

Obligatory assignment 2, TEK5010 Multiagent systems, 2018

Report delivery date is November 25 by e-mail to hjmoen@its.uio.no.

Mobile base station placement using swarm intelligence

In the first obligatory assignment we tried to provide network connectivity for mobile phone users by using a number of elevated mobile base stations. The question was how do we fly these UAV nodes in order to provide optimal connectivity for the many ground based mobile phone users?

In the first obligatory assignment we tried to answer this question using a game theoretic approach. We obtained the general result that it is hard to coordinate the system into a socially optimal solution when using non-cooperative game theory. Consequently, in this second obligatory assignment, we will try to address the same question using swarm intelligence methods instead. You can assume that mobile phone users are still uniformly spread out over a 2D square area.

- 1) How would you define swarm intelligence?
 - a. Name the key properties of SI
 - b. How would you describe the mechanism for self-organization?
 - c. What is stigmergy?
 - d. What do we mean by emergence in SI?
- 2) What could be the collective goal of such a swarm system on this problem? Could you name a few SI methods that would be relevant for solving this problem?
- 3) Use one (or more) SI methods to simulate the mobile base station placement.
 - a. Investigate how your solution scales with the number of base stations added to the area.
 - b. How do the results compare to your results from the first oblig?
 - c. Do your solutions satisfy the key properties of SI and the mechanism of SO?