MONASH University

PhD Scholarship Opportunity

What makes combinatorial optimisation problems hard to solve?

Faculty / Portfolio:	Faculty of Information Technology Centre for Research in Intelligent Systems
Location:	Caulfield campus, Monash University
Supervisors:	Dr Aldeida Aleti, Faculty of IT, Monash University Prof. Bernd Meyer, Faculty of IT, Monash University Prof Kate Smith-Miles, Faculty of Science, Monash University
Scholarship:	**$24,653** per annum full-time rate (tax-free stipend) + **Tuition fees**.

The Opportunity

We are seeking an enthusiastic student to research in the area of fitness landscape characterisation. Today, many optimisation problems involve complex combinatorial systems that make traditional approaches unsuitable or intractable. Metaheuristics and local search methods are effective optimisation techniques that find near-optimal solutions to complex combinatorial optimisation problems where exact solutions are hard to find. They have been applied to problems such as scheduling, vehicle routing, and task allocation. Despite their empirical effectiveness in a vast variety of problems, we lack a theoretical understanding of these methods. It has been empirically and theoretically proven that different optimisation techniques are optimal for different problems. However, the question `What makes a problem hard to solve?' is yet to be answered.

This PhD project aims at answering this important research question by developing metrics for describing the structure of fitness landscapes. A fitness landscape is composed of the solutions, a fitness function, and the search operator, which is part of the optimisation method and connects neighbouring solutions. For the same problem, different optimisation methods create different fitness landscapes. Optimisation methods that construct less rugged, and as a result, easily searchable fitness landscapes are more effective for that particular problem. The metrics developed in this project will shed light into the relationship between a problem and an optimisation method, by describing the underlying structure of the fitness landscape created by that optimisation method.

The Adaptive Optimisation project will equip the PhD student with a wide set of research skills in optimisation and machine learning, which are of emerging and increasing demand, allowing the PhD student to build a career in promising research areas.

From January 2013, Monash University has introduced Graduate Research Programmes, which will incorporate coursework and research training skills development. For more information, please go to: http://www.monash.edu/migr/why-monash/phd/index.html

Candidate Requirements

The successful student will have an excellent academic track record in IT, Mathematics or a related discipline. An academic track record in optimisation would be highly advantageous.

Details of eligibility requirements to undertake a PhD are available at http://www.monash.edu/migr/apply/eligibility/phd/.

The scholarship will be awarded at the equivalent of current Australian Postgraduate Award rates. The scholarship covers both foreign and domestic student tuition fees. Candidates will be required to meet Monash entry requirements that include English-language skills.

Remuneration

We offer a scholarship to the value of $24,653 per annum full-time rate (tax-free stipend). Tuition fees will be covered by the Faculty of Information Technology, Monash University.

Enquiries

For more details about the project please contact

Dr Aldeida Aleti, Clayton School of Information Technology, Monash University, aldeida.aleti@monash.edu

Submit an Expression of Interest (EOI)

Please email the following to aldeida.aleti@monash.edu

- Resume
- Full academic track record
- Contact details of 3 referees
- A brief statement of your suitability

Closing date

Monday, 14 January 2015, 11:55pm Aus. Eastern Standard Time