Exercises from lecture 9 (voting) TEK5010 Multiagent systems 2020

Question 1

A set of agents have to decide on the sequence of doing a set of independent tasks. The agents may have different desires and value the outcome of doing the tasks differently. So, the agents decide that a voting procedure is a way of agreeing upon the sequence of doing the different tasks:

Given the voters (i.e. agents) $Ag = \{1, 2, 3\}$ and their available outcomes (i.e. tasks) $\Omega = \{\omega_1, \omega_2, \omega_3, \omega_4\}$. The preference ordering of the different agents are as follows:

$$\varpi_1 = (\omega_1, \omega_2, \omega_3, \omega_4), \quad \varpi_2 = (\omega_2, \omega_3, \omega_1, \omega_4), \quad \varpi_3 = (\omega_3, \omega_4, \omega_1, \omega_2)$$

a) Given that the voting procedure is plurality, what outcome is the winner?

b) Do we have a Condorcet's paradox here?

c) Is it possible for the agents to manipulate this election? How can we safeguard against strategic manipulation?

d) Calculate the Borda count of each outcome.

e) Could you write up all winners in pairwise elections and draw a majority graph representing the results?

f) What is the best outcome in terms of the slater rule? Why is the slater rule problematic to use in the general case?

g) In terms of the analysis above, which task should the agents do first?