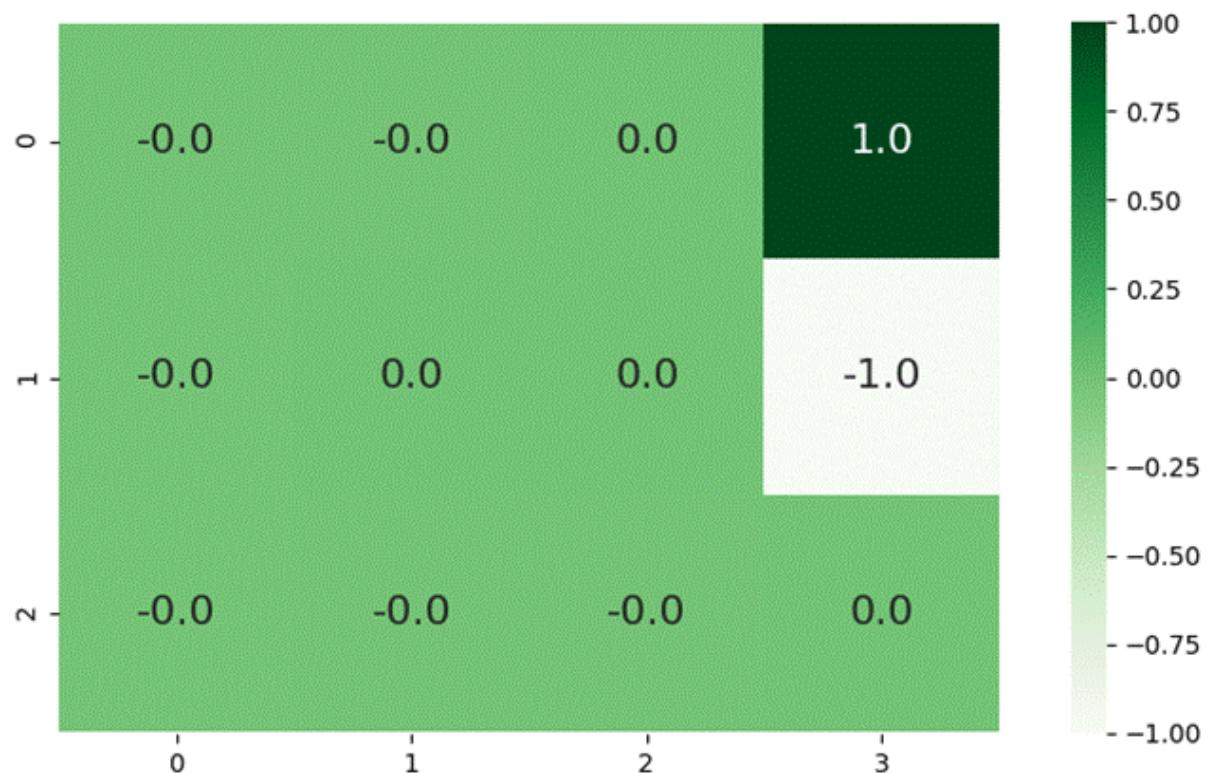


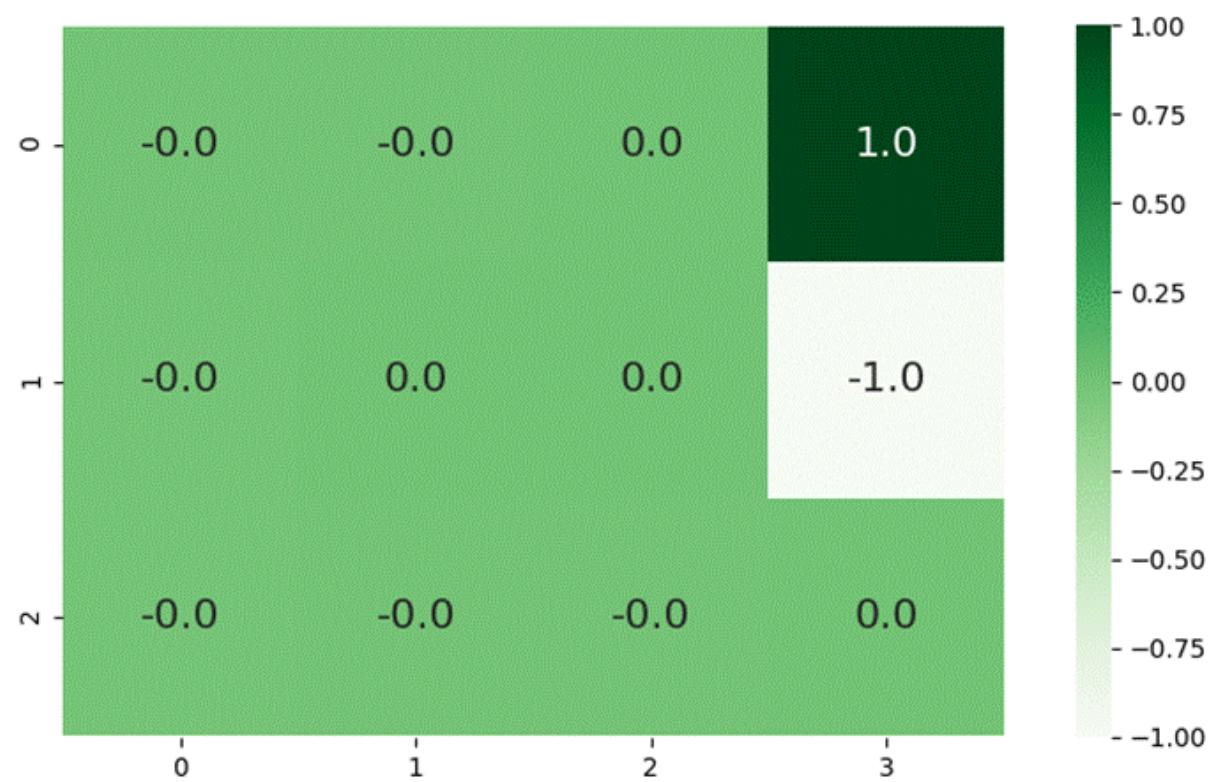


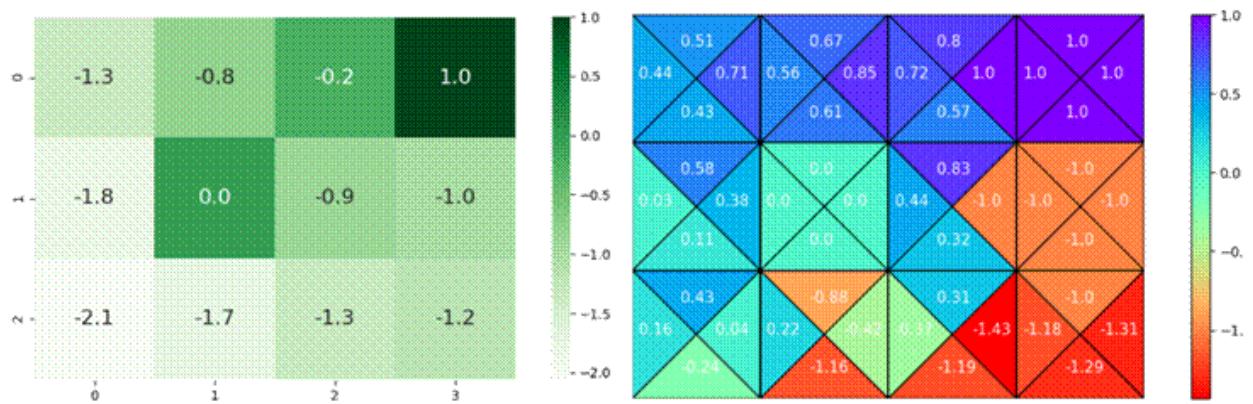
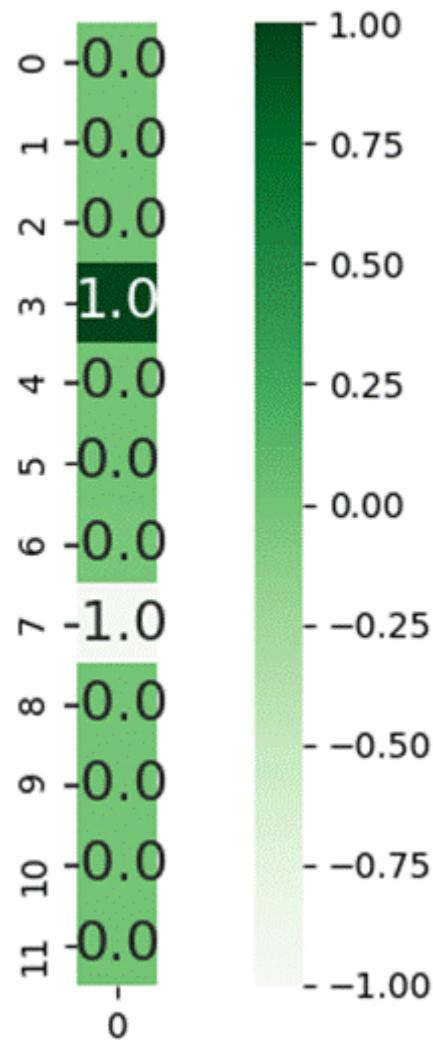
Action mapping:[0 - UP; 1 - DOWN; 2 - LEFT; 3 - RIGHT]

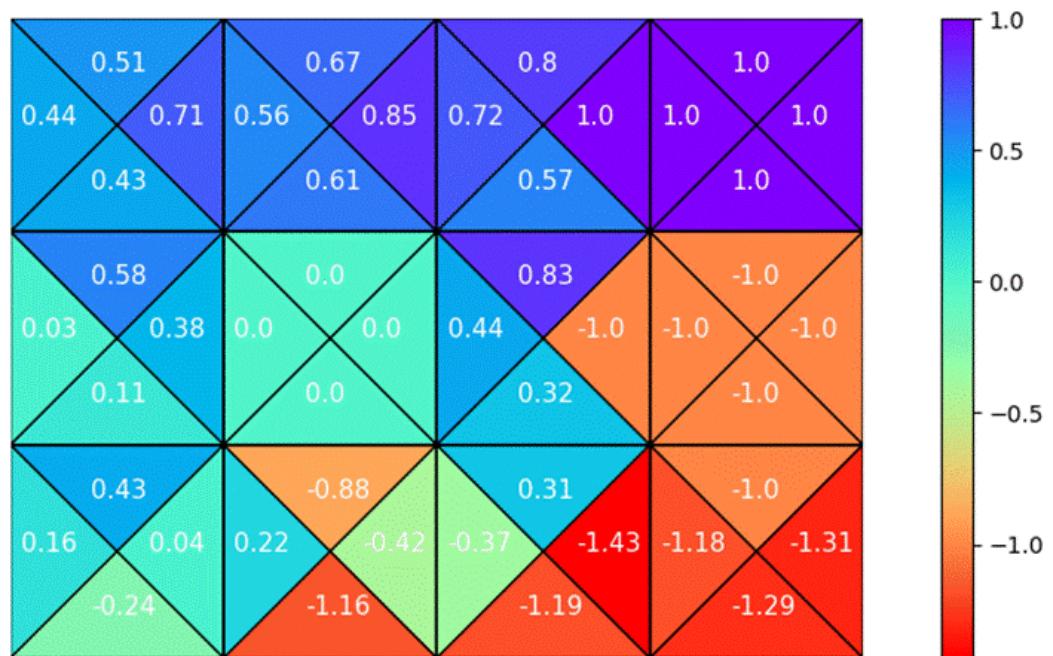
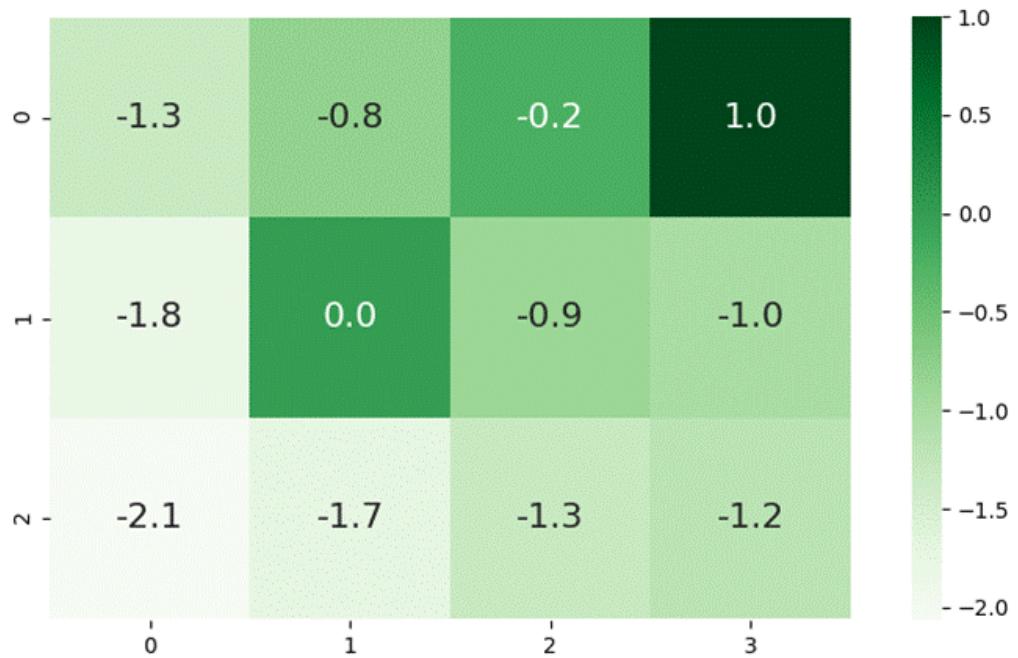
Optimal actions:

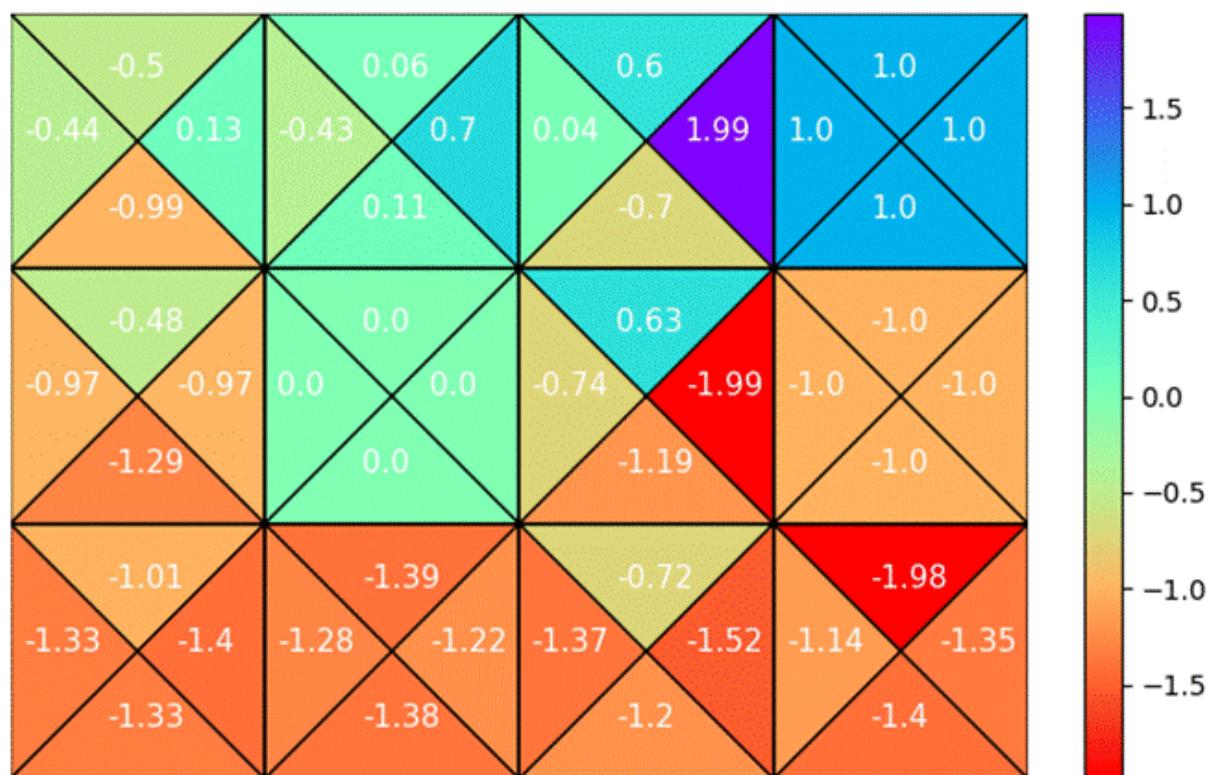
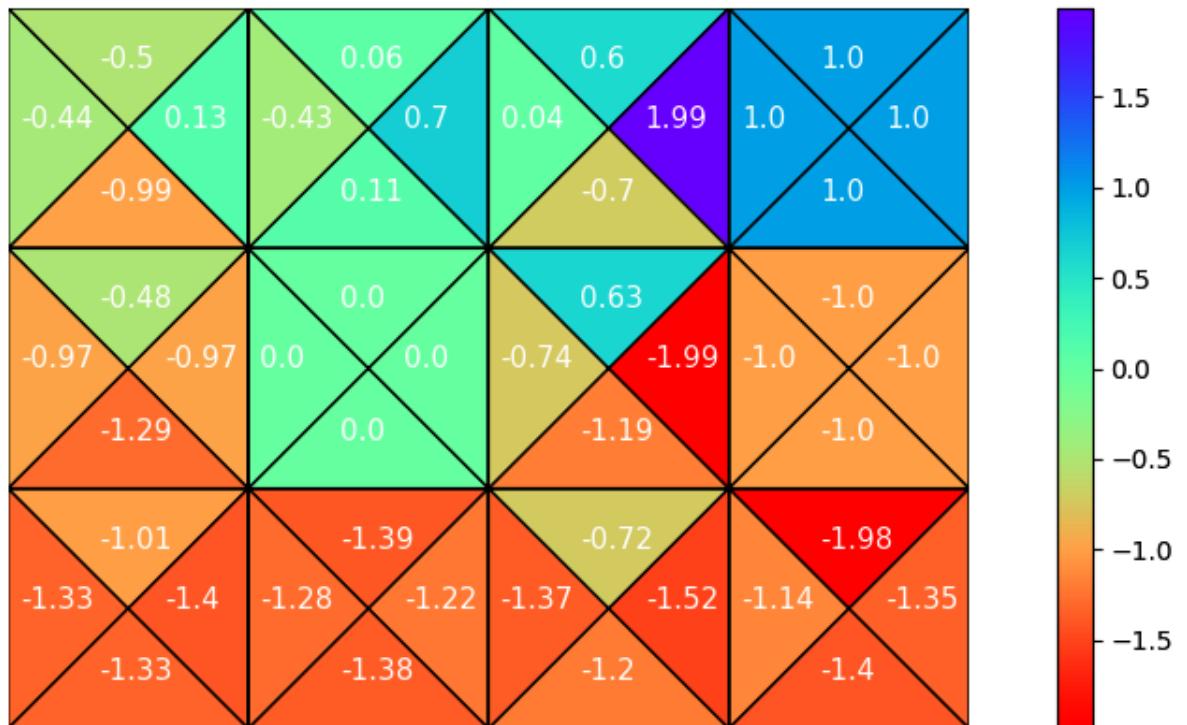
```
[1. 1. 1. 1. 1. 1. 1. 3. 3. 3. 3. 3. 3. 3. 3. 1. 1. 3. 1. 3. 1. 3. 3.  
3. 1. 3. 3. 3. 3. 3. 0. 3. 0. 0. 3. 0. 0. 0. 2. 2. 0. 2. 0. 2. 0. 0.  
0. 1. 0. 0. 1. 1. 0. 1. 0. 0. 3. 3. 0. 3. 0. 3. 0. 0. 3. 0. 0. 0.  
1. 1. 1. 2. 3. 3. 3. 1. 1. 1. 0. 1. 0. 0. 0. 1. 1. 1. 0. 1. 0. 0. 0.  
1. 0. 0. 0. 0. 0. 0. 2. 2. 2. 2. 0. 0. 0. 0. 0.]
```

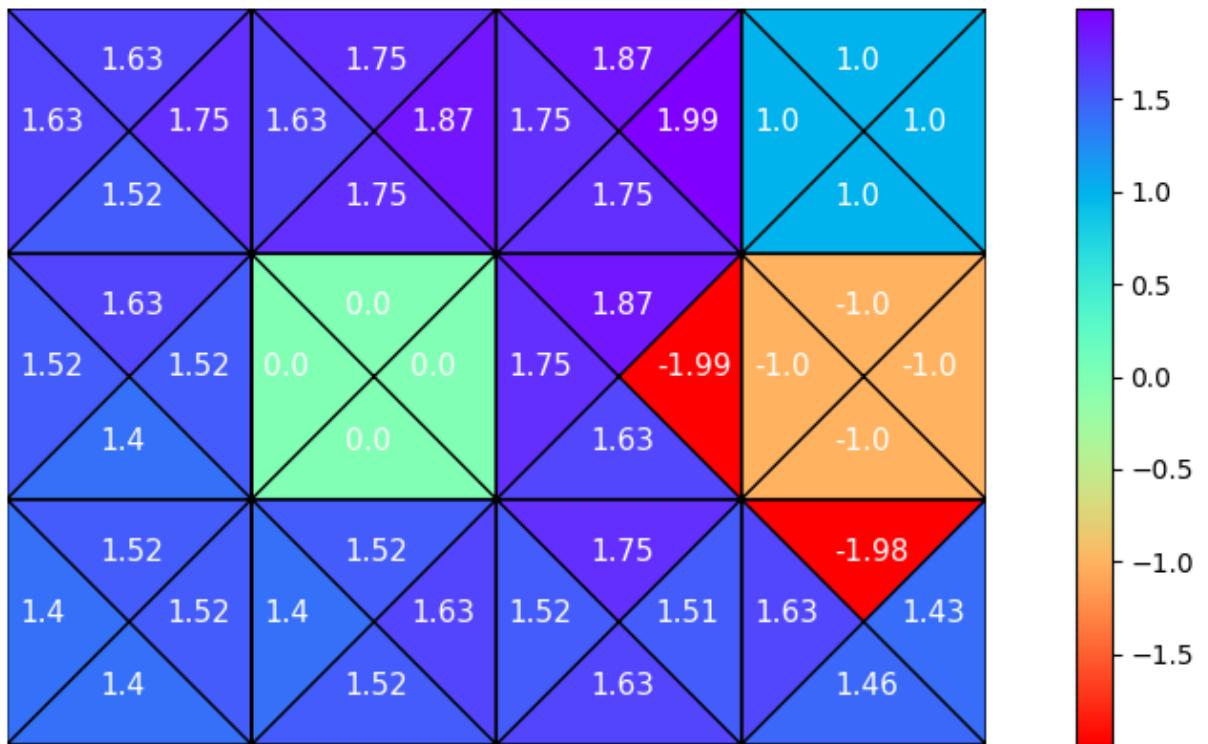
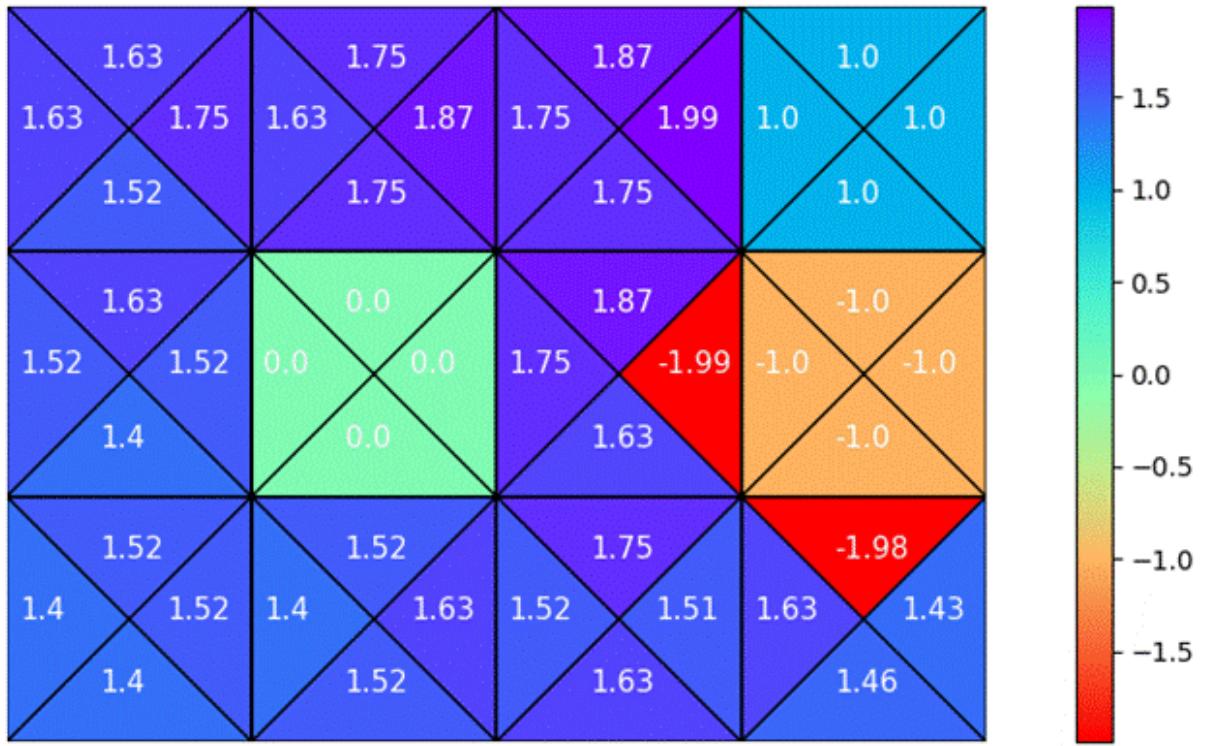


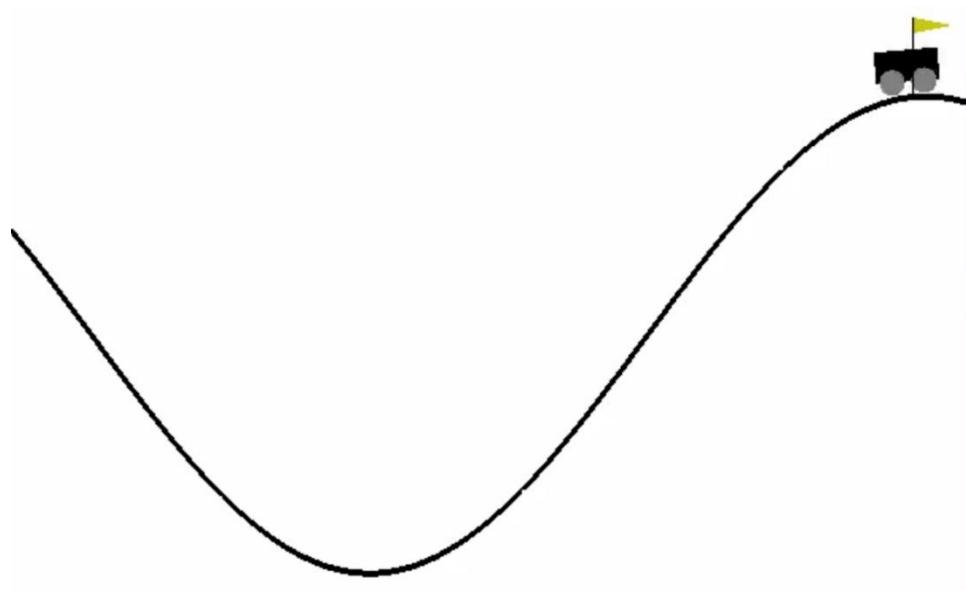




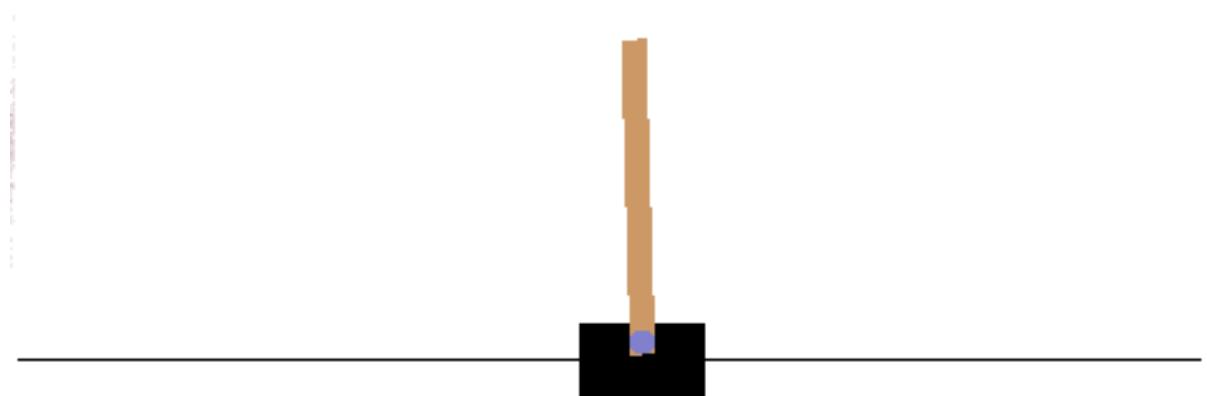




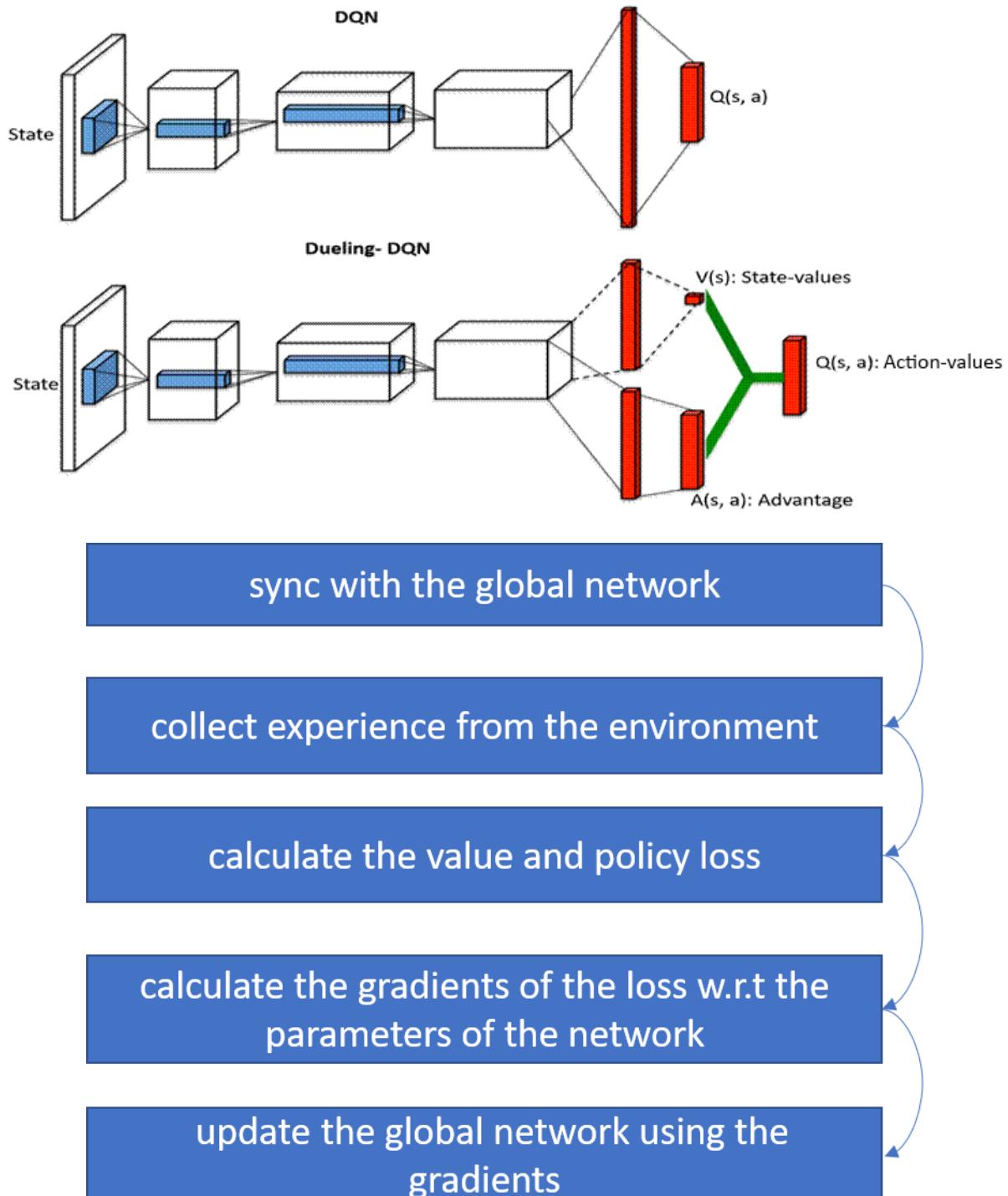




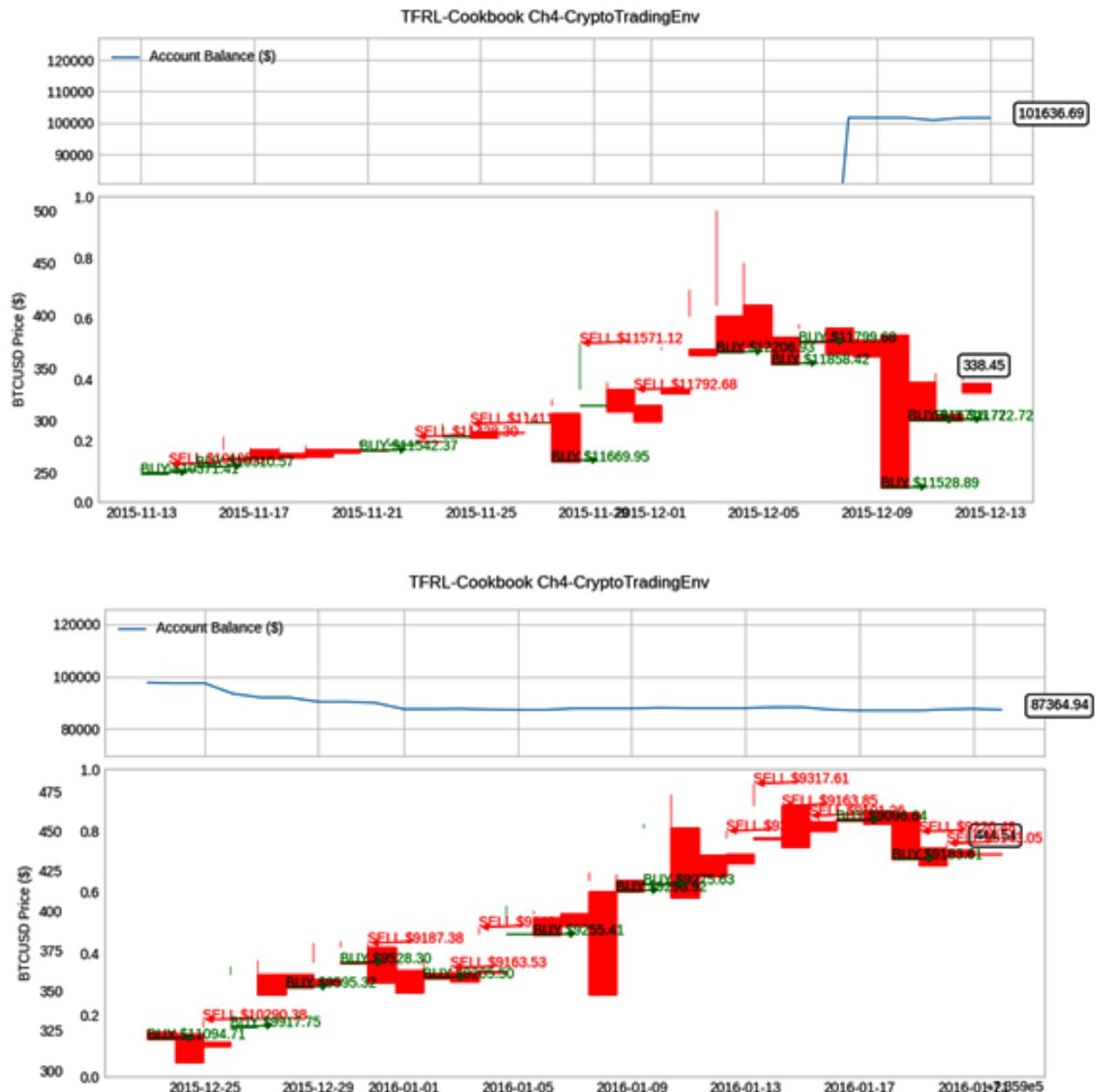
✖ - 8\_actor\_critic\_agent.py

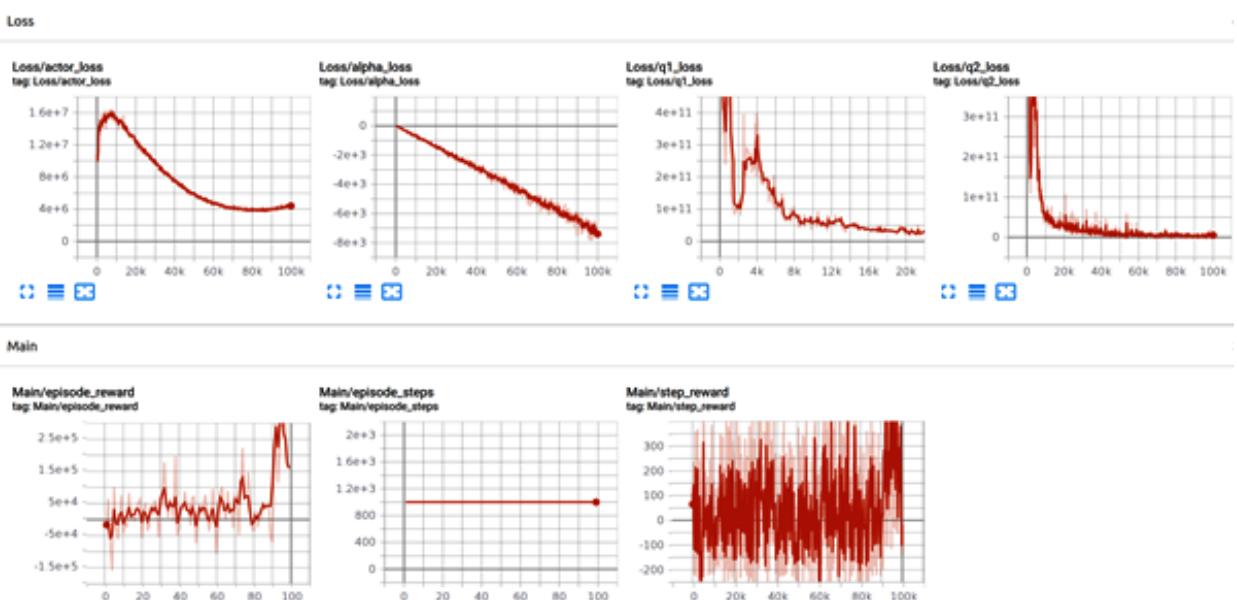
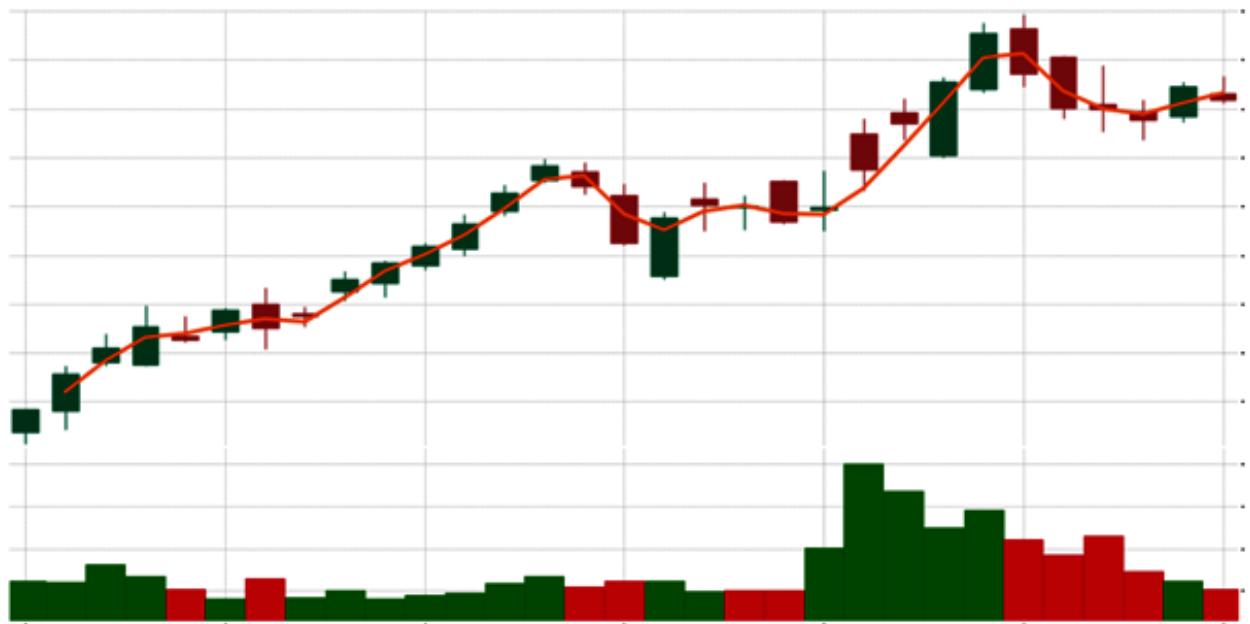


## Chapter 3: Implementing Advanced RL Algorithms

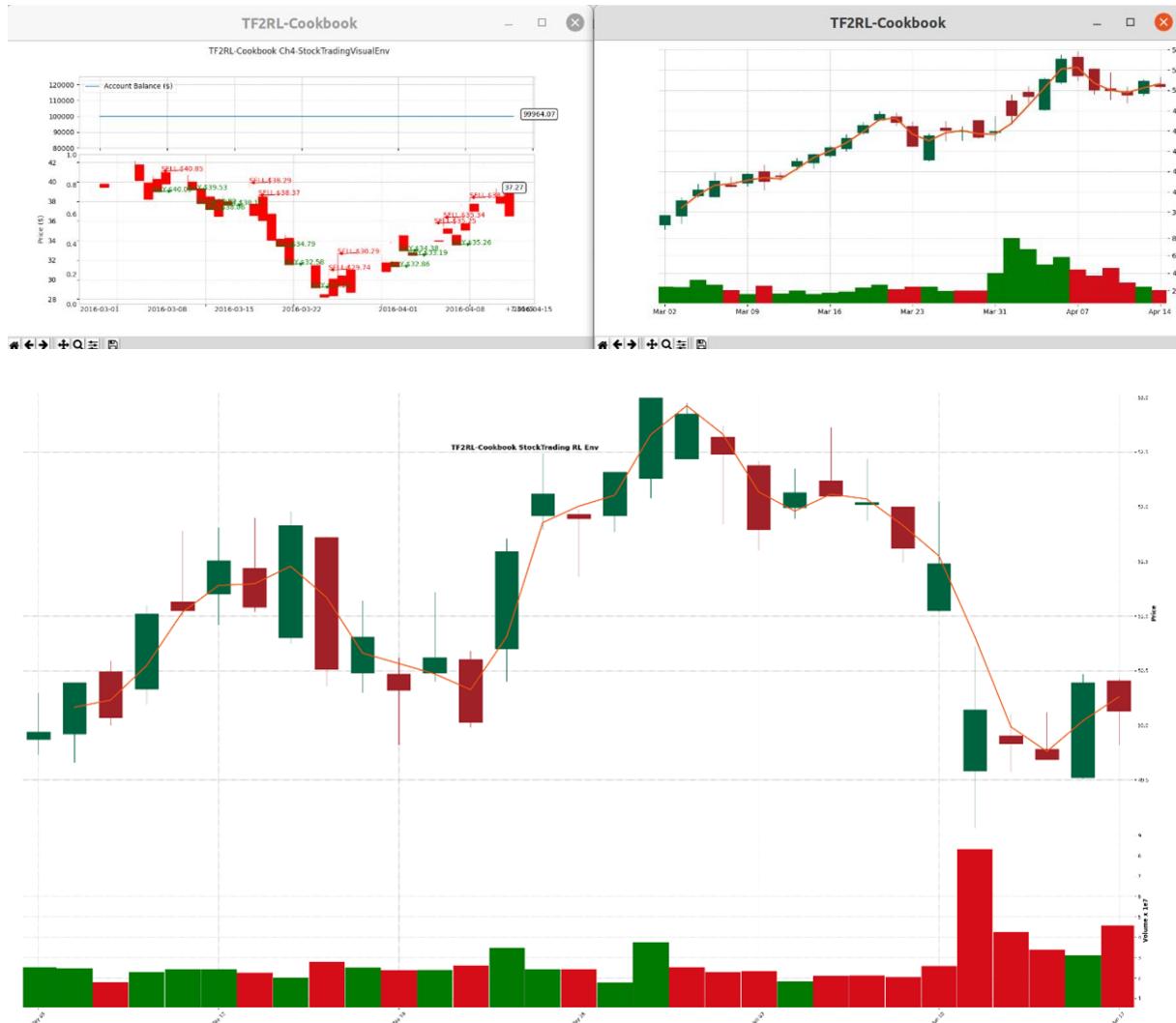


# Chapter 4: Reinforcement Learning in the Real World – Building Cryptocurrency Trading Agents





# Chapter 5: Reinforcement Learning in the Real World – Building Stock/Share Trading Agents



## TF2RL-Cookbook



# Chapter 6: Reinforcement Learning in the Real World – Building Intelligent Agents to Complete Your To-Dos

Click on the link "portitor".	Click on the link "at".	Click on the link "at".	Click on the link "rhoncus".	Click on the link "erat".	Click on the link "libero."..
Ac congue magna <a href="#">dictumst</a> . Ullamcorper feugiat lorem <a href="#">imperdiet</a> . Sed cum <a href="#">in portitor mattis</a> maecenas et gravida maecenas aliquam massa <a href="#">risus</a> .	<b>Commodo</b> vitae massa amet maecenas varius. Fermentum <a href="#">at</a> turpis laoreet. <a href="#">Nisi</a> bibendum quisque turpis amet tellus <a href="#">donec</a> ornare elit mauris.	Pelleentesque. Eget. <a href="#">Tristique</a> , <a href="#">Vestibulum</a> felis <a href="#">velit</a> . Commodo egestas tellus. Sit quis ultrices sit <a href="#">semenctus</a> sclerisque <a href="#">at</a> morbi mauris lectus vitae.	Arcti pulvinar massa, <a href="#">rhoncus</a> vulputate tristique vestibulum. Consectetur. Imperdiet bibendum sagittis adipiscing <a href="#">in</a> praesent. Neque. Diam <a href="#">Incididunt</a> amet. Etiam urna.	Elementum euismod sed sociis <a href="#">vitae</a> euismod interdum. Arcu. Leo, <a href="#">tincidunt</a> erat consequat enim dictum vestibulum, facilisis tempus. Et rhoncus, <a href="#">massa</a> .	Est <a href="#">id</a> arcu ullamcorper lacus, risus lectus laoreet pellentesque tortor <a href="#">orci</a> . Quam vel. Ac tortor <a href="#">dictum</a> . Egestas ac. Metus <a href="#">libero</a> .
Select GDKkQ and click Submit.	Select Vdpn2dP and click Submit.	Select b2D and click Submit.	Select yKwBox and click Submit.	Select L0 and click Submit.	Select i2bF and click Submit.
<input type="radio"/> USA <input type="radio"/> GDKkQ <input type="button" value="Submit"/>	<input type="radio"/> 91YPF <input type="radio"/> 2i <input type="radio"/> Vdpn2dP <input type="radio"/> d7Qi <input type="radio"/> OX <input type="button" value="Submit"/>	<input type="radio"/> 8F <input type="radio"/> YPK&gX <input type="radio"/> oN4Z <input type="radio"/> nIC <input type="radio"/> b2O <input type="radio"/> 56a <input type="button" value="Submit"/>	<input type="radio"/> yKwBox <input type="radio"/> EClyf <input type="button" value="Submit"/>	<input type="radio"/> 6j <input type="radio"/> ZIU <input type="radio"/> 7gF <input type="radio"/> 6H6 <input type="radio"/> L0 <input type="radio"/> 2QMPAG <input type="button" value="Submit"/>	<input type="radio"/> REX <input type="radio"/> Vctt <input type="radio"/> i2bF <input type="radio"/> cLCzAK <input type="radio"/> FI <input type="radio"/> pSNr <input type="button" value="Submit"/>

**Click Button Task**

Last reward: **-1.00**

Last 10 average: **-1.00**

Time left: **3 / 10sec**

Episodes done: **85**

Click on the "Okay" button.

viverra nam sociis  
sit nulla nunc:

placerat arcu egestas:

Click on the "okay" button.	Click on the "Ok" button.	Click on the "no" button.	Click on the "no" button.	Click on the "Ok" button.	Click on the "Ok" button.	Click on the "submit" button.	Click on the "previous" button.	Click on the "Next" button.	Click on the "cancel" button.
boni laevi, nictibus <a href="#">okay</a> <a href="#">okay</a>	cum quis dicitur facilius proin aliquam <a href="#">Ok</a>	proin purus datus facilius ac: massa <a href="#">no</a> <a href="#">ok</a>	etiam enim ipsum <a href="#">Okay</a> <a href="#">okay</a>	Ok commodo ullamcorper turpis <a href="#">next</a> <a href="#">submit</a>	submit <a href="#">no</a> <a href="#">okay</a>	Nemurum egit at turpis vel laorem real amet bibendum <a href="#">yes</a> <a href="#">cancel</a>	perferendis scilicetque egit tristique sagittis vestibulum <a href="#">previous</a>	Next <a href="#">Next</a>	submit sed nunc sociis vite congue autem <a href="#">Submit</a> <a href="#">cancel</a>

Click on the "cancel" button.

Last reward: **-1.00**

Last 10 average: **-0.27**

Time left: **10 / 10sec**

Episodes done: **5**

Click on the "Previous" button.

submit

in semper gravida:

Previous

fames eget quis:

no

Last reward: **0.84**

Last 10 average: **0.22**

Time left: **9 / 10sec**

Episodes done: **3**

START

Last reward: **0.82**

Last 10 average: **0.05**

Time left: -

Episodes done: **7**

Enter the <b>username</b> "nathalie" and the <b>password</b> "17jP" into the text fields and press login.	Enter the <b>username</b> "dannie" and the <b>password</b> "8F" into the text fields and press login.	Enter the <b>username</b> "deneen" and the <b>password</b> "yKw80" into the text fields and press login.	Enter the <b>username</b> "macie" and the <b>password</b> "z72vd" into the text fields and press login.	Enter the <b>username</b> "ignacio" and the <b>password</b> "6" into the text fields and press login.	Enter the <b>username</b> "truman" and the <b>password</b> "RE" into the text fields and press login.
Username <input type="text"/>	Username <input type="text"/>	Username <input type="text"/>	Username <input type="text"/>	Username <input type="text"/>	Username <input type="text"/>
Password <input type="password"/>	Password <input type="password"/>	Password <input type="password"/>	Password <input type="password"/>	Password <input type="password"/>	Password <input type="password"/>
Login	Login	Login	Login	Login	Login

Enter the **username** "nathalie" and the **password** "6928q" into the text fields and press login.

Username

nathalie

Password

Login

Last reward: **-1.00**

Last 10 average: **-1.00**

Time left: **5 / 10sec**

Episodes done: **3**

Enter the **username** "annis" and the **password** "pC1" into the text fields and press login.

**Username**

ann

## Password

•••

Login

Last reward: -1.00

Last 10 average: -1.00

Time left: 4 / 10sec

Episodes done: 5

Enter the **username** "olin" and the **password** "Ky" into the text fields and press login.

Last reward: -1.00

Last 10 average: **-1.00**

Time left: 6 / 10sec

**Username**

olin

### **Password**

•

Login

Last reward: **1.00**

Last 10 average: -1.00

Time left: 6 / 10sec

Book the shortest one-way flight  
from: Telluride, CO to: WAS on

Book the shortest one-way flight  
from: GPT to: BIL on 10/03/2016

Book the cheapest one-way flight  
from: LCH to: GGG on

Book the shortest one-way flight from Venetie, AK to Twin Falls,

Book the **cheapest** one-way flight  
from: West Yellowstone, MT to:

From:	To:
Departure Date:	
<input type="button" value="Search"/>	

Book the shortest one-way flight  
from: Telluride, CO to: WAS on  
12/13/2016.

**Book Your One-Way Flight**

From:
To:

**Departure Date**

**Search**

Book the shortest one-way flight  
from: GPT to: BIL on 10/03/2016

---

**Book Your One-Way Flight**

From:

To:

**Departure Date**

**Search**

Book the cheapest one-way flight  
from: LCH to: GGG on  
12/18/2016.

Book Your One-Way Flight

From:

To:

Departure Date

Book the shortest one-way flight from: **Venetie, AK** to: **Twin Falls, ID** on **10/30/2016**

**Book Your One-Way Flight**

**From:**

**To:**

**Departure Date**

**Search**

From:	To:
Departure Date	
<input type="button" value="Search"/>	

Book the shortest one-way flight from: ABL to: Carlsbad, NM on 11/26/2016.

**Book Your One-Way Flight**

Ambler, AK (ABL)

NM

Alamogordo, NM (ALM)  
Albuquerque, NM (ABQ)  
Carlsbad, NM (CNM)

Last reward: -1.00  
Last 10 average: -1.00  
Time left: 19 / 30sec  
Episodes done: 1

Book the shortest one-way flight from: MSL to: AGN on 11/08/2016.

**Book Your One-Way Flight**

December 2016

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

12/16/2016

Search

Last reward: -1.00  
Last 10 average: -1.00  
Time left: 19 / 30sec  
Episodes done: 2

Book the shortest one-way flight from: Prudhoe Bay/Deadhorse, AK to: San Angelo, TX on 12/15/2016.

Depart: 2:28 PM  
Thu Dec 15 2016  
Adak Island, AK (ADK)

Arrives: 9:36 AM  
Fri Dec 16 2016  
Abilene, TX (ABI)

Duration: 19h 8m

**Book flight for \$453**

Last reward: -1.00  
Last 10 average: -1.00  
Time left: 12 / 30sec  
Episodes done: 4

Find the email by <b>Audrey</b> and click the star icon to mark it as important.	Find the email by <b>Coletta</b> and click the star icon to mark it as important.	Find the email by <b>Danice</b> and click the star icon to mark it as important.	Find the email by <b>Gerta</b> and click the star icon to mark it as important.	Find the email by <b>Goldina</b> and click the star icon to mark it as important.	Find the email by <b>Alysia</b> and click the star icon to mark it as important.	Find the email by <b>Francis</b> and click the star icon to mark it as important.
In id.  Cora to me  Lacus. At sit. Voluptat tellus. Maecenas commodo, purus pellentesque tellus dui leo pulvinar varius.  Reply Forward	Nulla.  Evy to me  Tortor. Placerat. Egestas adipiscing. Euismod pretium nulla pulvinar ac, vulputate.  Reply Forward	Aenean vitae.  Bettine to me  Commodo est, aliquet id. Porta. Sagittis sed semper. Viverra mattis.  Reply Forward	Aenean.  Gerta to me  Vulputate blandit quam. Congue. Vestibulum.  Reply Forward	Et elementum.  Delores to me  Et gravida maecenas aliquam massa risus viverra gravida. Volutpat arcu. Amet sit. Et.  Reply Forward	Ornare erat.  Yvette to me  Mauris. Lorem aliquet nisi, nisl. Turpis dui leo id.  Reply Forward	Mollis.  Elvira to me  Vitae blandit voluptat. Commodo. Enim, quis id aliquam. Mauris.  Reply Forward

Find the email by **Arlina** and click the star icon to mark it as important.

Primary	Search
<b>Robbie</b> Quis varius. Ac. Est neque, ..	Reply Forward
<b>Arlina</b> Nib integer. Sem in eleifend..	Reply Forward
<b>Hephzibah</b> Quis pulvinar. Arcu tincidunt ..	Reply Forward

Find the email by **Kit** and click the star icon to mark it as important.

Consequat vel.	Star
Kit to me Vulputate suspendisse. Sagittis tempor. Sed mi, sapien. Nulla nullam faucibus.	Reply Forward

Last reward: **-1.00**

Last 10 average: **-1.00**

Time left: **30 / 30sec**

Episodes done: **1**

Find the email by **Audrey** and click the star icon to mark it as important.

In id.	Star
Cora to me  Lacus. At sit. Voluptat tellus. Maecenas commodo, purus pellentesque tellus duis leo pulvinar varius.	Reply Forward

Last reward: **-**

Last 10 average: **-**

Time left: **21 / 30sec**

Episodes done: **0**

Last reward: **0.88**

Last 10 average: **-0.30**

Time left: **26 / 30sec**

Episodes done: **5**

For the user **@nec**, click on the "Share via DM" button.

Christa @et - 11h ago Orci, ultrices consectetur.	Reply Forward
Branch @nec - 9h ago Massa, eget id egestas.	Reply Forward
Salaidh @tempus - 11h ago Aliquam tempor, quam. Et	Reply Forward

For the user **@eget**, click on the "Retweet" button.

Nielsen @molestie - 1h ago Libero urna, sem et cras.	Reply Forward
Hanson @sed - 17h ago Tincidunt a.	Reply Forward
Campos @bludit - 5h ago Euismod mauris ornare	Reply Forward

For the user **@lectus**, click on the "Retweet" button.

Acosta @dolores - 8h ago Gravida enim nibh.	Reply Forward
Bond @chas - 2h ago Diam eget et.	Reply Forward
Loria @ac - 4h ago Vehicula pulvinar. Mi.	Reply Forward

For the user **@volutpat**, click on the "Like" button.

Antoinette @thaddeus - 1h ago Arcu. Diam integer pellentesque.	Reply Forward
Bertie @fusce - 15h ago Sit vulputate cras aliquam.	Reply Forward
Nathalie @renda - 5h ago Turpis pellentesque id. Enim.	Reply Forward

For the user **@kasie**, click on the "Reply" button.

Lyons @vel - 6h ago Fringilla consectetur tortor.	Reply Forward
Moody @lacus - 9h ago Cursus velit.	Reply Forward
Dinnie @kasie - 3h ago Ut gravida volutpat.	Reply Forward

For the user **@integer**, click on the "Share via DM" button.

Sib @briana - 9h ago Integer semper aliquam nibh. Odio.	Reply Forward
Rush @integer - 5h ago Ut diam arcu nulla.	Reply Forward
Cherie @ashlea - 14h ago Rhoncus. Vel tempor.	Reply Forward

For the user **@karrie**, click on the "Embed Tweet" button.

Evaleen @karrie - 8h ago Nec, proin. Mi et.	Reply Forward
Vere @cierra - 17h ago Ipsum at vel egestas in.	Reply Forward

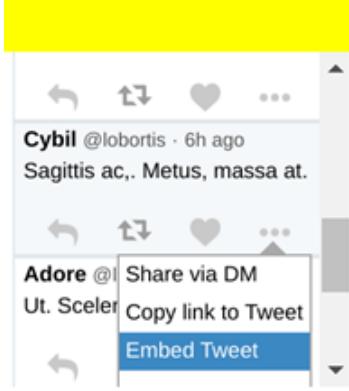
Last reward: **-1.00**

Last 10 average: **-1.00**

Time left: **11 / 15sec**

Episodes done: **1**

For the user @lobortis, click on the "Mute" button.



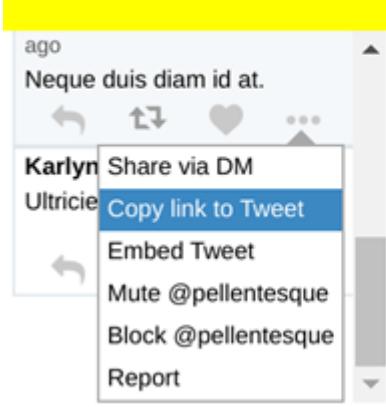
Last reward: **-1.00**

Last 10 average: **-1.00**

Time left: **7 / 15sec**

Episodes done: **4**

For the user @pellentesque, click on the "Copy link to Tweet" button.



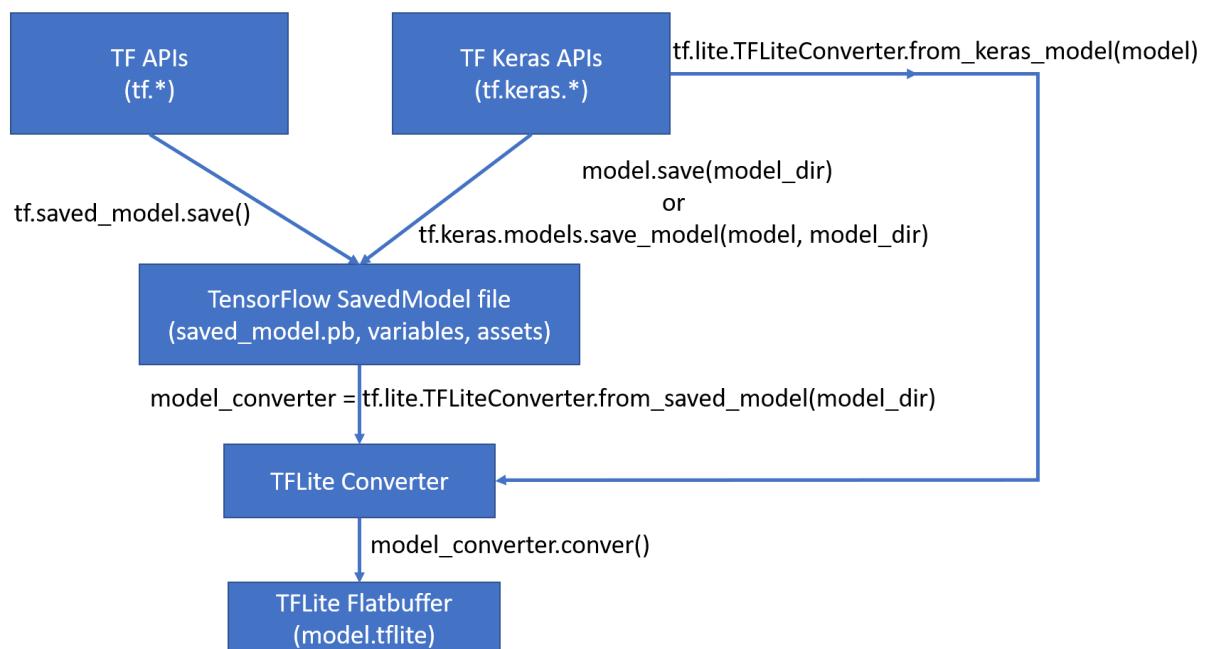
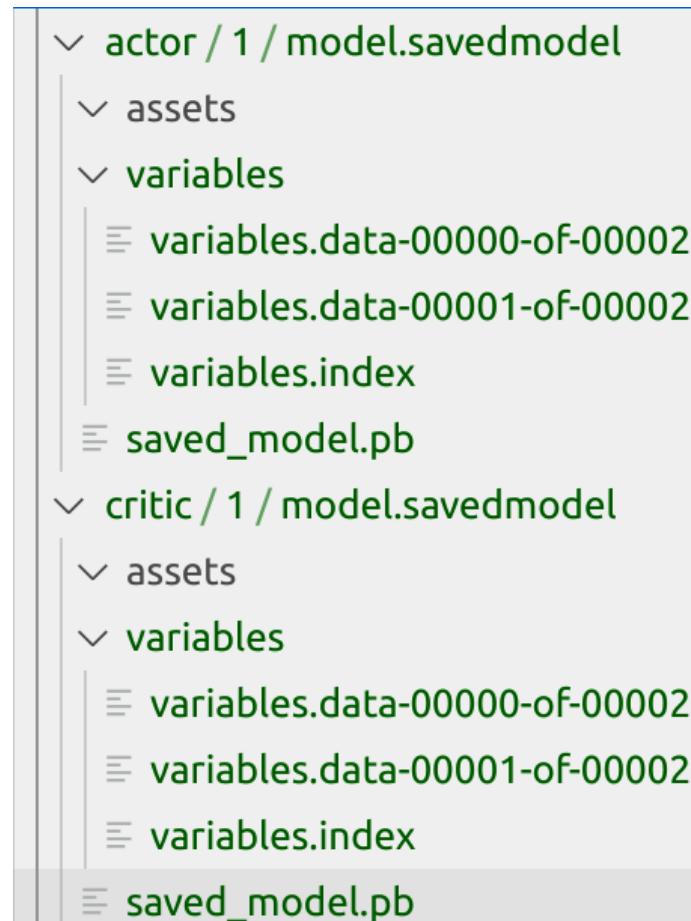
Last reward: **-1.00**

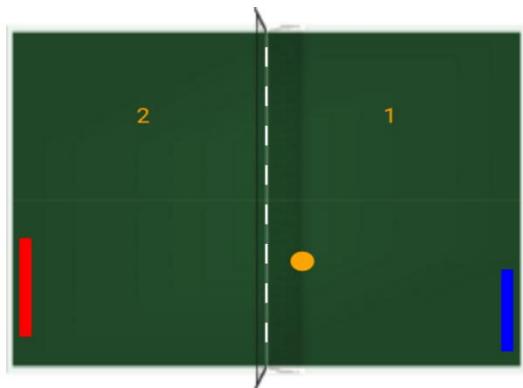
Last 10 average: **-1.00**

Time left: **4 / 15sec**

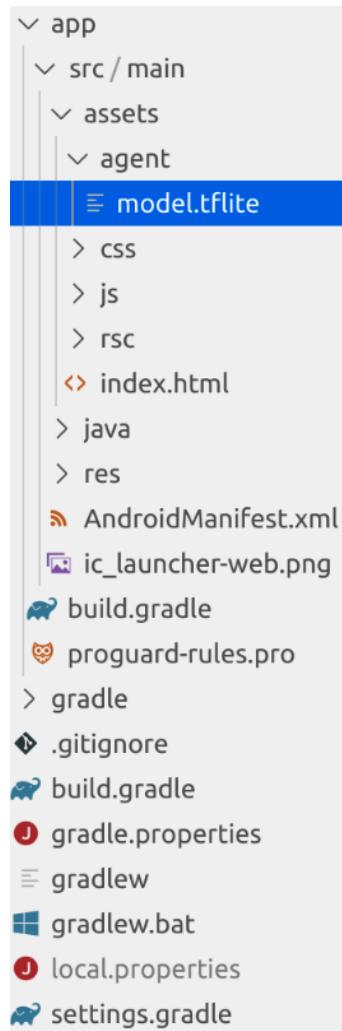
Episodes done: **6**

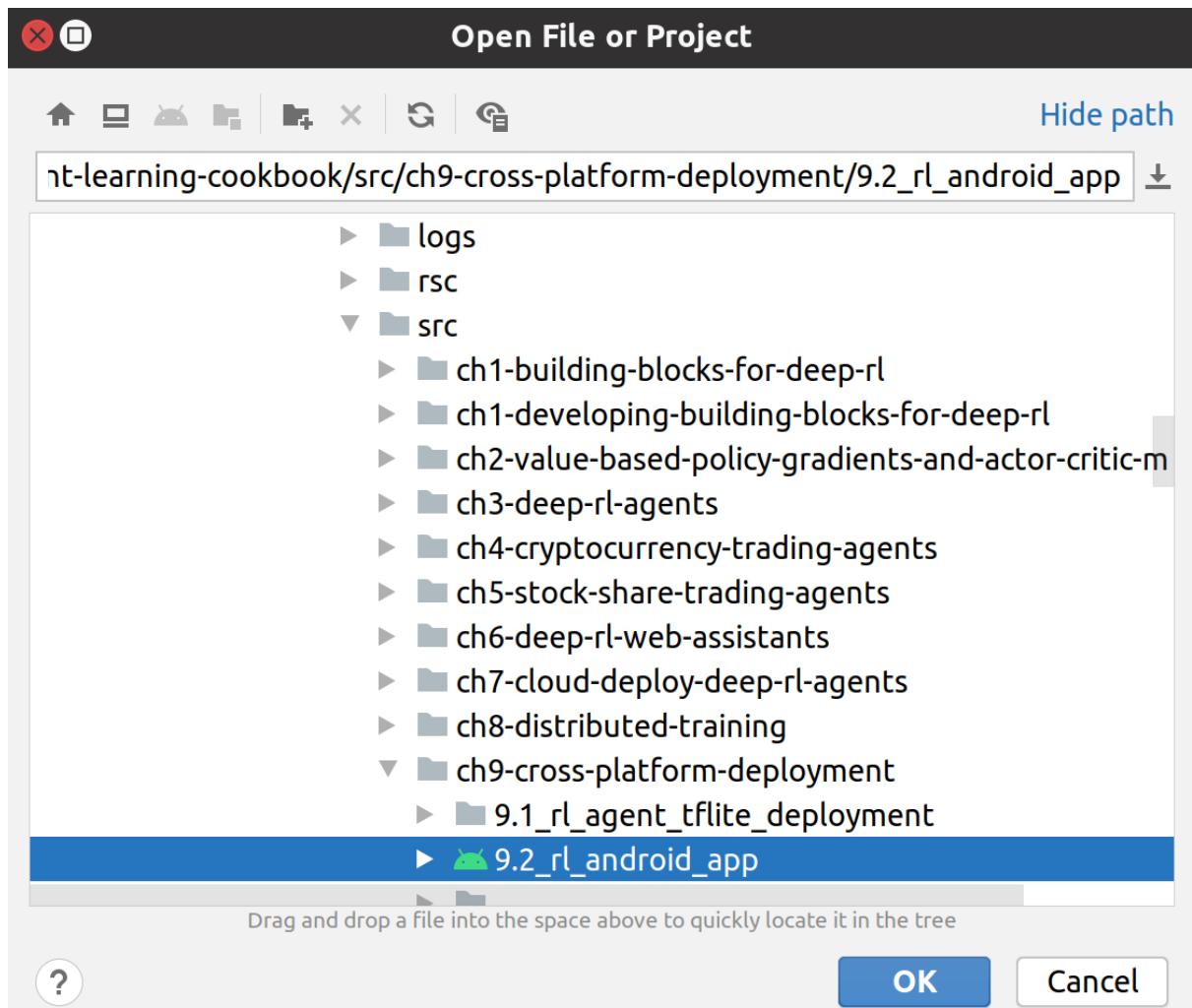
## Chapter 9: Deploying Deep RL Agents on Multiple Platforms





- > .gradle
- > .idea
- > app
- > gradle
- ❖ .gitignore
- 🐘 build.gradle
- ❶ gradle.properties
- ≡ gradlew
- WINDOWS gradlew.bat
- ❶ local.properties
- 🐘 settings.gradle





9.2\_rl\_android\_app – build.gradle (:app)

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

app Pixel XL API 30 Git: Ok, apply suggestion! Open (Ctrl+Alt+Shift+S) Hide notification

Project 9.2\_rl\_android\_app .gradle .idea app build src build.gradle proguard-rules.pro gradle .gitignore build.gradle gradle.properties gradlew gradlew.bat local.properties settings.gradle External Libraries

Properties local.properties build.gradle (app)

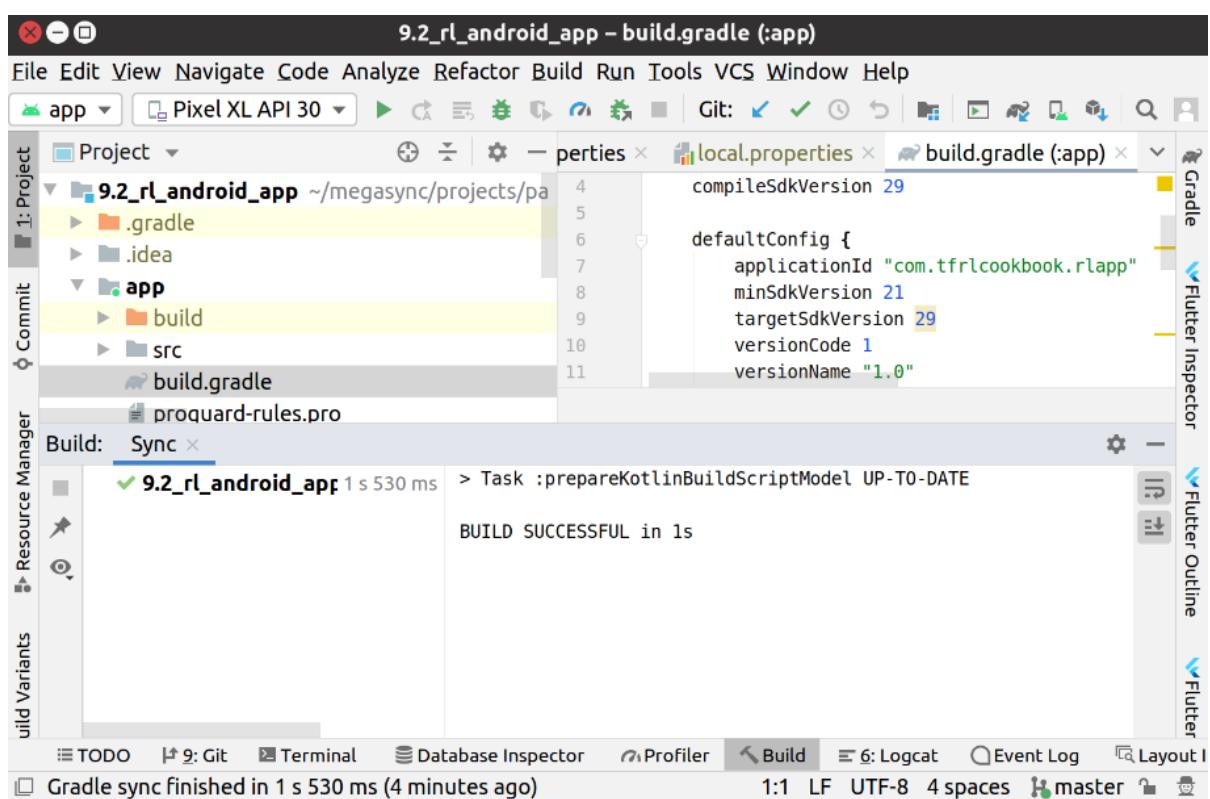
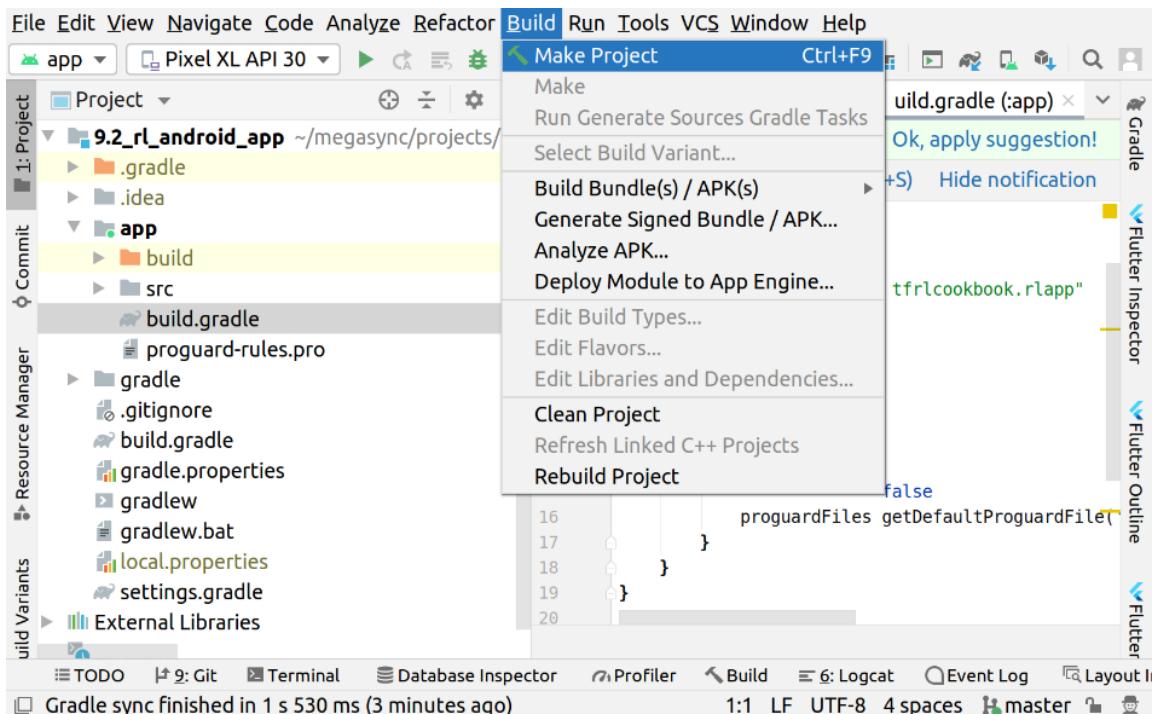
```
4 compileSdkVersion 29
5
6 defaultConfig {
7     applicationId "com.tfrlcookbook.rlapp"
8     minSdkVersion 21
9     targetSdkVersion 29
10    versionCode 1
11    versionName "1.0"
12 }
13 buildTypes {
14     release {
15         minifyEnabled false
16         proguardFiles getDefaultProguardFile('proguard-android.txt'), 'proguard-rules.pro'
17     }
18 }
19 }
20 }
```

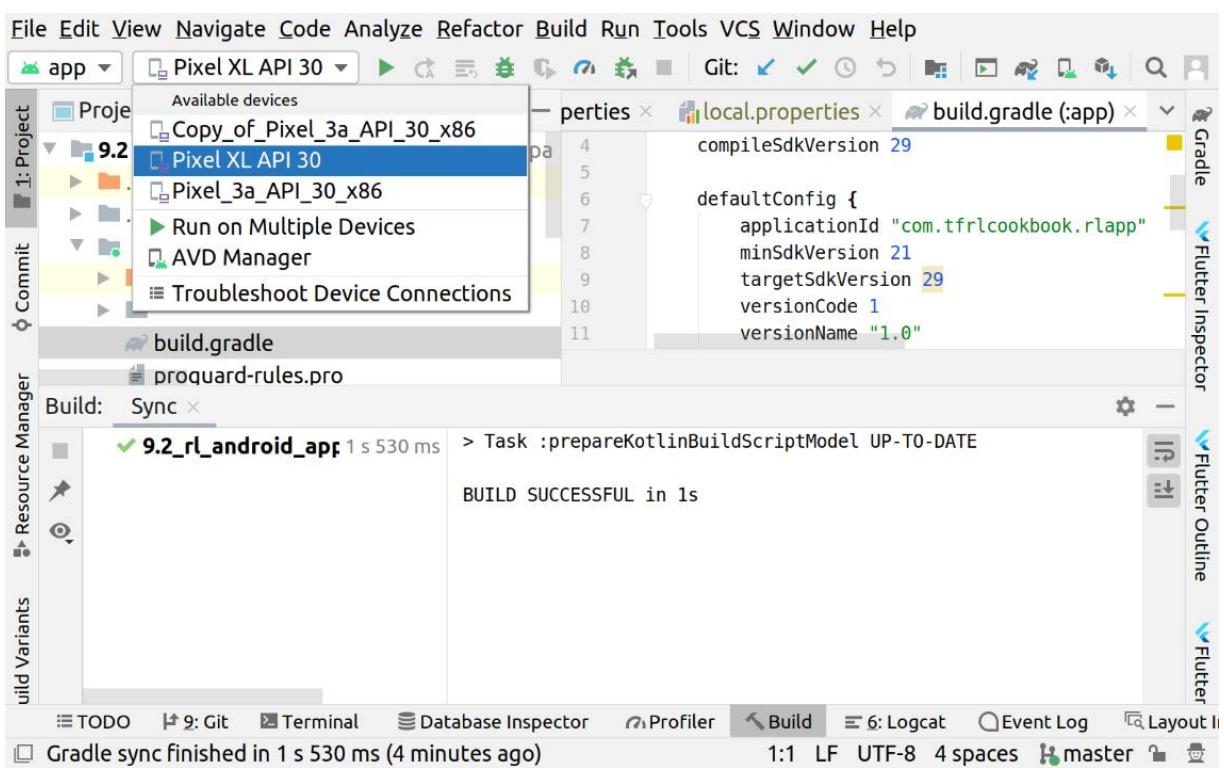
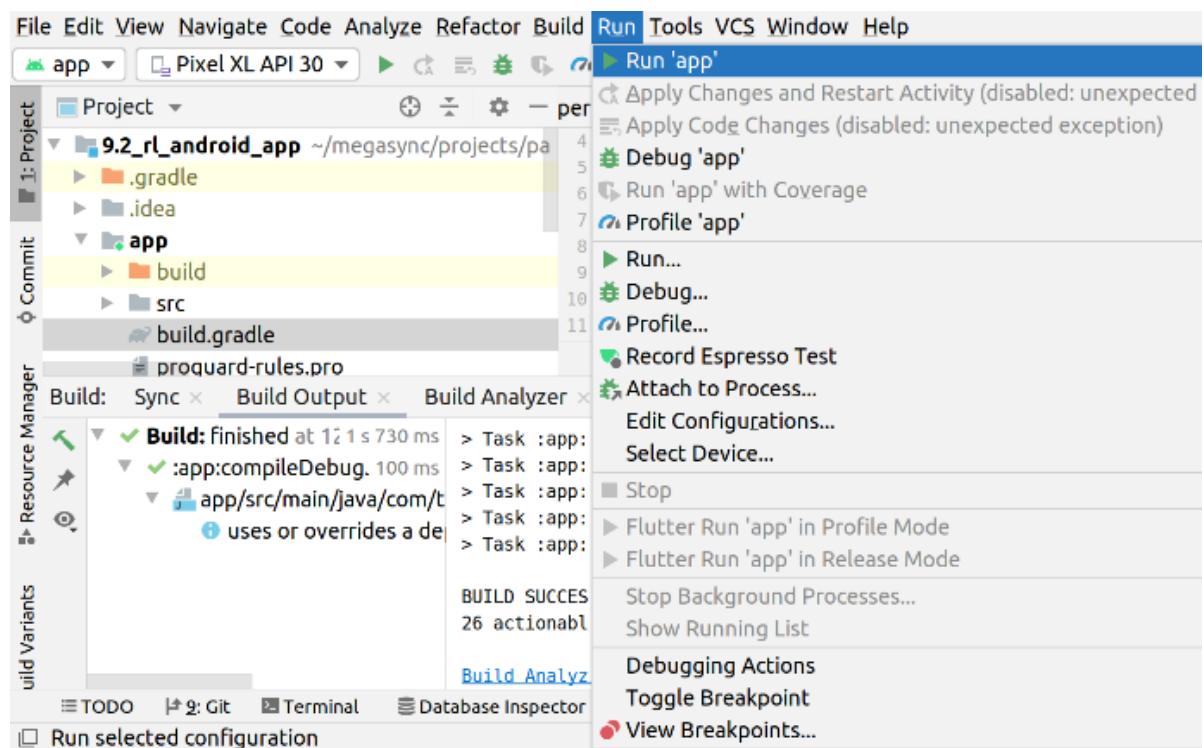
Gradle Flutter Inspector Flutter Outline Flutter

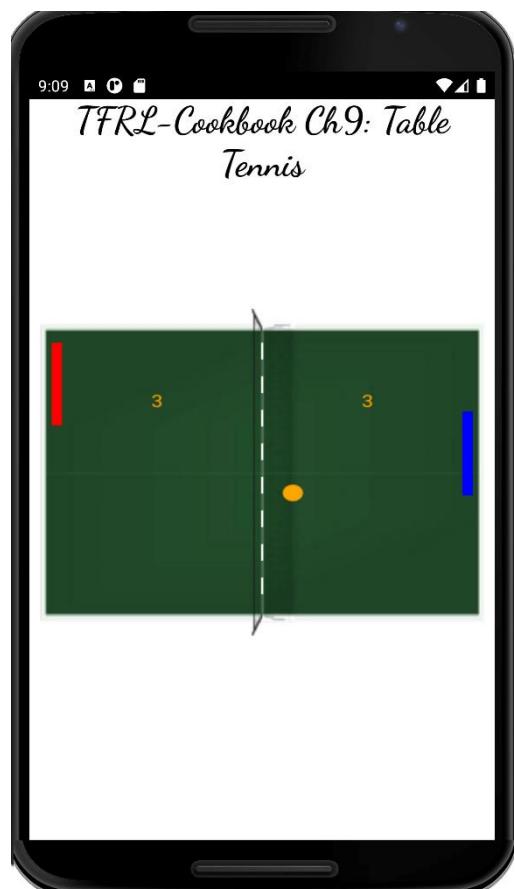
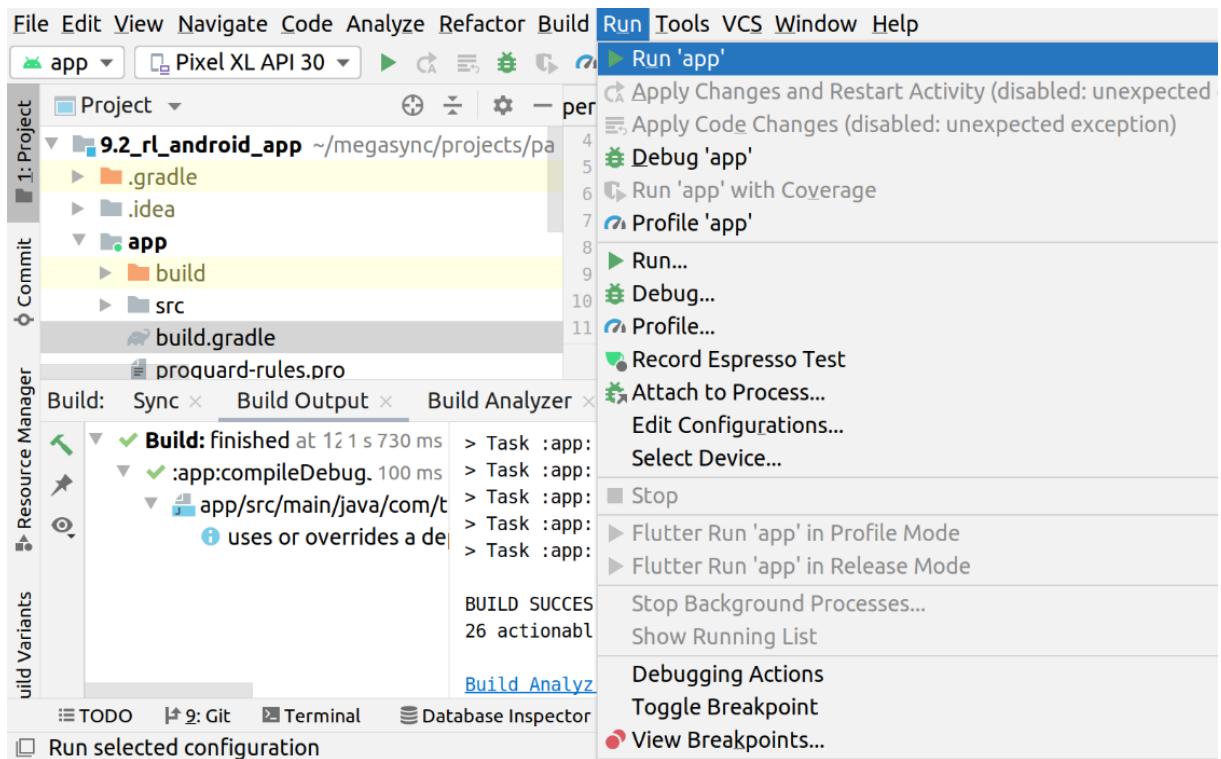
TODO 9: Git Terminal Database Inspector Profiler Build 6: Logcat Event Log Layout 1:1 LF UTF-8 4 spaces master

Gradle sync finished in 1 s 530 ms (2 minutes ago)

The screenshot shows the Android Studio interface with the title "9.2\_rl\_android\_app – build.gradle (:app)". The left sidebar shows the project structure with the "app" module selected. The main editor shows the build.gradle file content. The file defines a compileSdkVersion of 29, a defaultConfig block with an applicationId of "com.tfrlcookbook.rlapp", a buildTypes block with a release configuration (minifyEnabled false), and a proguard-rules.pro file reference. The bottom status bar indicates "Gradle sync finished in 1 s 530 ms (2 minutes ago)".







```
    < trained_models
        < DDPG_MiniWoBSocialMediaMuteUserVisualEnv-v0
            < actor / 1
                ≡ model.h5
            < critic / 1
                ≡ model.h5

    < DDPG_MiniWoBSocialMediaMuteUserVisualEnv-v0
        < actor / 1 / model.tfjs
            ≡ group1-shard1of1.bin
            {} model.json
        < critic / 1 / model.tfjs
            ≡ group1-shard1of1.bin
            {} model.json

    < trained_models
        > dqn-cartpole
        < PPO-MiniWoBSocialMediaMuteUserVisualEnv-v0
            < actor / 1 / model.savedmodel
                > assets
                > variables
                ≡ saved_model.pb
            > critic
```

```
trained_models / PPO_procgen:procgen-ninja-v0
  actor / 1
    model.savedmodel
      assets
      variables
        variables.data-00000-of-00001
        variables.index
        saved_model.pb
    model.tfjs
      group1-shard1of1.bin
      model.json
      model.h5
      model.onnx
      model.tflite
  critic / 1
    > model.savedmodel
    > model.tfjs
    model.h5
    model.onnx
    model.tflite
```

