CISC271: Linear Data Analysis

WINTER 2024

Detailed Description:

Linear data analysis encompasses a broad range of techniques for analysis of structured data. This course will cover techniques that address sets of data in vectors.

To test, implement, and analyze this material, we will use MATLAB as an interactive tool and programming language. Students are expected to learn basic MATLAB on their own. Some tutorial information will be provided early in the course.

For basic material in data analytics, students can expect to be instructed in:

- organization of data into vectors and matrices
- description of vectors in a space
- minimal space descriptors
- linear relations
- spaces of solutions to linear relations

For basic material in machine learning, students can expect to be instructed in:

- linear regression
- polynomial regression
- data reduction by PCA
- SVD methods
- elementary material for artificial neural networks

Learning Outcomes:

By the end of the course, a successful student will be able to:

LO1: Select and implement algorithms for vectorial data

LO2: Synthesize data and solution methods for principal-component analysis

LO3: Implement, test and evaluate methods for linear regression

LO4: Interpret and explain methods and solutions in data classification

LO5: Evaluate and critique performance of algorithms in data classification

These learning outcomes will be assessed by computer implementations, written English assignments, and tests.

Textbook:

We will use the text *Introduction to Linear Algebra, Sixth Edition* by Gilbert Strang. Earlier editions may have uncorrected errors and definitely differ in the problem sets that are found at the end of each section.

We will also use the instructor's notes and other sources that are available through permissions granted to the Queen's University Library.