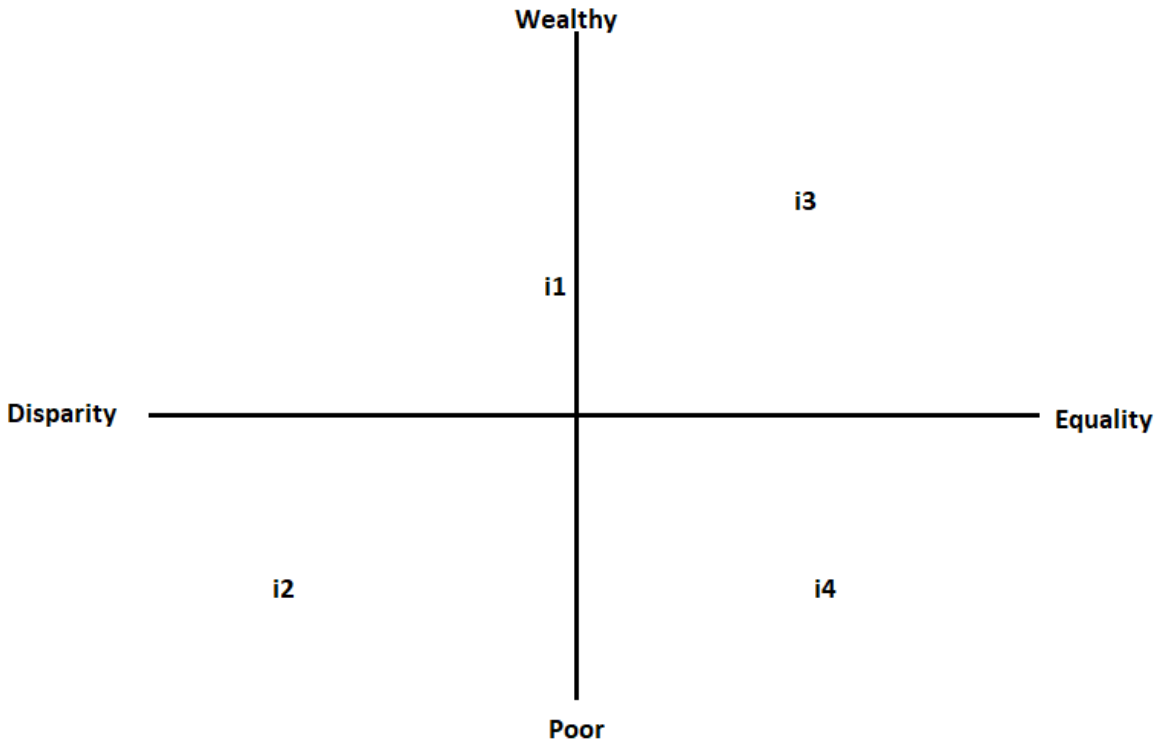
Richard White

CS5260 – AI trade agent Part 1 notes

Below describes 4 test cases generated, and discussed during the presentation, and findings/insights gained from studying them:



I1: normal mode – Initial provided/set-up

I2: brutal mode – poor country in rich world

I3: easy mode – rich Country in rich world

I4: hard mode – poor Country in poor world

These 4 use cases were chosen to provide a diversity/variance across the 4 quadrants above.

While the search uses the same underlying implementation, based on different starting conditions take very different approaches to maximize the utility function.

Case 1:

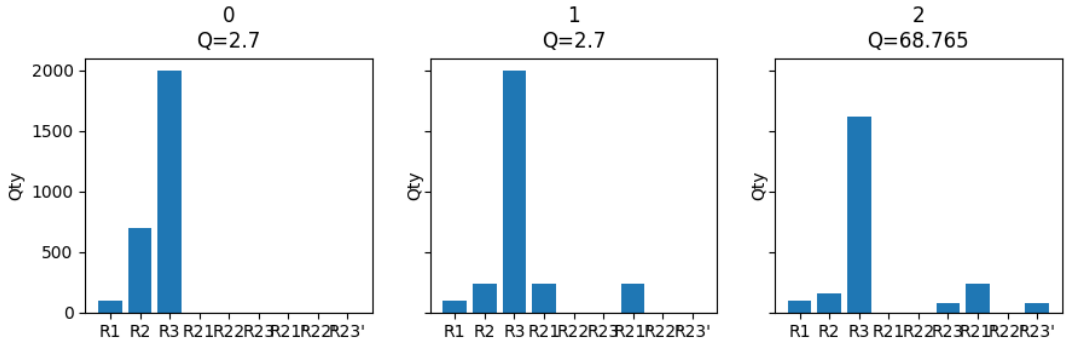
Python src\main.py –i 1 –d 2 –b 100 –t0.50 –st0.50

Depth:2

Bean width: 100

Schedule Probability/Threshold: 50%

C1:
1: Template - Alloy x 233
2: Template - Housing x 77
Schedule Probability: [1.0, 1.0, 1.0] = 1.0
id: 556

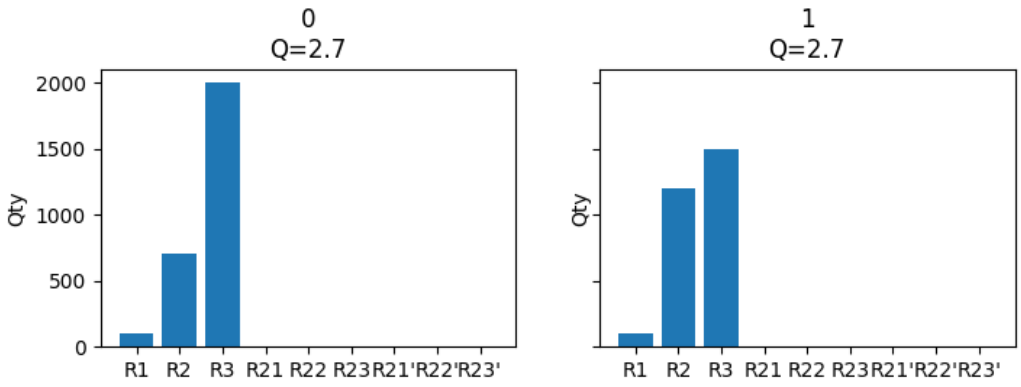


The above plot demonstrates some key aspects of the search:
The best 2 moves to make (if you have enough resources) is to craft alloys, and then build houses.

Notice that crafting alloys does not actually improve state on its own!
However it is the best first move to take to enable building houses which have a huge impact on Goal/Quality.

Figure 1

C1:
1: Transfer x C1:Atlantis (R3 x 500) to C5:Erewhon (R2 x 500)
Schedule Probability: [1.0, 0.5] = 0.5
id: 192



Alternatively, the next best move was an attempted trade with another Country, (trading metallic elements for more Timber/wood).

Note how this transform did not even increase quality.

The 3rd best option in this scenario was to simply do nothing.

This is impacted by the fact that we are limiting our trade schedule to only permit trades which are “likely”. No “likely” trades will actually increase our quality function, so those weren’t in the top set.

Case 2: “Brutal Mode”

Python src\main.py –i 2 –d 2 –b 100 –t0.50 –st0.50 : 101 states, best opt: 0

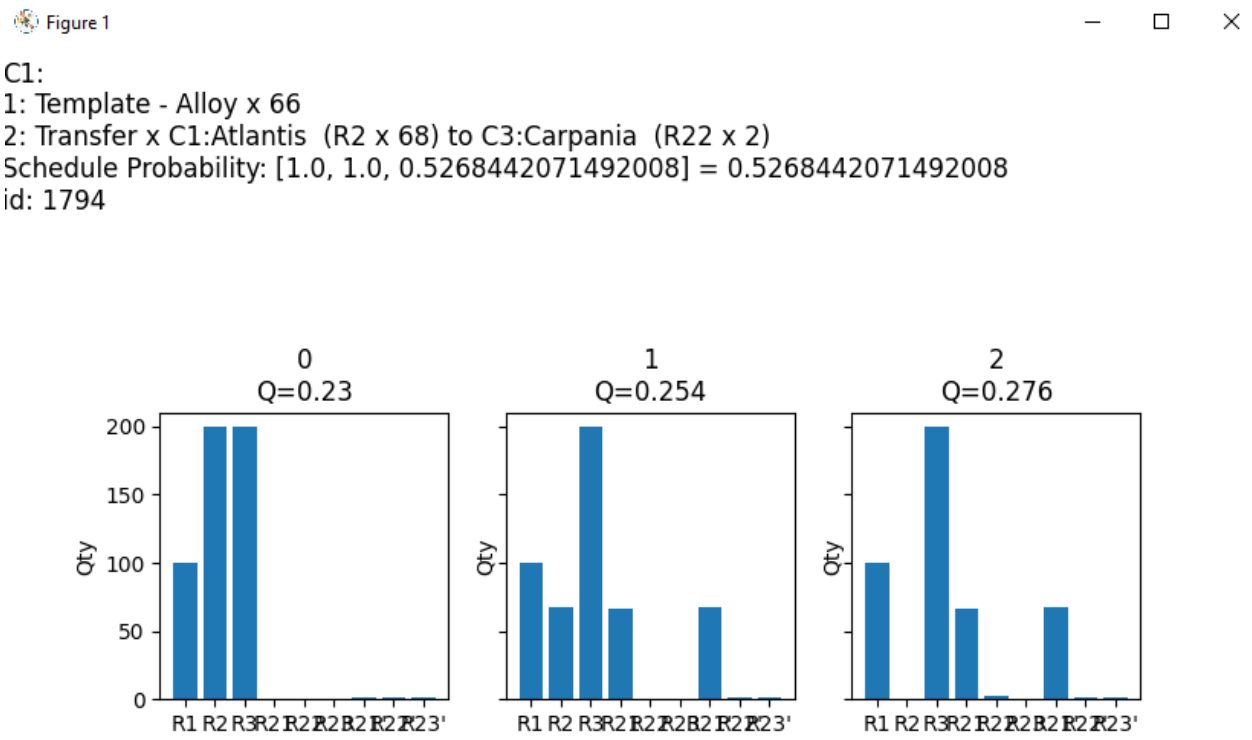
Python src\main.py –i 2 –d 2 –b 500 –t0.50 –st0.50 : best opt: 1794/2001

Depth: 2

Bean width: 500

Schedule Probability/Threshold: 50%

With a narrow Beam on Case 2, we do not get any reasonable suggestions: Our best move is to do nothing.



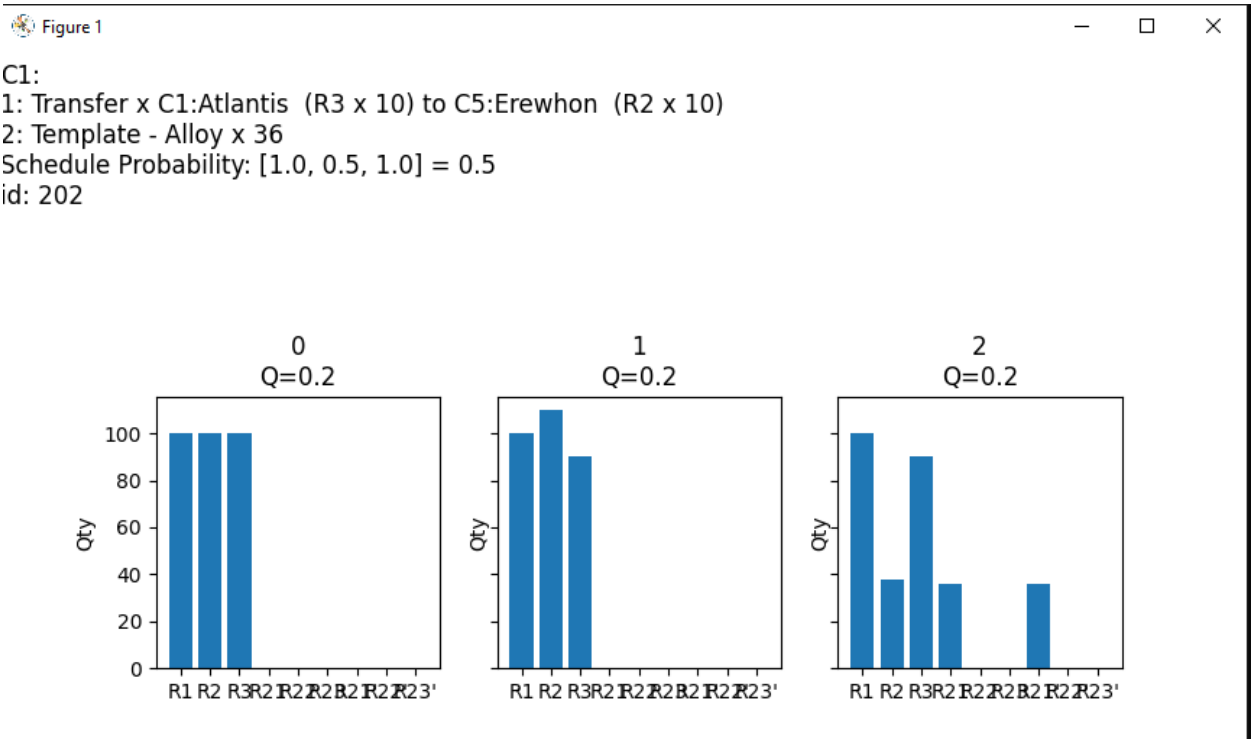
Once we increase the beam, the best solution found is to transfer alloys, and then try a trade.

Why not make houses?

Based on our s-curve goal progression, unless we had enough resources to make a significant chunk of houses (say 20%), we pursue other opportunities which may more meaningfully increase our state

CASE 3:

Python src\main.py –i 4 –d 2 –b 5000 –t0.50 –st0.50 : 20905 states, best opt: 202



Best solution was found on check 202 of 20902 total states.

The state side is smaller despite a wide/non-narrow beam width, because the trade successors are very limited.

This is due to the fact that all countries are limited on resources, therefore narrowing the generate successors and shrinking the allowable world state space.

The best option with only 2 moves, where building houses would amount to less than about 20% involves trading, even sometimes at no gain (since schedule probability prohibits unfair deals on behalf of the country.