

Bio-inspired Computing in R

Deliverable 1: Final Year Dissertation

BSc (Hons) Computer Science

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**Declaration of own work**

I, Ryan Porteous confirm that this work submitted for assessment is my own and is expressed in my own words. Any uses made within it of the works of other authors in any form (e.g., ideas, equations, figures, text, tables, programs) are properly acknowledged at any point of their use. A list of the references employed is included.

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**Abstract**

R has become the first-choice language for data scientists. However, it is typically not the first choice for people developing and implementing bio-inspired algorithms. Consequently, it can be hard for data scientists to make use of bio-inspired methods. This project will look at the current availability of bio-inspired algorithms in R, identify holes in the provision, and develop a package to fill in one of these holes.

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# Introduction

## Purpose

The purpose of this document is to give an overview of the domain of the project; to identify and describe the motivations and objectives of the project; and to give initial plans of how to overcome foreseeable problems. Supporting technical literature relevant to the project domain is also discussed.

## Aims and Motivations

R is a programming language which is among the first-choice of languages for statisticians and data miners but is not the first-choice for those who are interested in implementing algorithms from bio-inspired computing. Bio-inspired computing is a field which takes inspiration for its algorithms from a variety of nature’s systems such as evolution, and the way populations of animals interact with each other in an environment. This collection of algorithms can be applied to various areas and be used to solve NP-hard problems due to the way the search space for these problems is explored. It can be hard for R users to apply bio-inspired methods to problem due to their limited availability.

The primary aims of this project can be defined as:

1. **Investigate the availability of bio-inspired algorithms in R**

I will begin by identifying the main areas of bio-inspired computing and searching for implementations of these algorithms available through the Comprehensive R Archive Network (CRAN). CRAN is a network which provides a central platform for R users to upload the software packages they have developed and provide access to them for other users.

1. **Identify implementations to be improved or built upon, and areas where no solution exists**

From the implementations found in the previous step, I will assess how the solution has been implemented, what the solution provides and if it can be improved upon. Where no solution exists, this will be identified as an area that can be developed.

1. **Produce an R Package to improve the availability of bio-inspired tools for R**

A package will be developed to improve upon an existing solution or to provide a solution where no solution exists. This package will be released on CRAN so that other R users may use the package.

# Bio-inspired Computing

Give an overview of main areas mentioning main applications of each area

# Availability of Bio-inspired Algorithms in R

## Main Areas

Identify R Packages that provide access to the main areas mentioned in Section 3. Take into account what they do, how they are implemented, if they are still being built upon

## Areas for Improvement / Areas to be Developed

Select areas which can be improved or are absent from the above section giving ways to improve the existing implementations if one exists

# Chosen Area

Reasons as to why I have chosen this area

More in depth look at this areas packages

Main literature review

# Requirements Analysis

# R Packages

## Process of Package Creation

## Packages and Software Tools to Aid in the Process

# Evaluation Strategy

# Project Management

## Project Schedule

### Work Breakdown Structure

### Project Timetable

## Risk Analysis

### Risk Identification

### Risk Management

## Professional, Legal, Ethical and Social Issues

# References

# Appendices