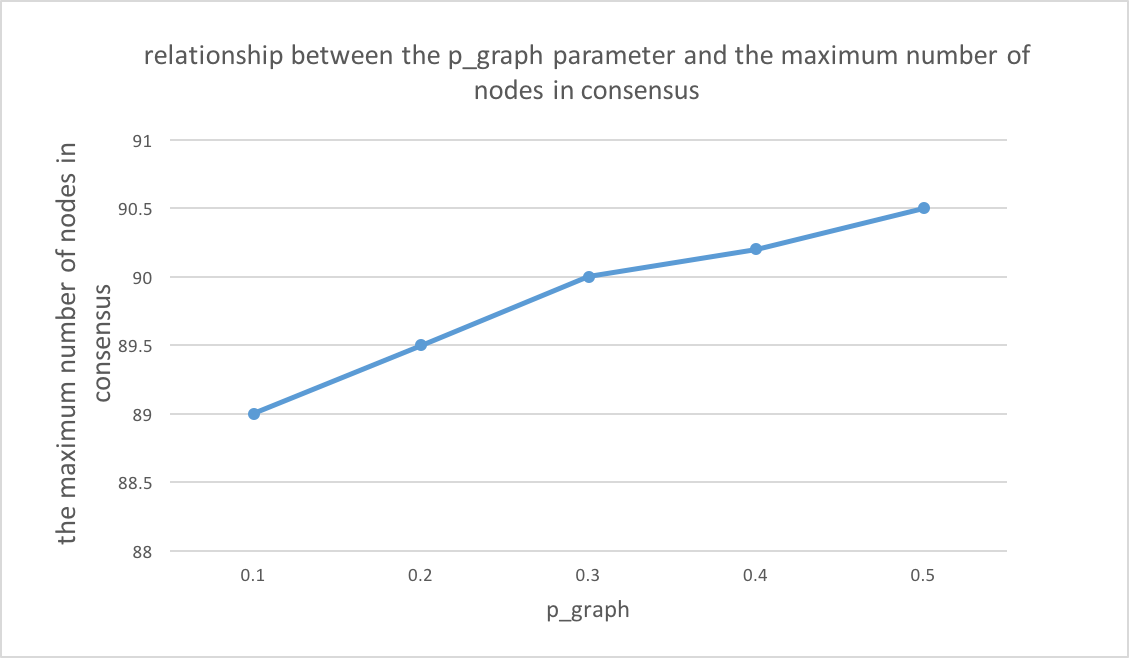
Homework 4

1. The relationship between the p\_graph parameter and the maximum number of nodes in consensus (p\_malicious = 0.1, p\_txDistribution = 0.01, numRounds = 10)

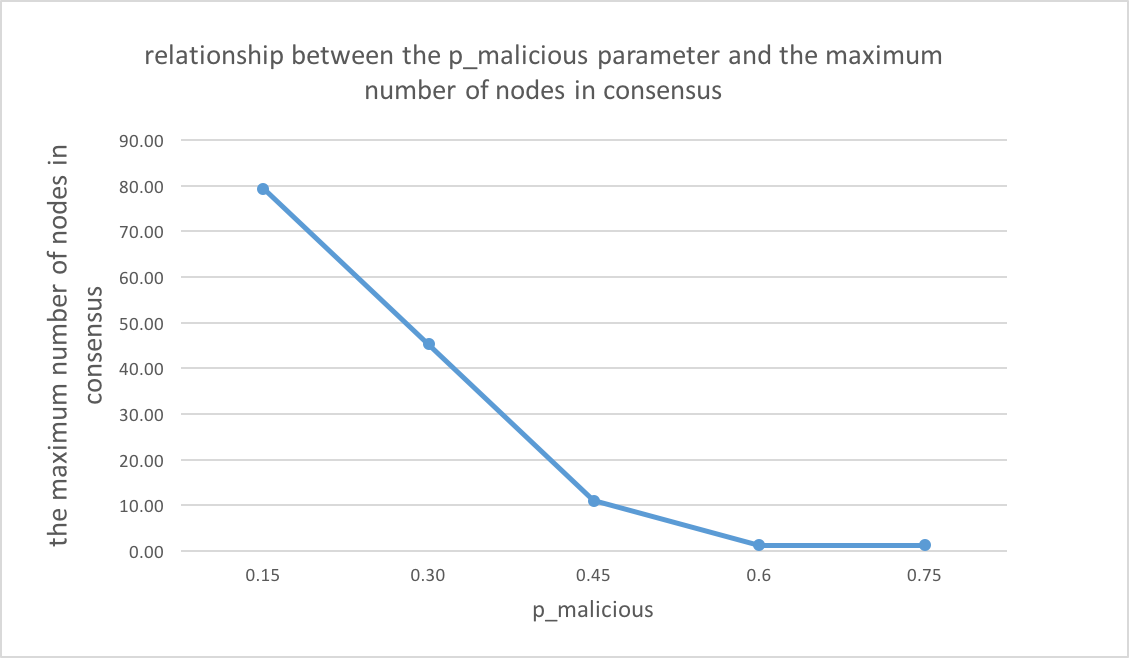
|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| p\_graph | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | average |
| **0.1** | 92 | 91 | 88 | 85 | 86 | 92 | 90 | 90 | 93 | 83 | **89** |
| **0.2** | 89 | 97 | 92 | 91 | 87 | 87 | 86 | 91 | 83 | 92 | **89.5** |
| **0.3** | 88 | 89 | 90 | 94 | 90 | 87 | 88 | 94 | 90 | 90 | **90** |
| **0.4** | 91 | 93 | 91 | 87 | 91 | 87 | 92 | 90 | 91 | 89 | **90.2** |
| **0.5** | 94 | 89 | 92 | 88 | 95 | 89 | 89 | 86 | 89 | 94 | **90.5** |



According to the above line graph, when p\_graph parameter increases, the maximum number of nodes in consensus have little change, the number remains between 89~92. The effect of p\_gragh is very unobvious, even no effect on the number of nodes in consensus.

1. The relationship between the p\_malicious parameter and the maximum number of nodes in consensus (p\_graph = 0.1, p\_txDistribution = 0.01, numRounds = 10)

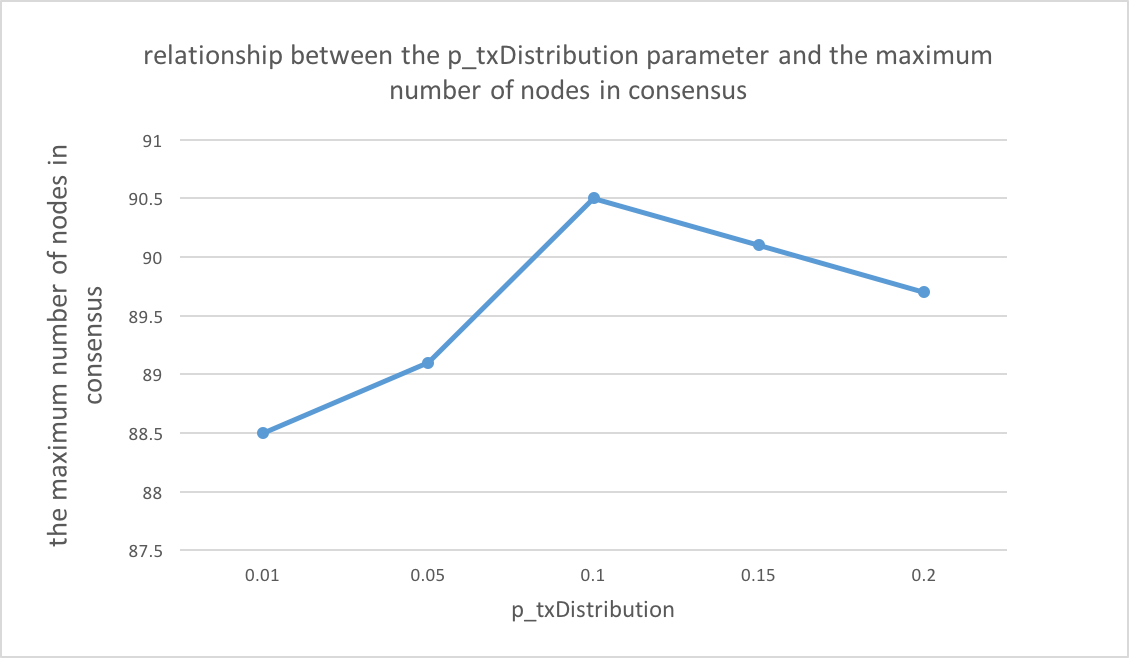
|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| p\_malicious | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | average |
| **0.15** | 86 | 85 | 85 | 94 | 84 | 81 | 74 | 71 | 52 | 81 | **79.3** |
| **0.3** | 49 | 48 | 57 | 26 | 51 | 47 | 33 | 49 | 56 | 37 | **45.3** |
| **0.45** | 21 | 6 | 7 | 22 | 6 | 22 | 2 | 8 | 6 | 10 | **11** |
| **0.6** | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | **1.2** |
| **0.75** | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **1.2** |



According to the above line graph, when p\_malicious parameter increases, the percentage of malicious nodes will increase; consequently, the maximum number of nodes in consensus will decrease. The effect is significant.

1. The relationship between the p\_txDistribution parameter and the maximum number of nodes in consensus (p\_graph = 0.1, p\_malicious = 0.1, numRounds = 10)

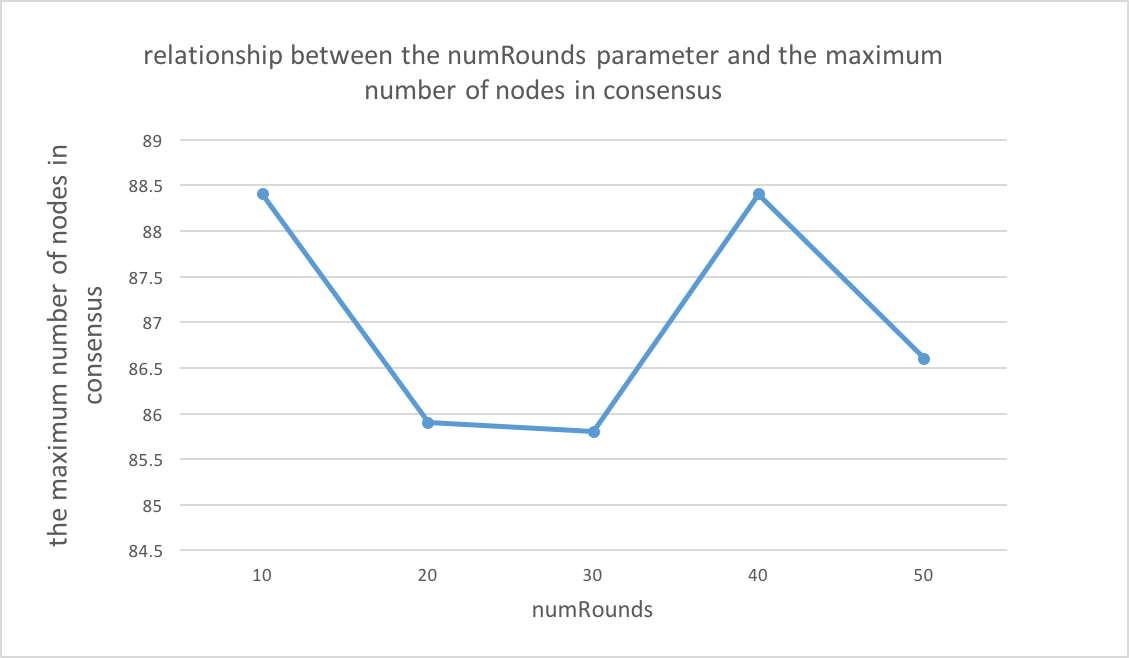
|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| p\_txDistribution | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | average |
| **0.01** | 88 | 82 | 86 | 93 | 90 | 86 | 92 | 87 | 88 | 93 | **88.5** |
| **0.05** | 86 | 95 | 83 | 84 | 91 | 86 | 93 | 92 | 91 | 90 | **89.1** |
| **0.1** | 89 | 93 | 92 | 91 | 92 | 89 | 87 | 91 | 91 | 90 | **90.5** |
| **0.15** | 88 | 95 | 95 | 89 | 87 | 89 | 92 | 89 | 89 | 88 | **90.1** |
| **0.2** | 89 | 85 | 81 | 89 | 89 | 94 | 95 | 91 | 95 | 89 | **89.7** |



According to the above line graph, p\_txDistribution parameter has no effect on the maximum number of nodes in consensus. When the parameter increase, the random selections of transactions increase. However, this change doesn’t affect on the number of nodes in consensus.

1. The relationship between the numRounds parameter and the maximum number of nodes in consensus (p\_graph = 0.1, p\_malicious = 0.1, p\_txDistribution = 0.01)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| numRounds | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | average |
| **10** | 89 | 96 | 84 | 85 | 90 | 91 | 88 | 82 | 87 | 92 | **88.4** |
| **20** | 91 | 80 | 85 | 84 | 81 | 91 | 92 | 87 | 84 | 84 | **85.9** |
| **30** | 81 | 90 | 85 | 93 | 88 | 82 | 76 | 88 | 96 | 79 | **85.8** |
| **40** | 89 | 86 | 93 | 89 | 90 | 91 | 88 | 89 | 83 | 86 | **88.4** |
| **50** | 88 | 90 | 91 | 73 | 78 | 87 | 91 | 90 | 88 | 90 | **86.6** |



According to the above line graph, numRounds parameter has no effect on the maximum number of nodes in consensus.