Contribution ID: **59** Type: **Oral Presentation**

Big Data and A General Theory of Concept Lattice

Thursday, 4 April 2019 17:00 (30 minutes)

Big data is instrumental for the triumph of deep machine learning, it generates enormous number of quasi-ground states for the learning algorithms to converge. In the Big Data Analytics, it was recognized that prediction and description are two generic goals in its field. Prediction often appears with the use of attributes to predict the membership of a particular object in some object set with similar attributes. Description looks for the attributes that describes the object, often it involves identifying a set of attributes that are shared by all objects in the set. However, general frameworks in this direction, such as Formal Concept Analysis and Rough Set Theory, are not only suffering from the size of the object-attributes pair but also the challenges to sort out the complex relationships within the objects and attributes in order to generate implication rules.

We have developed a General Concept Lattice (GCL) theory that is capable of flexible knowledge representation, discovery, Big Data Analytics and logic reasoning. The GCL also emerges as a Galois lattice, on which simultaneous partial ordering is stablished among 2-tuples represented by General_Concept = (General_Extent, General_Intent). Each General Extent is referred to as an Object Class recognized as distinct by the categorization and the General Intent its corresponding description of properties. In practice, on particular General Concepts of GCL one achieves that the Formal Concept Lattice-Intents contributes to a part of the lower bound and/or Rough Set Lattice the upper bound for the General Intents. The set inclusion relation between two General Extents induces the logic implications between members of the two corresponding Intents and implies that the property of an object set is essentially a part of the features of its super set. In particular, attributes grouped into the same Intent are logically equivalent since they correspond to the property of the same object class.

Such a general theory that is capable of treating object-attribute-logic of the data set is fundamental to the Data Science and Machine Learning. Achievements of this study will establish a new fundamental theory and framework for the future research and development of Computational Intelligence. Various fields of Data Analytics and Data Science may be revolutionized by the novel applications of GCL theory.

Primary authors: LIN, Simon C. (ASGC); Dr LIAW, Tsong-Ming (ASGC)

Presenter: LIN, Simon C. (ASGC)

Session Classification: Data Management & Big Data

Track Classification: Data Management & Big Data