Lecturer: Jan Baumbach Term: Winter 2015/2016

Class: Introduction to Bioinformatics

Exercise sheet – Network Enrichment

1. Explain/define: "Key pathway" and "Ant Colony Optimization" (ACO).

2. ACO is a so-called bio-inspired computing paradigm. Name and describe two more.

3. Describe/define the following terms: "vertex cover", "set cover", "connected cover". Paint an example graph for each and highlight the corresponding covers.

3. Implement an Ant Colony Optimization strategy in JAVA that solves the Travelling Salesman Problem (TSP). The TSP web site of Georgia Tech (URL1) provides geographical positions of cities of different countries. Use the provided data in TSBLIB format as input and solve the TSP for Qatar (URL2) and Zimbabwe (URL3). Systematically vary the input parameters and note the calculated shortest TSP distances. Summarize the results in a table. Give that parameter set with the best solution. What are the shortest distances for the two data sets? [6 points] Paint the two travelling maps graphically.

Please send the JAVA program as well as the source code and the input file via email to your TAs. Also email the names of all group members and a short tutorial on how to execute the program with the input file.

URL1: http://www.tsp.gatech.edu/world/countries.html

URL2: http://www.tsp.gatech.edu/world/qa194.tsp

URL3: http://www.tsp.gatech.edu/world/zi929.tsp