Evolutionary Computation

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Homework 1

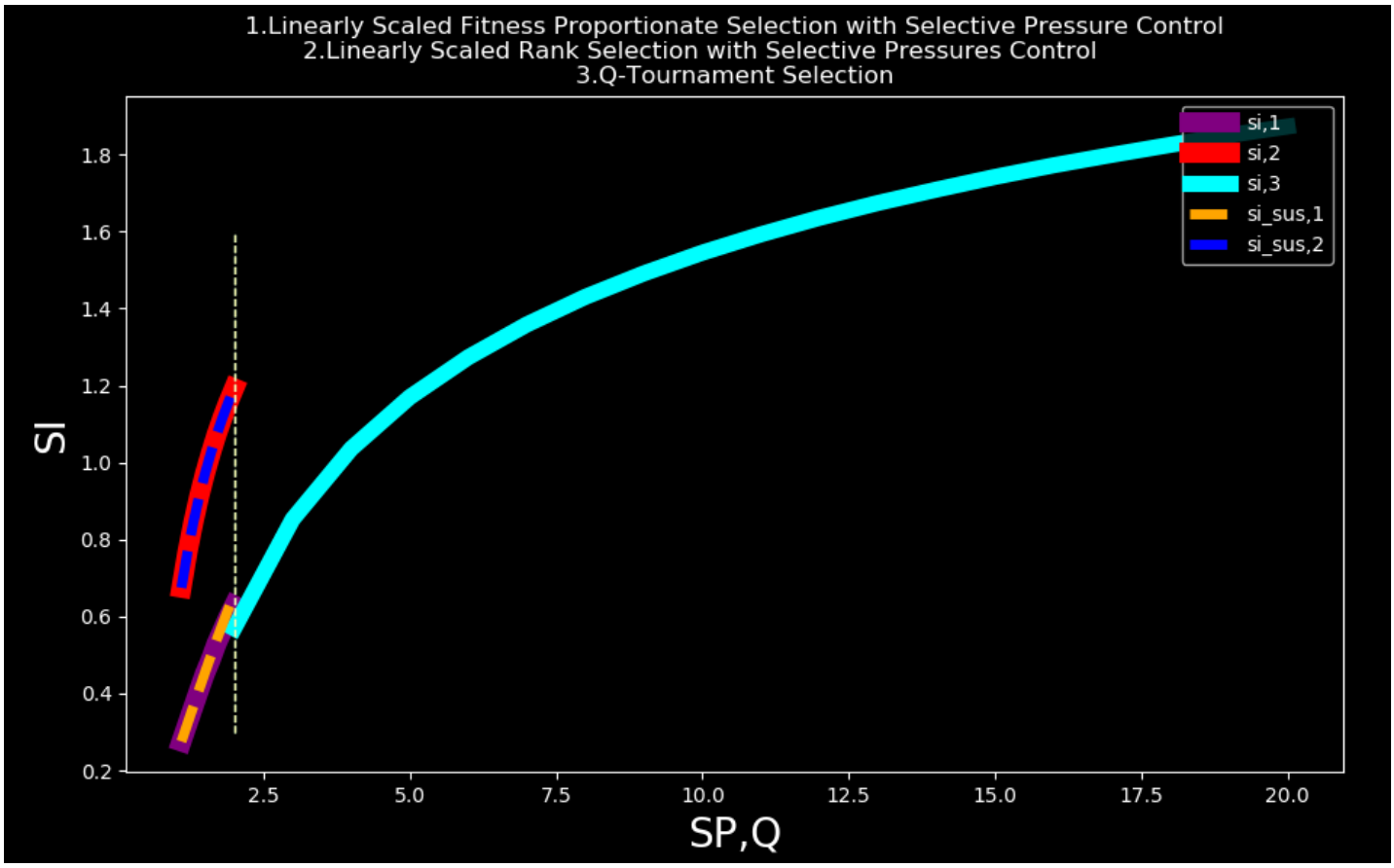
Three requested approaches:

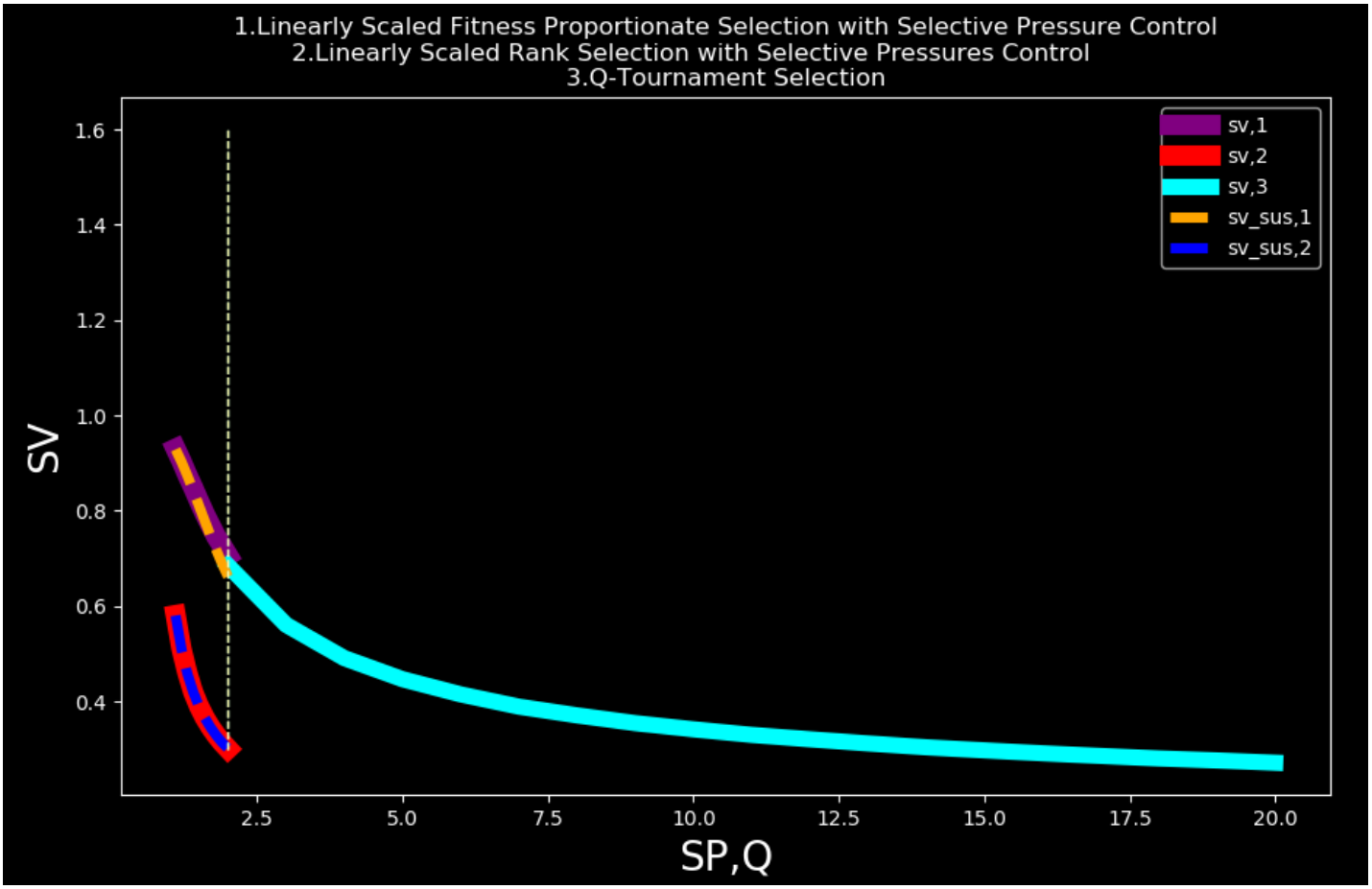
1. Linearly Scaled Fitness Proportionate Selection with Selective Pressure Control
2. Linearly Scaled Rank Selection with Selective Pressures Control
3. Q-Tournament Selection

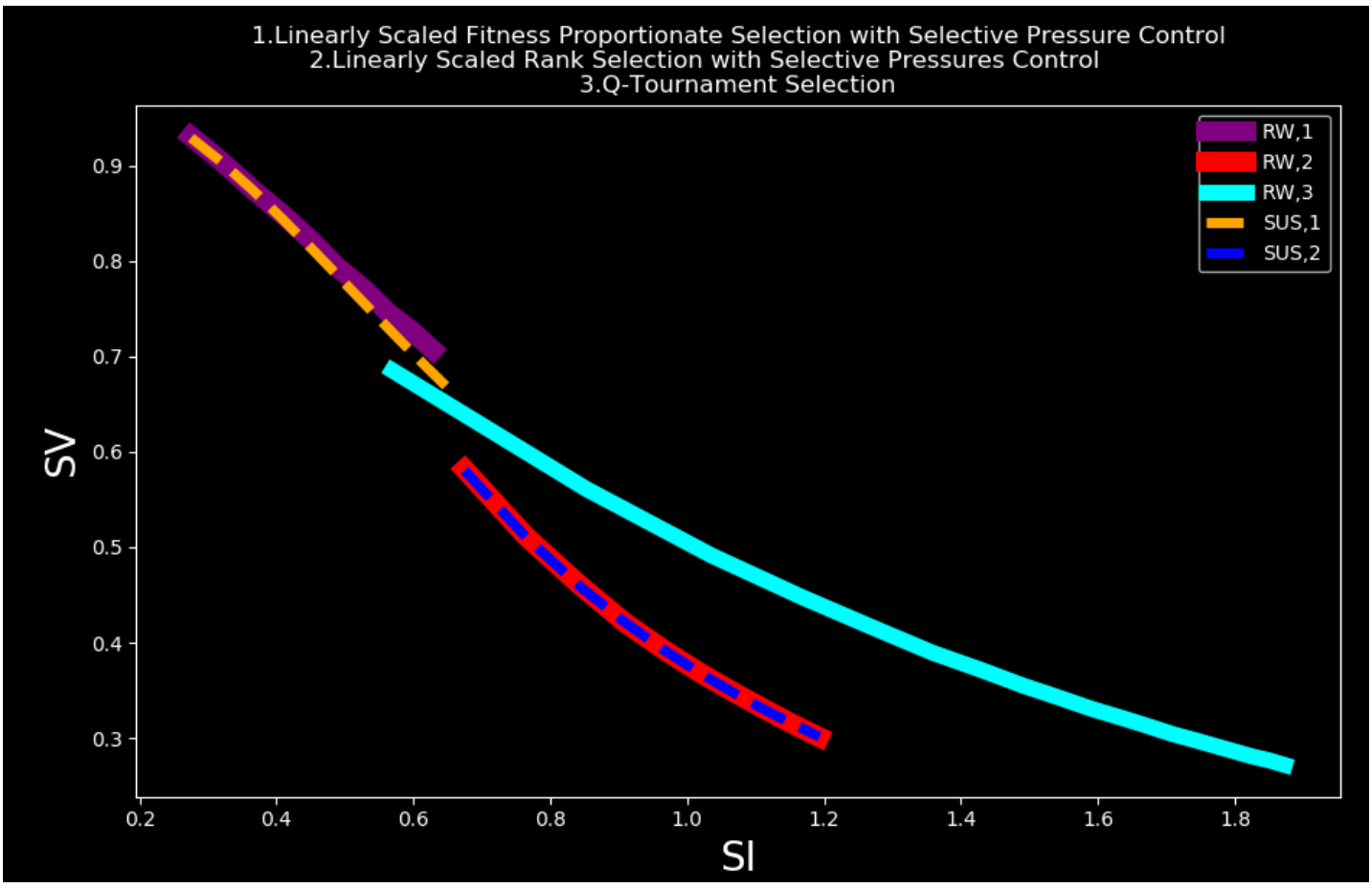
For the two first approaches both methods of RW and SUS were applied. The value of N1 and N2 were assumed 100000 and 50000 respectively.

Results for SUS method are shown by dashed lines and RW method with solid lines.

The obtained figures are as follows:




1.Linearly Scaled Fitness Proportionate Selection with Selective Pressure Control
2.Linearly Scaled Rank Selection with Selective Pressures Control
3.Q-Tournament Selection
sv,1
sv,2
sv,3
sv_sus,1
sv_sus,2
SV
SP,Q
1.6
1.4
1.2
1.0
0.8
0.6
0.4
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


1.Linearly Scaled Fitness Proportionate Selection with Selective Pressure Control
2.Linearly Scaled Rank Selection with Selective Pressures Control
3.Q-Tournament Selection
RW,1
RW,2
RW,3
SUS,1
SUS,2
SV
SI
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8

Evaluation:

As it can be figured out from the first two figures, first and third approaches are approximately continuous and attached at the SP and Q values of 2; therefore, they can be considered as continuation of each other. Moreover, since we search for approaches with higher SV and SI, as it can be figured out from the third figure, the second approach seems to have poor performance compared to the third approach. That is, at constant values of SI, the third approach reaches higher values of SV, similarly, at constant values of SV, the third approach reaches higher values of SI. To sum up, “Q-Tournament” approach outperforms “Linearly Scaled Rank Selection with Pressure Control” approach in both convergence speed and diversity (variety) fields. Furthermore, from the third figure it can be figured out that the first approach works better in the term of diversity (variety) as opposed to the third approach which performs better in the term of convergence speed and betterment of population fitness.