

## Template for thesis project proposals

Project Title	Monitoring the operation of bus fleet by tracking the changes in causal network
Author(s)	<i>Student(s) name(s)</i>
Keywords	Causal network, change detection, stream mining
Project description	<p>Causal relation between variable does not stay constant through time. Changes in the relations between variables can be evidence of structural change. For example, detecting changes during the operation of the buses in a city can identify different modes that these buses are operating on.</p> <p>The challenge is that the results of causal network discovery methods based on observational data are not robust to noise. Therefore, simply comparing the causal networks producing by these methods will not work due to robustness issue. Further, time segment for comparison of the causal graphs is needed. Granger causality has been used previously for finding causal changes through time. However, detecting changes in structural causal discovery methods through time has not been investigated before.</p> <p>The first step is to find the robust causal graph which can be achieved by bootstrapping techniques or Bayesian aggregation. The next step is to create causal networks through time segments and to measure the difference between the causal networks. The final step is to identify changes in the signal.</p>
References	<p>Structural causal discovery techniques: <a href="https://arxiv.org/pdf/1211.3295.pdf">https://arxiv.org/pdf/1211.3295.pdf</a></p> <p>Change detection in Granger causality: <a href="http://cowles.yale.edu/sites/default/files/files/pub/d20/d2059.pdf">http://cowles.yale.edu/sites/default/files/files/pub/d20/d2059.pdf</a></p>
Prerequisites	Artificial Intelligence and Learning Systems courses
Time frame	Fall 2018
Supervisor(s)	Sepideh Pashami, Sawomir Nowaczyk,
Programme	<i>Name and the number of credits</i>
Examiner	<i>Name of project Examiner</i>
Signatures	<p><i>Student(s):</i> _____ <i>Supervisor(s):</i> _____ <i>Examiner:</i> _____</p>