



## **School of Computing, Engineering, and the Built Environment Edinburgh Napier University**

### **PHD STUDENT PROJECT**

#### **Application instructions:**

Detailed instructions are available at :

<https://www.napier.ac.uk/research-and-innovation/doctoral-college/how-to-apply>

*Prospective candidates are encouraged to contact the Director of Studies (see details below) to discuss the project and their suitability for it.*

### **Project details**

#### **Supervisory Team:**

- DIRECTOR OF STUDY: Dr Sarah L Thomson (Email: [s.thomson4@napier.ac.uk](mailto:s.thomson4@napier.ac.uk))
- 2<sup>ND</sup> SUPERVISOR: Prof. Emma Hart

**Subject Group:** Computer Science

**Research Areas:** Computer Science -> Artificial Intelligence/Data Science

**Project Title:** Understanding the True Nature of Fitness Landscapes in Evolutionary Computation

#### **Project description:**

Fitness landscape analysis in evolutionary computing has been used for decades to better understand optimisation problems, optimisation algorithms, and how the two interact together. A fitness landscape is a topological model of the interplay between a problem and an algorithm. Despite a wealth of existing literature, landscape analysis techniques are often computationally expensive or sensitive to sampling bias. The vision of this PhD is to work towards an in-depth understanding and analysis of existing landscape metrics, and to propose and test new metrics (or sets of metrics) to help in characterising fitness landscapes. The disadvantages of current landscape approaches will be addressed and hopefully reduced. At the end of the PhD, it is hoped that a better understanding of fitness landscape analysis will have been gained.

## **Candidate characteristics**

### **Education:**

A second class honour degree or equivalent qualification in Computing Science, Computer Science, Artificial Intelligence, Data Science

### **Subject knowledge:**

- Analysing and visualising data
- Artificial intelligence

### **Essential attributes:**

- Strong programming skills
- Self-motivated
- A passion for learning
- Excellent standard of academic writing

### **Desirable attributes:**

- Some knowledge of metaheuristic algorithms or evolutionary computation