AGILE 2016 Workshop on Visually-supported Computational Movement Analysis (VCMA '16)

Workshop website: http://viz.icaci.org/vcma2016/

Workshop Overview

Understanding movement is important for a range of applications: town and transport planners need to understand how people commute; cycle hire scheme operators need understand how the bikes are used to help run operational aspects and future planning; animal ecologists are increasingly tracking the movement of animals and birds and using these to help understand more about their ecology and response to external factors. The past 10-15 years have seen dramatic improvements in positioning technologies (GPS, WLAN, Bluetooth, mobile phone positioning, RFID etc.) that have led to huge volumes of tracking data being collected about virtually any object that moves, in a multitude of application domains. Consequently, many new methods for analysing these data have been developed, and computational movement analysis has evolved as an important stream of research within GIScience. However, many challenges still remain — often induced by the introduction of new sensor technologies — including context-aware analysis, multi-sensor data integration, scale-adaptive analysis, and, very importantly, the integration with appropriate visualisation methods for both data and analytical methods outputs.

This workshop aims to demonstrate recent advances in, and showcase convincing examples of, **visually-supported analysis of movement**, including best-practice applications in relevant domains. We are interested in **any application** for which analysis of movement is important.

Movement data come in different forms. Where location loggers are placed on moving objects, sampled sequences of locations are produced. However, movement can often also be inferred from counts of objects at fixed locations with time references, from fixed times with spatial references or from origin-destination data. We are interested in use of **any data type** from which movement can be inferred.

Alongside the increase in availability and use of movement data are **methodological developments** that help analyse these data. Movement is a complex spatio-temporal phenomenon, often linked to other contextual data. Resampling, statistical and machine-learning techniques can help reduce this complexity, but decisions have to be made about what scale of analysis is appropriate and how do aggregate the data.

In this workshop, we are particularly interested in the **role of visualisation** in the computational analysis of data. This can be particularly helpful for helping identify suitable scales and aggregations for analysis, or trying different parameter of computational analyses and we're interested in examples that demonstrate this. We want to reflect in the **impact of visual support** on the use of computational analysis. What are the impacts on the **practice, reasoning and results obtained** when doing **visually-supported computational analysis, compared to computational analysis with limited visual support**? We hope the talks of the workshop and the planned data challenge will help us consider this.

This workshop is a follow-up of a series of movement analysis events that were organised within the context of the COST Action MOVE (http://www.move-cost.info) and which were essential in establishing the foundations of the new field of Computational Movement Analysis and Visualisation in GIScience. While these events have been organised within the international community of scientists developing new methods for visualisation and analysis of movement, this community has so far not overlapped to a significant extent with the AGILE community. We therefore see a great potential for expansion of the Computational Movement Analysis and Visualisation among the AGILE members.

Workshop Format

This full day workshop will consist of two parts:

1) a regular session with research presentations based on the accepted short papers; and
2) a data challenge on a large bird migration dataset

Participation in the data challenge is encouraged, but not required for workshop attendance.

1. Regular session

We invite submissions of short papers of 1500-2000 words that describe research that fits the general theme of computational movement analysis. Submissions can use **any movement data type** and be in **any application area**. We are particularly interested in the following three themes:

- new computational methods of movement analysis and
- new visually-supported methods, as well as
- empirical evaluations and applications of existing methods.

Please prepare your submissions as per the instructions below. **Submissions will be judged** on the **novelty** and **appropriateness** of the methods to carry out the analysis undertaken.

2. Data challenge

The purpose of the data challenge is to showcase a range of computational movement analyses on a common dataset. We will use spatio-temporal data describing both the foraging and migration patterns of gulls. We are particularly interested in entries that try to:

- establish suitable temporal and spatial scales of analysis
- identify groups of individuals with distinct behaviours, and whether these groupings are stable across the year
- compare migrating and foraging behaviour between individuals, or groups of individuals

Examples of questions that are ecologically-interesting questions are:

- Are there patterns in foraging trips that might indicate a balance between energy use and forage availability? For example, do individuals regularly go on long forage trips followed by short forage trips?
- How does foraging or migrating behaviour differ between individuals within a species?
- Does migration behaviour relate to foraging behaviour?
- Does the migration arrival time relate to migration and/or foraging behaviour?
- Does foraging or migration behaviour change at different times of year and between years?

We are interested in comparing entries that use extensive visual support in their analyses from those that do not. If you do use extensive visual support in your entry, please comment on what you think the impact is on the **practice, reasoning and results obtained**.

This data challenge is based on the freely-available data at:
http://data.inbo.be/ipt/resource?r=bird-tracking-gull-occurrences&v=5.4

The dataset describes movements (both foraging and migrating behaviour) of 101 individuals of two gull species breeding at the Belgian Coast over just more than 2 years. The data can be used to study things like foraging behaviour, habitat use and migration.

As for the regular contributions, submissions should be **1500-2000 words** long, but they can **optionally** include a **technical report** and a **video**. **Submissions will be judged** on the how **compelling the application of the techniques** is for answering an ecologically interesting question.

Please contact Aidan Slingsby (vcma2016@city.ac.uk) if you have any questions about the data challenge.

Workshop Outcomes

All contributions (for regular session and for data challenge) will be reviewed by the organisers and the members of programme committee.

Accepted short papers will be made available on the workshop website. Where it is appropriate, we will also ask authors of accepted papers to write up a description of their case study and what the advantages are of the visual support offered.

Depending on the submissions obtained, we will consider preparing a **paper or special issue** on the outcomes of the workshop, the data challenge, and/or the impact of visual support for computational movement analysis. Details to follow at the workshop.

Workshop Submission Guidelines

Submissions should be emailed in PDF-format to vcma2016@city.ac.uk with the subject header "*VCMA submission*" using the template provided on the workshop website: http://viz.icaci.org/vcma2016/.

Important Dates

- Deadline for short papers and data challenge contributions, 15 March 2016
- Notification of acceptance for short papers and data challenge, 15 April 2016
- Final version of short papers (prepared after any required revisions), 15 May 2016
- Workshop at AGILE conference, 14 June 2016

Workshop Organizers

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Aidan Slingsby – Lecturer (Assistant Professor), giCentre, City University London

Robert Weibel – Professor of GIScience, Department of Geography, University of Zurich

Programme Committee

See the workshop homepage: http://viz.icaci.org/vcma2016/

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