

CIV-ML's Seminars 2018-2019

Presenter: Zachary Hamida | Ph.D. Candidate, Polytechnique Montreal

June 17 2019 at 16h | B431.4.8

Title: Advancement Report: Network-Scale Structural Health Monitoring using Machine Learning

Abstract: In this seminar, a summary of the project "Network-Scale Structural Health Monitoring using Machine Learning" advancement and progress will be presented.

Presenter: Shervin Khazaeli | Ph.D. Candidate, Polytechnique Montreal

June 04 2019 at 16h | B431.4.8

Title: Probabilistic Decision Making for Structural Health Monitoring: Reinforcement Learning Approach

Abstract: In this seminar we present a probabilistic framework for anomaly detection and triggering an alarm in the context of Structural Health Monitoring. The anomaly detection is carried out using Bayesian Dynamic Linear Model (BDLM) method. The process of decision making, triggering an alarm in this case, is done using Reinforcement Learning (RL) to consider the long-term effect of the decision.

Presenters: James-A. Goulet, Professor and Zachary Hamida, Ph.D Candidate | Polytechnique Montreal

May 14 2019 at 16h | B431.4.8

Title: Preparation Session for ICASP13 (South Korea - 2019)

Abstract: In this seminar, three short-presentations are offered covering different topics in the area of structural health monitoring (SHM).

Presenter: Zachary Hamida | Ph.D. candidate, Polytechnique Montreal

April 30 2019 at 16h | B431.4.8

Title: Analyses on Visual Inspection Data of Bridges + Project Progress

Abstract: This seminar will present analyses performed on visual inspection data of bridges. This includes modeling as well as simulating the degradation behaviour.

Presenter: Saeid Amiri | Research Associate, Polytechnique Montreal

April 23 2019 at 16h | B431.4.8

Title: Comparing Performances of Different Models on the Transformation Data.

Abstract: Modeling the transportation data is a challenge, because of human interact, policy changes, transport infrastructure, and vehicles. The primary goal of this presentation is to compare the performance of different models (regression models and time series models) on the transportation data.

Presenter: Barghob Deka | Ph.D. Candidate, Polytechnique Montreal

April 9 2019 at 16h | B431.4.8

Title: Nonparametric Modelling of Nonlinear Relationship between Periodic Components of Two Time-Series.

Abstract: Nonlinear relationship between the periodic components of two series will be analyzed using non-parametric approach. It is another application of Gaussian Conditional Approximation to nonlinear cases where a parameter can be introduced and learned over time as a hidden state.

Presenter: Shervin Khazaeli | Ph.D. Candidate, Polytechnique Montreal

April 2 2019 at 16h | B431.4.8

Title: Probabilistic Decision Making for Structural Health Monitoring: Reinforcement Learning Approach - Part (2).

Abstract: In this seminar we introduce the application of Reinforcement Learning (RL) for Structural Health Monitoring (SHM). Particularly, the agent interacts with the environment throughout SHM data. The goal of the agent is to notify the engineers (in the form of alarms) in case of anomalies in the structures.

Presenter: Shervin Khazaeli | Ph.D. Candidate, Polytechnique Montreal

March 26 2019 at 16h | B431.4.8

Title: Probabilistic Decision Making for Structural Health Monitoring: Reinforcement Learning Approach - Part (1).

Abstract: In this seminar we introduce the application of Reinforcement Learning (RL) for Structural Health Monitoring (SHM). Particularly, the agent interacts with the environment throughout SHM data. The goal of the agent is to notify the engineers (in the form of alarms) in case of anomalies in the structures.

Presenter: Zachary Hamida | Ph.D. Candidate, Polytechnique Montreal

March 19 2019 at 16h | B431.4.8

Title: Analyses on the Initial State of Kalman Filter for Modeling Degredation.

Abstract: This seminar presents methods utilized in estimating Kalman Filter's initial state in the context of visual inspections. These methods are needed due to having short and noisy time-series.

Presenter: Saeid Amiri | Research Associate, Polytechnique Montreal

March 12 2019 at 16h | B431.4.8

Title: Studying the Statistical Properties of Multivariate Random Variables.

Abstract: Under a complex pattern in the data, we need to consider several variables. In this presentation, we consider multivariate random variables with the summation and product operators, and discuss how to find the statistical properties of the summation and product.

Presenter: Shervin Khazaeli | Ph.D. Candidate, Polytechnique Montreal

March 5 2019 at 16h | B431.4.8

Title: Locally Weighted Regression: A Review.

Abstract: Linear Regression Models (LRMs) are widely used in supervised learning. However, LRM suffers from a limitation: it establishes a global model for the entire training dataset. In many practical applications in reinforcement learning, the agent needs to be trained locally for different regions of its state-space. Therefore, LRM is not suitable for such a task. Locally Weighted Regression Model (LWRM) is a variation of LRM enabling us to deal with local models. In this seminar we review the formalism of LERMs for function approximation.

Presenter: Luong Ha Nguyen | Ph.D. Candidate, Polytechnique Montreal

February 26 2019 at 16h | B431.4.8

Title: Online Learning for Bayesian Dynamic Linear Models - Applications.

Abstract: This seminar presents the practical application of the real-time anomaly detection methodology to multiple datasets collected from several structures in Canada.

Presenter: Shervin Khazaeli | Ph.D. Candidate, Polytechnique Montreal

February 19 2019 at 16h | B431.4.8

Title: Structural Health Monitoring (SHM)-Based Decision Making: Bayesian Approach.

Abstract: Structural Health Monitoring (SHM) is a process to provide information concerning structural condition and its performance. SHM can be the basis for decision making associated with operations, maintenance, etc. However, in practice SHM is less used maybe due to not fully understanding the Value of Information (VoI) gained by the monitoring system. In this seminar, we quantify the value of information gained during the monitoring procedure. An illustrative example is provided regarding a bridge to show how SHM affects the decisions. To this end, Bayesian approach needs to be employed because SHM information can change our believe about the condition of the structure. It is expected that such a quantification of the VoI from monitoring system helps the engineers to have better understanding of the importance of the SHM information.

Presenter: Saeid Amiri | Research Associate, Polytechnique Montreal

February 12 2019 at 16h | B431.4.8

Title: Toward the Modeling of Transportation Data.

Abstract: Modeling the transportation data is a challenge, because of human interact, policy changes, transport infrastructure, and vehicles. In this presentation, we discuss different approaches to model the transportation data. In the proposed models, we modified the dynamic linear models in a way to recognize pattern effectively.

Presenter: Barghob Deka | Ph.D. candidate, Polytechnique Montreal

February 5 2019 at 16h | B431.4.8

Title: Comparison of Gaussian Conditional Approximation within BDLM framework and nonlinear estimation methods (Part 2)

Abstract: In this seminar, we would look into some of the pros and cons of using gaussian conditionals in the BDLM framework. Similarly, Nonlinear estimation methods which are extensions of the standard kalman filter algorithm, will be shown as an alternative to the gaussian conditional approximation.

Presenter: Barghob Deka | Ph.D. candidate, Polytechnique Montreal

January 29 2019 at 16h | B431.4.8

Title: Comparison of Gaussian Conditional Approximation within BDLM framework and nonlinear estimation methods (Part 1)

Abstract: In this seminar, we would look into some of the pros and cons of using gaussian conditionals in the BDLM framework. Similarly, Nonlinear estimation methods which are extensions of the standard kalman filter algorithm, will be shown as an alternative to the gaussian conditional approximation.

Presenter: Zachary Hamida | Ph.D. candidate, Polytechnique Montreal

January 15 2019 at 16h | B431.4.8

Title: Initializing Kalman Filter for Visual Inspection Data of Bridge Network + Software Demo

Abstract: The seminar will cover a previous method employed in estimating the initial state of the Kalman Filter as well as an improved method. The results of both initialization approaches will be compared and presented. In the last part of the seminar, a new user interface is demonstrated.

Presenter: Shervin Khazaeli | Ph.D. candidate, Polytechnique Montreal

December 11 2018 at 14h | B431.4.8

Title: Practical Reinforcement Learning

Abstract: In this seminar we focus on the application of Q-learning approach in real practices. To this end, first a brief summary of Q-learning approach is presented, and the limitations are investigated. Afterwards, regression-based method for value function approximation is presented and the so-called Locally Weighted Prediction (LWP) approach for such an estimation is discussed. To show the efficiency of the approach, the Mountain-Car problem is addressed with the aid of LWP.

Presenter: Barghob Deka | Ph.D. candidate, Polytechnique Montreal

December 4 2018 at 16h | B431.4.8

Title: Implementation of Gaussian conditional equations in the non-gaussian cases within the BDLM framework - Part 2

Abstract: The parameter in the AR process(ϕ) is considered to be a new hidden state or a new component in the BDLM framework. In the previous framework, this parameter would be an unknown but constant value which would be learnt over time. This presentation will highlight the results of using the new component alone as well combined with other hidden states.

Presenter: Ianis Gaudot | Post-Doc, Polytechnique Montreal

November 28 2018 at 14h | B431.4.8

Title: Automated model selection for BDLMs using Akaike and Bayesian Information Criterion

Abstract: Finding the right model in BDLMs is a critical issue. In most cases, the choice of the model results from a manual test and trials procedure, which limits the large-scale deployment of BDLMs. In this research, we explore an automatized model selection procedure for BDLMs based on Akaike and Bayesian Information Criterion values computed from multiple regression modelling.

Presenter: Barghob Deka | Ph.D. candidate, Polytechnique Montreal

November 21 2018 at 14h | B431.4.8

Title: Implementation of Gaussian conditional equations in the non-gaussian cases within the BDLM framework - Part 1

Abstract: The parameter in the AR process(ϕ) is considered to be a new hidden state or a new component in the BDLM framework. In the previous framework, this parameter would be an unknown but constant value which would be learnt over time. This presentation will highlight the results of using the new component alone as well combined with other hidden states.

Presenter: Saeid Amiri | Postdoc, Polytechnique Montreal

October 31 2018 at 14h | GRS meeting room

Title: Statistical inference of coefficient in Autoregressive using Gaussian Conditional Equations

Abstract: Autoregressive model is well-known model in time-series, to best our knowledge there is no analytic statistical inference about the coefficient in AR, and often the empirical approach is used to draw the inference about it. We discuss how Gaussian conditional equations and the Kalman filter can be used to estimate the autoregressive and its variance.

Presenter: James Goulet | Professor, Polytechnique Montreal

October 24 2018 at 14h | B431.4.8

Title: Application of Gaussian Conditional Equations to Non-Gaussian Cases - Part 2

Abstract: Gaussian conditional equations are behind powerful methods such as the Kalman filter and Gaussian Process Regression. This presentation explores how Gaussian conditional can be applied to non-Gaussian cases. The two target applications treated here are to (1) replace back propagation for learning the parameters of a Neural Network and (2) to learn the parameter of a state-space model in the context of a Bayesian Dynamic Linear Model.

Presenter: James Goulet | Professor, Polytechnique Montreal

October 10 2018 at 14h | B431.4.8

Title: Application of Gaussian Conditional Equations to Non-Gaussian Cases - Part 1

Abstract: Gaussian conditional equations are behind powerful methods such as the Kalman filter and Gaussian Process Regression. This presentation explores how Gaussian conditional can be applied to non-Gaussian cases. The two target applications treated here are to (1) replace back propagation for learning the parameters of a Neural Network and (2) to learn the parameter of a state-space model in the context of a Bayesian Dynamic Linear Model.

Presenter: Luong Ha Nguyen | Ph.D. student, Polytechnique Montreal

October 3 2018 at 14h | B431.4.8

Title: Online learning for Bayesian Dynamic Linear Models

Abstract: The seminar presents the mathematical background along with a general framework for the online learning procedure. A case-study that illustrates the potential of the new approach is also provided in this presentation.

Presenter: Zachary Hamida | Ph.D. candidate, Polytechnique Montreal

September 26 2018 at 14h | B431.4.8

Title: Project progress summary: Network-Scale Structural Health Monitoring Using Machine Learning

Abstract: This seminar will present a brief progress summary about the project "Network-Scale Structural Health Monitoring Using Machine Learning". The aim of the project is to develop machine learning methods suited for the network-scale degradation analysis of transportation infrastructure. The techniques developed in this project will enable tracking the performance of structural elements, forecasting the degradation, assessing the degradation rate changes with time and provide assistance in comparing different maintenance strategies.

Presenter: Ianis Gaudot | Post-Doc, Polytechnique Montreal

September 12 2018 at 13h30 | GRS meeting room

Title: Using OpenBDLM - Part 2: Data simulation

Abstract: OpenBDLM is an open-source Matlab software for time-series analysis using Bayesian dynamic linear models. This seminar will give an overview of OpenBDLM by focusing on data simulation. Data simulation is particularly useful for validation, test and debugging purposes.

Presenter: Shervin Khazaeli | Ph.D. candidate, Polytechnique Montreal

September 5 2018 at 13h00 | B431.4.8

Title: Bayesian Dynamic Linear Model (BDLM) for bridge monitoring

Abstract: A BDLM is developed for selected spans on a bridge in Canada. The model benefits from so called Switching Kalman Filter (SKF) for regime switching. In this seminar, first the model is discussed and then the preliminary results will be presented. Finally, the challenges and next steps will be discussed.