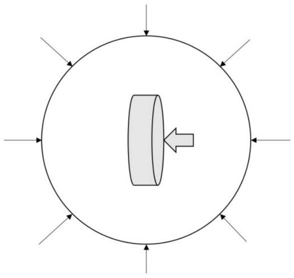
Reinforced Learning AI:

Tsetlin, Krinsky, Krylov, LRI

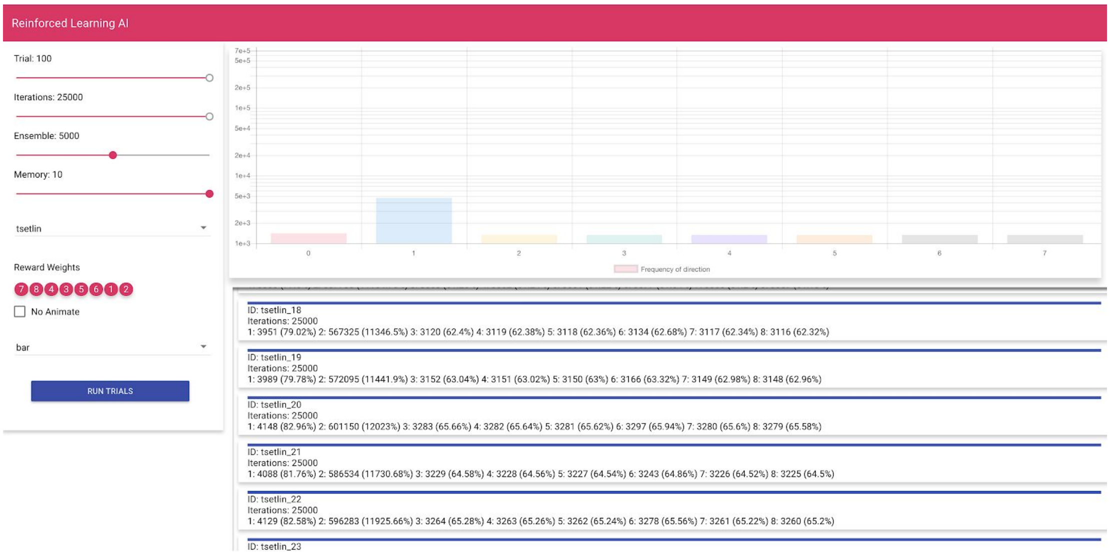
For this project we were expected to use the lessons from COMP4106 to design and implement a AI that would appropriately point a satellite dish to receive maximum signal:



During this process we were intended to implement Tsetlin, Krinsky, Krylov, and the LRI learning automata in the given production system. Additionally we would eventually compare performance against one another to answer the following:

- Learn the best direction for the disk using the Tsetlin, Krinsky, Krylov and LRI schemes.
- In each case, use a suitable value for the "memory" and learning parameter. In each case, plot the ensemble average of the received signal strength for an ensemble of 100 experiments.
- Explain the way you chose the parameters for each scheme.
- Rank the schemes in terms of their speed/accuracy

My Implementation was as follows: LINK



Reinforced Learning AI

Trial: 100

Iterations: 25000

Ensemble: 5000

Memory: 10

tsetlin

Reward Weights

7 8 4 3 5 6 1 2

☐ No Animate

bar

RUN TRIALS

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ID: tsetlin_18
Iterations: 25000
1: 3951 (79.02%) 2: 567325 (11346.5%) 3: 3120 (62.4%) 4: 3119 (62.38%) 5: 3118 (62.36%) 6: 3134 (62.68%) 7: 3117 (62.34%) 8: 3116 (62.32%)

ID: tsetlin_19
Iterations: 25000
1: 3989 (79.78%) 2: 572095 (11441.9%) 3: 3152 (63.04%) 4: 3151 (63.02%) 5: 3150 (63%) 6: 3166 (63.32%) 7: 3149 (62.98%) 8: 3148 (62.96%)

ID: tsetlin_20
Iterations: 25000
1: 4148 (82.96%) 2: 601150 (12023%) 3: 3283 (65.66%) 4: 3282 (65.64%) 5: 3281 (65.62%) 6: 3297 (65.94%) 7: 3280 (65.6%) 8: 3279 (65.58%)

ID: tsetlin_21
Iterations: 25000
1: 4088 (81.76%) 2: 586534 (11730.68%) 3: 3229 (64.58%) 4: 3228 (64.56%) 5: 3227 (64.54%) 6: 3243 (64.86%) 7: 3226 (64.52%) 8: 3225 (64.5%)

ID: tsetlin_22
Iterations: 25000
1: 4129 (82.58%) 2: 596283 (11925.66%) 3: 3264 (65.28%) 4: 3263 (65.26%) 5: 3262 (65.24%) 6: 3278 (65.56%) 7: 3261 (65.22%) 8: 3260 (65.2%)

ID: tsetlin_23
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The fully configurable UI will allow you to manipulate almost all useful fields. In doing this you will notice the advantages and disadvantages of all the methods. All of the methods were able to produce respectable results but there were specific standouts in the process.

Given ample memory Tsetlin was able to find the right answer the vast majority of the time but due to chance could fall out of this ‘correct’ path, inversely with that same memory Krinsky’s method would often get stuck in a wrong path leading to less than optimal results.

Krylov on the other hand has the benefit of being able to converge to the optimal result in systems where all the probabilities of reward are above 50% where as krylov and tsetlin methods will never get there necessarily.

Finally LRI is by far the most effective at learning successful actions while not getting ‘stuck’ in bad paths. This would largely be due to the fact that unlike the others it doesnt follow a linear path but at any point could switch to a new action given a better probability.