Subject: Phase 1 - Saville: Exploring a Continuous Variant of the Travelling Salesman Problem

Phase 1 Project Selection Status Report

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Director of Studies: Timothy Griffin

Please complete 1, 2 and 3 below.

1. Please write 100 words on your current project ideas.

Given a cost density function defined over some connected continuous domain, and a set of points in that domain, find the minimum-cost contour which passes through all of the points.

Applications of this problem are similar to those of the TSP, but capturing the fact that there might be more than one route between two points, and the optimal one will depend on which other points are being visited next.

This transforms the TSP from a graph theory problem into a calculus problem, and the project explores how calculus can give some insights into how to make good approximations of the solution.

It also explores whether a bijection exists between the continuous and discrete TSPs.

Furthermore, it explores how well existing heuristic approaches to the TSP generalise to the continuous case.

2. Please list names of potential project supervisors, indicating any interactions you have had with them, for example: not contacted, awaiting reply, in discussion, agreed to supervise.

- **Felipe Ferreira Santos:** Was not available to supervise
- **Timothy Griffin:** Awaiting reply
- **Andrej Ivašković:** Not contacted
- **Dima Szamozvancev:** Not contacted
- **Thomas Sauerwald:** Not contacted
- **Jagdish Modi:** Not contacted

3. Is there any chance that your project will involve any computing resources other than the Computing Service's MCS and software that is already installed there, for example: your own machine, machines in College, special peripherals, imported software packages, special hardware, network access, substantial extra disc space on the MCS. If so indicate below what, and what it is needed for.

The resources required by this project are as follows:

- My personal computer
  - **Processor:** AMD Ryzen 9 5900HX with Radeon Graphics, 3301 Mhz, 8 Core(s), 16 Logical Processor(s)
  - **Total Physical Memory:** 31.4 GB
  - **Total Virtual Memory:** 36.2 GB
  - I will be using git for revision control of code, and GitHub for online backup thereof.
  - I will store non-code files in Google Drive or some equivalent platorm.
  - I accept full responsibility for this machine and I have made contingency plans to protect myself against hardware and/or software failure.
- (Possibly) Cloud computing resources such as Google CoLab Pro
  - This would allow me to test algorithms with various GPUs and TPUs to explore their effects on efficiency.
  - At this point in the project planning I am unsure whether this will be necessary.