Research Plan HS11

**Desert Ant Behaviour**

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**General Introduction**

We think ants are fascinating animals because – despite their small brains – they form very huge and complex structures. Very large colonies work very efficiently together as one body. This requires a high level of social coordination. We have (prior to this project) seen some videos which highlight the great buildings ants can form and think their movement is equally interesting. They cover extreme distances in comparison to their size. We as human beings would definitely get lost, so we would to find out how ants are achieving this difficult task.

Ants have been subject of modern research since 1848. The motivations were often interest in instinct, learning and society. Studies in ant movement became even more compelling when scientists started to look for algorithms that solve fundamental tasks like finding the shortest way in a graph. The class of ant colony optimization algorithms was introduced 1992 and has since been a field of active study.

**Fundamental Questions**

1. How does ant movement work?
   1. Is ant communication connected to ant movement
   2. Which mechanisms influence ant movement
   3. Are there different strategies
   4. How do desert ant accomplish the task without many landmarks and such a small brain
   5. How efficient are ants
2. How can we describe it in mathematical terms?
   1. Which algorithms describe ant movement in a good way
   2. How we can improve these algorithms
   3. How efficient are our models
3. How does it apply to the real world (is it useful for navigation tasks etc.)

We would like to simulate ant movement and see how efficient our algorithms are. Also we'd like to see how close our algorithms are to real ant movement. Therefore we want to simulate different environments (different number of landmarks and obstacles).

**Expected Results**

Our guess is that ants have a very optimized way to orientate because they have evolved since a very long time and conquered nearly every possible territory on this earth.

Probably there are more ways to orientate than by landmarks. Ants may have similar compass-like abilities as pigeons, or use the sun as a fix-point.

We expect that there are already some quite advanced mathematical models available because it is a topic of research for quite some time.

**References**

Texts taken from projects homepage (We will update this section during research).

**Research Methods**

Agent-Based-Model (probably).

**Other**

No datasets available.