Inferring population dynamics of house-hunting ants

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Literature List

1. Scope

The aim of the project is to create a differential equation discovery model through the use of genetic algorithms while taking into account the relationship between the equations and then integrate that algorithm into a software. The final step will be to create ODE (ordinary differential equations) that represent the emigration process of an ant colony based and evaluate them by comparing them with the existing ODE.

This will involve research in the following key areas:

1) Understanding of how machine learning and data mining is used to build genetic algorithms so that they take data and mutate them so as to create a set of differential equations based on the data. [1] [2]
2) Study existing genetic algorithm models like Nutonian Eureqa to have a better understanding of how we can manipulate them to return more accurate results and to find how credit assignment works on discovery systems. [3] [4]
3) Finding which programming language is more appropriate to create the software that will use the genetic algorithm that will be discovered. Some languages have genetic libraries included however they have limitations concerning the outcomes they offer. [5] [6]

2. Key publications

[1] T.M. Mitchell. Machine Learning. New York ; London.1997

[2] J.R. Koza. Genetic programming: on the programming of computers by means of natural selection. Cambridge. MIT Press. 1992

[3] M.Schmidt and H.Lipson. Distilling free-form natural laws from experimental data. Science. Vol.324, no. 5923, pp.81-85, 2009.

[4] J.J. Grefenstette. Credit Assignment in Rule Discovery Systems Based on Genetic Algorithms. Machine Learning, Vol.3 (2), pp.225-245. Washington. 1988

3. Other publications

[5] R Core Team. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing. Vienna, Austria. 2015

[6] A.J. Chipperfield and P.J. Fleming. The MATLAB genetic algorithm toolbox. Applied Control Techniques Using MATLAB, IEE Colloquium on. London. 1995