

### Modeling and Interpretation of Manufacturing Time Series Data via a Natural Language Processing Perspective

#### SEMINAR SESSION INFORMATION

**DATE:** Wednesday, November 2

**TIME:** 12:15pm

**LOCATION:** Durham 260

**PROVIDED:** Pizza and Soda

#### SPEAKER INFORMATION

**Hongyue Sun**  
PhD Candidate

Grado Department of Industrial  
& Systems Engineering

#### MEMBERSHIP INFORMATION

Fees are as follows and include all weekly seminars (22+) & workshops.

**FIRST MEETING: FREE**

**MEETING: \$5**

**SEMESTER: \$25**

**YEAR: \$40**

The automation and online sensing of smart manufacturing enables a big data environment, where time series data are widely used to record manufacturing activities, process conditions, etc. Data analytics based on time series data have been widely used to reduce variation, improve efficiency and mitigate defects. Thus, data analytics set the foundation for data-driven decision making in smart manufacturing. However, the data-driven decision making is less effective for situation dependent and resilient solutions. These decisions in manufacturing, such as trouble shooting, require domain knowledge and engineering perceptions, and are still mainly made by human operators. Therefore, it is critical to bring insights and discover knowledge from the time series data analytics to human operators with clear interpretations and understandings. Motivated by this observation, we propose a Supervised-Subgraph Augmented Non-negative Matrix Factorization (Super-SANMF) approach to represent and model time series data in manufacturing modeling. The time series data are encoded with graphs, which are generated from natural language processing perspective. Super-SANMF is used to identify groups of temporal trends from the graphs as features. The learned features are easy for human operators to memorize and understand, and predictive of the quality response variable in a crystal growth process in the case study.