Causal Inference for Time Series Analysis

Organizer(s)  Raphaël Liégeois

2 ECTS

Summary  This course will provide an introduction into the theoretical background and main causal inference methods for time series data. The students will gain a critical understanding of the different approaches, enabling selection of the most adequate method and proper interpretation of the corresponding results.

Course level  Introductory
Basic notions of linear algebra are required: matrices, (auto)correlation, regression.

Content of course sessions  Theoretical sessions
Session 1: The elusive notion of causality
Session 2: Specificities of time series data
Session 3: From causal inference to causal networks
Session 4: The linear case - Granger causality and related methods
Session 5: Towards nonlinear causal inference
Session 6: Advanced methods
Session 7: Interpretation of causal links – focus on neuroimaging data

Hands-on sessions
Session 1: Identifying causal networks
Session 2: Granger causality - evaluation and interpretation
Session 3: Advanced methods

Course materials
• Go to "https://moodle2.unil.ch"
• Log in with your institutional address (unil, chuv, epfl)
• Click on "Faculté de Biologie et de Médecine" > "École doctorale / doctoral school" > "Lemanic Neurosciences Doctoral School"
• Course materials and the connection link for remote participation (if finally needed) will be stored under the course name "Causal Inference for Time Series Analysis"

References

Location  The course will take place in the “Atelier des Saveurs”, Campus Biotech Geneva. Possibility to attend remotely, but in-person attendance in Geneva is strongly preferred.
<table>
<thead>
<tr>
<th><strong>Course dates</strong></th>
<th>Classes will take place on 4 successive Wednesdays: Nov. 17, Nov. 24, Dec. 1 &amp; Dec. 8. The schedule is 8h30-12h30 and 14h-17h. Final project presentations will take place on Wed. 15/12.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluation</strong></td>
<td>Evaluation is based on a project presentation. The project consists in applying methods seen in the course to a dataset that will be provided. Students are also welcome to work on their own dataset, upon approval by the organizer.</td>
</tr>
<tr>
<td><strong>Registration</strong></td>
<td>The course is limited to 20 participants. <strong>Register before October 29</strong> by writing a mail to <a href="mailto:indscourses@gmail.com">indscourses@gmail.com</a> (with your supervisor in copy) and stating the course title as subject.</td>
</tr>
</tbody>
</table>