# STRATEGY DESCRIPTIONS

|  |  |
| --- | --- |
| Random TopK | This strategy returns a random list of documents of size K. |
| Random TopK with Memory | This strategy returns a random list of documents of size K, it will remember and exclude documents that were in the list previously. |
| Like Documents with Shared Tags | The user will like documents that were returned by their rank strategy if that documents has at least one tag in common with the user. |
| Advertising Payoff | Rewards the user based on how many times documents with the same taste as them have been visited since the user’s last turn. |
| Selfish Payoff | Rewards the user based on how many documents returned by their rank strategy have tags in common with the user. Punishes the user based on how many documents returned by their rank strategy have no tags in common with the user or have already been seen. |
| Follow Similar Peers | The user will follow peers who have liked documents that were returned by the user’s rank strategy this turn, and that the user liked. |
| Publish with Threshold and Cost | If the payoff the user received this turn is above a certain threshold, then the user will publish a document and a cost will be subtracted from the user’s payoff. The published document will possess the same tags as the user who published them. |
| Viral Payoff | Rewards the user based on if documents with the same taste as them are consumed once. |

# CONSTANT DESCRIPTIONS

|  |  |
| --- | --- |
| Reward | This is the reward value a peer will receive in their payoff function |
| Punishment | This is the punishment value a peer will receive in their payoff function. |
| Turn Cost | This is the starting payoff a peer has each turn, before rewards and punishments are applied |
| Publish Threshold | This is how much payoff a peer will need to have before they consider publishing a document |
| Publish Cost | When a peer publishes a document, this cost will be subtracted from their turn-payoff |
| TopK Size | How many files can a peer consume each turn? |
| Publishing Chance | The chance that a peer will publish a document when all other criteria for publishing are met |

LAB 1 – Small Network Analysis

# Simulator

|  |  |
| --- | --- |
| Simulation Run Time | 1000 |
| Simulations Run | 100 |

# Breed Populations

|  |  |
| --- | --- |
| Initial Population Size | Population Name |
| 20 | Attack-profiles |
| 100 | Random-profiles |
| 12 | Documents |

Explained: Arbitrary assumption attackers make up around 20% of the peer network, and that the file to peer ratio is 1:10

# Breed Profiles

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Population Name | Rank Strategy | Like Strategy | Payoff Strategy | Follow Strategy | Publish Strategy | Tag Values |
| Attack-profiles | N/A | N/A | Advertising Payoff | N/A | Publish-with-Threshold-and-Cost | 1 |
| Random-profiles | Random TopK | N/A | Selfish Payoff | N/A | Publish-with-Threshold-and-Cost | 0 |
| Documents | N/A | N/A | N/A | N/A | N/A | 1 or 0 (evenly divided) |

Explained: Random profiles are chosen for their simplicity. They are simple because they do not use like or follow strategies.

# Constants

|  |  |  |
| --- | --- | --- |
| Constant Name | Attack Peers Value | Random Peers Value |
| Reward | 0.05 | 1.5 |
| Punishment | N/A | 0.5 |
| Turn Cost | -1 | 0 |
| Publish Threshold | 4 | 4 |
| Publish Cost | 4 | 4 |
| TopK Size | N/A | 5 |

Explained: The constants were chosen in hopes of keeping peers and attackers in close competition. The thresholds are fairly high relative to the rewards in order to avoid the network being flooded

# Notes

Attackers benefit from having very high publishing thresholds because of the limit of documents that consumer peers can consume each turn. This is not necessarily realistic: for one thing, they advertiser could quite probably have a heart attack and die from excitement (thus having a detrimental effect on their next turn). One way around this is to create a logarithmic scoring for advertisement success.

# Results

From This Graph we decide to stop taking data after turn 13 because the population size for attackers becomes too small.

Here we see the average “age” of the Network (number of total turns) for a user’s nth turn. Comparing this to graph one, we can draw a correlation between the slope of the Network age and the number of users who have had a turn. The more users who have had a turn, the higher the slope of the network age.

Attackers outperform users in the first 3 turns before equalizing then falling behind. What this could mean is that despite their higher average per turn score, attackers also experience a greater deviation in score. This deviation means that many attackers will obtain turn-payoffs that fall below the threshold for publishing new documents.

Another possible reason for the drop off is that as a peer’s turns increase, the network age increases logarithmically. Meaning that the greatest changes in network age occur early in the early turns of a peer. The network age is important to advertisers because it represents that more peers have had turns, and therefore have consumed more files. Naturally, advertisers will receive the highest payoffs when the network age is growing quickly between each of their turns.

Extrapolating this graph, we can predict that random-profiles will eventually have a higher gain than advertising profiles.

As predicted, attack profiles have a much higher standard deviation.

LAB 2 – Small Network Viral Analysis

# Simulator

|  |  |
| --- | --- |
| Simulation Run Time | 1000 |
| Simulations Run | 100 |

# Breed Populations

|  |  |
| --- | --- |
| Initial Population Size | Population Name |
| 20 | Attack-profiles |
| 100 | Random-profiles |
| 12 | Documents |

Explained: Arbitrary assumption attackers make up around 20% of the peer network, and that the file to peer ratio is 1:10

# Breed Profiles

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Population Name | Rank Strategy | Like Strategy | Payoff Strategy | Follow Strategy | Publish Strategy | Tag Values |
| Attack-profiles | N/A | N/A | Viral Payoff | N/A | Publish-with-Threshold-and-Cost | 1 |
| Random-profiles | Random TopK | N/A | Selfish Payoff | N/A | Publish-with-Threshold-and-Cost | 0 |
| Documents | N/A | N/A | N/A | N/A | N/A | 1 or 0 (evenly divided) |

Explained: Random profiles are chosen for their simplicity. They are simple because they do not use like or follow strategies.

# Constants

|  |  |  |
| --- | --- | --- |
| Constant Name | Attack Peers Value | Random Peers Value |
| Reward | 0.05 | 1.5 |
| Punishment | N/A | 0.5 |
| Turn Cost | -1 | 0 |
| Publish Threshold | 4 | 4 |
| Publish Cost | 4 | 4 |
| TopK Size | N/A | 5 |

Explained: The constants were chosen in hopes of keeping peers and attackers in close competition. The thresholds are fairly high relative to the rewards in order to avoid the network being flooded

# Results

The score drop off is much sharper.

Hardly any new documents were published. More interesting results may be obtained by increasing the reward for viral attackers.

LAB 3 – Small Network Viral with Increased Rewards Analysis

# Simulator

|  |  |
| --- | --- |
| Simulation Run Time | 1000 |
| Simulations Run | 100 |

# Breed Populations

|  |  |
| --- | --- |
| Initial Population Size | Population Name |
| 20 | Attack-profiles |
| 100 | Random-profiles |
| 12 | Documents |

Explained: Arbitrary assumption attackers make up around 20% of the peer network, and that the file to peer ratio is 1:10

# Breed Profiles

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Population Name | Rank Strategy | Like Strategy | Payoff Strategy | Follow Strategy | Publish Strategy | Tag Values |
| Attack-profiles | N/A | N/A | Viral Payoff | N/A | Publish-with-Threshold-and-Cost | 1 |
| Random-profiles | Random TopK | N/A | Selfish Payoff | N/A | Publish-with-Threshold-and-Cost | 0 |
| Documents | N/A | N/A | N/A | N/A | N/A | 1 or 0 (evenly divided) |

Explained: Random profiles are chosen for their simplicity. They are simple because they do not use like or follow strategies.

# Constants

|  |  |  |
| --- | --- | --- |
| Constant Name | Attack Peers Value | Random Peers Value |
| Reward | 0.5 | 1.5 |
| Punishment | N/A | 0.5 |
| Turn Cost | -1 | 0 |
| Publish Threshold | 4 | 4 |
| Publish Cost | 4 | 4 |
| TopK Size | N/A | 5 |

Explained: The constants were chosen in hopes of keeping peers and attackers in close competition. The thresholds are fairly high relative to the rewards in order to avoid the network being flooded

# Results

Although it’s difficult to see, the payoff per turn of random profiles is going down as attacking profiles drown out the network. In a normal network, peers would probably disconnect.

The slope of files published per turn is much greater for attacking profiles than random profiles, meaning that they will drown out the network. On top of that, peers will have consumed most of the files that match their tastes, so it will become increasingly unlikely for them to gain the payoff necessary to make more (this is shown in the previous turn payoff graph).

LAB 4 – Small Network Viral with Moderate Rewards Analysis

# Simulator

|  |  |
| --- | --- |
| Simulation Run Time | 1000 |
| Simulations Run | 100 |

# Breed Populations

|  |  |
| --- | --- |
| Initial Population Size | Population Name |
| 20 | Attack-profiles |
| 100 | Random-profiles |
| 12 | Documents |

Explained: Arbitrary assumption attackers make up around 20% of the peer network, and that the file to peer ratio is 1:10

# Breed Profiles

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Population Name | Rank Strategy | Like Strategy | Payoff Strategy | Follow Strategy | Publish Strategy | Tag Values |
| Attack-profiles | N/A | N/A | Viral Payoff | N/A | Publish-with-Threshold-and-Cost | 1 |
| Random-profiles | Random TopK | N/A | Selfish Payoff | N/A | Publish-with-Threshold-and-Cost | 0 |
| Documents | N/A | N/A | N/A | N/A | N/A | 1 or 0 (evenly divided) |

Explained: Random profiles are chosen for their simplicity. They are simple because they do not use like or follow strategies.

# Constants

|  |  |  |
| --- | --- | --- |
| Constant Name | Attack Peers Value | Random Peers Value |
| Reward | 0.1 | 1.5 |
| Punishment | N/A | 0.5 |
| Turn Cost | -1 | 0 |
| Publish Threshold | 4 | 4 |
| Publish Cost | 4 | 4 |
| TopK Size | N/A | 5 |

Explained: The constants were chosen in hopes of keeping peers and attackers in close competition. The thresholds are fairly high relative to the rewards in order to avoid the network being flooded

# Results

This looks almost exactly the same as the advertising peers; it required doubling the reward constant for attack peers.

Like in lab 1 with the advertising peers, the first 3 turns of attackers outperform the consumers. Through this we now know there is correlation between viral and advertising peers given the assumptions of this experiment.