

Minutes of meeting ENRAM workshop WG3 '*Visualizing spatio-temporal patterns of animal movement*', February 7<sup>th</sup> 2014 at the University of Amsterdam

Minutes of meeting: Hans van Gasteren

Aim of the meeting was to explore existing methods to visualize spatio-temporal movement data and see whether we can apply new methods or improve existing methods to visualize radar and simulation data of animal movement.

The meeting was attended by 18 people from six countries.

Attendees included members of the COST ACTION MOVE (IC0903) and the EU Infrastructure project LifeWatch (<http://www.lifewatch.eu/web/guest/home>) .

After an introduction on the ENRAM EU Cost Action (ES1305) and the presentation of the day's schedule by Hans van Gasteren, the following speakers present their work:

Peter Desmet '*Visualizing bird tracking data with CartoDB*'

Peter gave a live demonstration of CartoDB, showing the full functionality of the program. Nice visualizations are easy to export to your own website, blog or other web based communication. Easy for users.

Vladislav Kosarev '*Visualization of vocalization and movements of a small cetacean: Harbour Porpoise*'

Vladislav developed his own data analysis and visualizations in R based on existing software packages. He used sea surface temperatures (from NOAA), environmental & biological data. Relations with tide, wind & sea surface temperatures explained his model. The impact of hammering down the turbine pylons for a wind farm on the distribution of Harbour Porpoises was huge.

Jack van Wijk '*Vizualization of Vessel Movements*'

Jack showed an overview of the diverse visualization work from his group (TU Eindhoven). Flow visualization was demonstrated live, even on static objects you could see movements (image based flow visualization, see [www.win.tue.nl/~vanwijk/](http://www.win.tue.nl/~vanwijk/)). He combined shading techniques for historic data and colored lines on top of it for current movements of vessels. More on this topic can be found at the website of Roeland Scheepens ([www.win.tue.nl/~rscheepe/](http://www.win.tue.nl/~rscheepe/)), which definitely needs more attention from the group. He also showed visualizations with nice aggregation levels of pie charts, which changes with more detail when zooming in. These are also available in CartoDB.

George Fuchs '*Visualization of trajectory attributes in space-time cube and trajectory wall*'

The German Fraunhofer institute developed their own GIS tool for visual analytics. This tool showed trajectories over space-time (so called space-time cubes) as well as 2D trajectory on a map with time projected along the Z-axis. Vast and nice rotating visualization tool, although the interpretation of the data in these 3D cubes is still not easy. Demonstration of 7-yearly pattern of white stork satellite telemetry data.

Gennady Andrienko '*Space transformation for understanding group movement*'

Gennady demonstrated visualization techniques of individuals (monkeys) within a group along a trajectory. Plotting the different position along x-y axis out of the centre of the group, he summarized one year data and showed individual changes/roles over time.

Frédéric Ruys *'Storytelling for TV: The adventurous visualization process of animal tracks'*

Frédéric presented several examples of his visualizations which were made for the TV series 'The Netherlands from above'. In the first year they concentrated on telling the story using the tracks of animals themselves, in the second year they combined tracks with other datasets, like weather, tides. His main focus was on creating the ultimate visualization which can clearly tell a story, each time again.

Michal Koutek *'3D radar visualization – use cases'*

Michal showed 3D weather over time. Normally with 3D glasses, now cross sections in 3D patterns of weather (rain, clouds or updrafts). A nice way of showing more details in 3D+time.

Judy Shamoun-Baranes *'Current approaches to visualizing radar data to study bird movement'*

Judy demonstrated earlier work of the FlySafe projects, the importance of the virtual laboratory developed at the UvA and some military radar tracks and quantitative weather radar bird profiles. In her talk she demonstrated the data we have to work with as a starting point for the following discussion.

Willem Bouten lead the brainstorm session regarding the challenges, opportunities and future perspectives for visualizing movement across multiple radar and large spatial scales. He asked the following questions:

1. Why do we need visualizations?

Responses in key words: Publications, explore, mistakes/outliers, understand behavior/aggregate data, relations in data, proper scale, public, curious, inspiration, protection/actions, different explorations, high level concept, space/time, beautiful, store information, simplification

2. What would we like to see (ENRAM)?

Responses in key words: Map migrating birds, tracks on radar, time/direction of movement, movement/interaction with (weather, landscape/DEM/land use, day/night, birds, humans, post events, other birds data, aircraft, pests/flee, tides, altitudes, seasonal/diel patterns, model movements), altitude, fat/state of individuals, identifications, climate, resources, outliers, deviations from the mean, cost of transport, military activities, disturbance, validations/gaps in data

Discussion points

- How does the visual analytics community present their multi-dimensional data? It's very common in the VA world to upload video material as supplementary data. Other solutions are own websites, for supplementary material with their own DOI and add as reference. Lots of ecological journals don't allow this (yet).
- COST Action does not fund research directly. What can we do to get proposals accepted? Most people agreed that we must impress people with (1) good story in the data, but show

problems why you need the research; (2) good storyline following Frédéric Ruys; (3) nice bird collision with aircraft/wind farm. How can radar data/models help. What are we still missing and what gaps must be filled by research. Clearly visualizations can help a lot.

- We do need lists of tools (pro's and con's), data to experiment with and stories (bird strike, bird watching, visual bird migration combine with radar data, disturbances) to create new show cases. Visualization groups were clearly interested in working on a data challenge in this context

#### Action Items

The group will create a spreadsheet to list different tools available and currently used to visualize spatio-temporal data presented during working, including their pros and cons

The group will work towards setting up a data challenge and prepare some datasets with good stories and show the added value of new visualizations, what are our problems with current tools and how VA can help us.

