Visualizing and assessing data at the level of the individual

April 7-9, 2020

Organized by the Center for Proper Housing of Poultry and Rabbits, Zollikofen, Switzerland

Summary

An appreciation for animal individuality has grown considerably with recognition of responses within an individual that are consistent over time and across varied conditions. The individuality concept is now recognized in many scientific fields and disciplines though substantial knowledge gaps exist as to how this information can best be used. The proposed scientific event seeks to bring leading experts from various disciplines together to allow synergism and cross-fertilization of concepts and ideas that can be used to improve visualization and analysis of individual-level data. The format will include a combination of lectures and practical work to provide attendees with hands-on experience at programming and development to enhance their own efforts at the visualization and statistical analysis of individual-level data. Following the event, a core group of attendees will develop the discussions into a methodological summary paper as well as a second paper targeting needed developments and focus areas of research.

Key Lectures

- Dr. Lucy Asher, Newcastle University
- Dr. Julian Evans, University of Zurich
- Dr. Yamenah Gomez, Universität Bern
- Dr. Lorenz Gygax, Humboldt Universität
- Dr. Richard Parker, University of Bristol
- Dr. Joshua Peschel, Iowa State University
- Dr. Nicholas Philips, École polytechnique fédérale de Lausanne (EPFL)
- Dr Lucas Noldus, Noldus Information Technology
- Mr Benedict Ramsauer, Swiss Statistical Design and Innovation

Applied sessions

In addition to lectures, approximately half of the three day workshop will involve practical work on five specialized topics for which we are asking attendees to submit a half page proposal (300 words or less) of a dataset that could be used for the exercise. Attendees are asked to select one of the practical themes described below which they would be assigned, a choice we will do our best to fulfill. It is intended that the practical work will involve several sessions over the three day period and that participants remain with that group for the duration of the workshop.

The specialized topics with descriptions are:

1. Time series visualization and modeling (categorical/ordinal data) (Berezowki, Asher)

Data will be first visualized using a variety of techniques to determine underlying structures that are not readily apparent to determine data patterns within and across individuals. We will then attempt to cluster animals and determine if resultant clusters conform to pre-defined classifications of interest, e.g. genetic line, occurrence of injury, etc. Data should be in a format with repeated observations of animals over multiple, ideally contiguous days where observations are time-date stamped. Categories can be variable in nature, e.g., inside/outside, locations of a specified and set number, or some other relevant classification of the animal's state such as awake/sleep.

2. Time series visualization and modeling (continuous response) (Philips)

We will analyse continuous time series data using a step-by-step approach. First we will visualise the data and perform basic data exploration with statistical summaries. We will then build a generative model of the data and perform parameter inference within a Bayesian paradigm. Finally, we will check that our inferred model makes sense and whether it can provide new insights into the data for interpretation.

3. Parametric survival analysis for behavioural sequences (Gygax)

We will apply parametric survival analysis to behavioural sequences to evaluate transition probabilities between behavioural states, the short-term history of such states and the influence of additional (experimental) predictors. At the same time, we will account for dependencies in the data-set such as individuals nested in groups, individuals observed at the same time, and different (experimental) phases of an experiment. As the basis of such an evaluation is repeated (e.g. daily), behavioural sequences of individual animals observed in one or several groups are needed.

4. Automated video and sound analysis for behavior recognition (Noldus)

I will cover a variety of data analysis methods that are part of the Noldus family of software tools that have been developed over the years. The various programs include: The Observer, EthoVision, TrackLab and UltraVox. During the practical sessions, participants will be able to experiment with the various software tools, view the respective outputs, and determine the most appropriate configurations for their particular dataset. Data sets for analysis during the workshops may include video files, audio files, event logs or track files. Exact file format requirements will be published in due course.

5. Modeling social interactions (Vöelkl, Evans)

Data should be in the form of either edge lists of dyadic interactions or (weighted) adjacency matrices (i.e. an NxN matrix where the element at position X,Y gives the number of observed interactions between individuals X and Y). The matrix should be in .csv format ("comma separated", not tab or semicolon separated, .xls, .xlsx nor any proprietary data formats like matlab data files, R data frames etc).

Key dates:

- Registration is open for available spaces beginning Dec 16th, 2019 and will close January 31, 2020
    - To register, please go to the google form located here:
      <https://forms.gle/VJygiBdPLvZx8nr2A> and fill out the requested information.
- Attendance will be confirmed by Feb 15th, 2020 as well as whether you were selected to submit a dataset. Given that there is no registration cost, we are anticipating being able to accept all whom register. If you need confirmation sooner, please contact the organizers.
- Datasets for the practical sessions will be due by March 1st, 2020 so that the session leader(s) has appropriate time to review the dataset, discuss any problems with the author, and prepare for the session. If you are selected to submit your dataset and miss this deadline, you will immediately lose your place and a substitute dataset selected.

Other information

- No registration fee will be collected.
- We will be organizing several meals at local restaurants for participants (lunch and dinner) which we will ask you to confirm in the google form. While these are voluntary to attend, we will be organizing for these events and appreciate you keeping to your commitment.
- The currency in Switzerland is not the Euro, but Swiss Francs. While most restaurants will accept credit cards, the likely site for lunch will require cash payment so please prepare.
- Grants to cover travel and accommodation expenses may be possible via a special Swiss National Science Foundation grant or an EU-COST Action chaired by Dr. Michael Toscano.
    - Those whom would be eligible for the Swiss National Science Foundation grants have been contacted and should communicate with Dr. Toscano if they will not be able to attend.
    - For those whom are based within an EU-COST participating nation AND are part of the KeelBoneDamageNet Action (www.keelbonedamage.eu), approximately 20-25 persons will be eligible for a travel grant. In addition to complying with all standard EU-COST policies, those wishing for a travel grant should include a 150 word paragraph explaining their interest in attending the workshop via the google form.
- Awarding of ECTS credit will be possible.
- All logistical questions regarding the conference should be directed to Ms. Lilian Smith (Lilian.Smith@vetsuisse.unibe.ch).
- For questions scientific content, please contact: klara.grethen@vetsuisse.unibe.ch or laura.candelotto@vetsuisse.unibe.ch.
- Traveling to Bern is relatively straightforward with accessible airports including: Basel, Geneva, and Zurich. From each airport, two trains per hour will go directly to Bern with tickets that can be purchased at www.sbb.ch.
- Participants are expected to book their own travel, accommodation, and otherwise all arrangements. A list of recommended hotels is below.
    - https://fassbindhotels.ch/hotel/city-am-bahnhof-bern/
    - http://www.metropolehotelbern.com/

- https://sorellhotels.com/en/ador/bern
- https://sorellhotels.com/en/arabelle/bern