Design Artificial Intelligence and Analytics for Deep STEM Learning

The UF team led by Dr. Wanli Xing from Educational Technology will be collectively in charge of cleaning, processing, and mining large-scale data sets generated by Energy3D, infrared related applications and other learning software and provided by the Concord Consortium team led by Dr. Charles Xie. These efforts include, but are not limited to, identifying and formulating research questions, developing codes to process the data, publishing the results, and authoring research papers for academic journals and professional conferences. In addition, the UF team will also hold regular research meetings with the Concord Consortium team to brainstorm new research ideas and discuss the mining techniques.

The initial datasets from the Concord Consortium team include a dataset from more than 100 students in a high school collected in 2015 and a dataset from more than 100 students from a middle school collected in 2018, as well as students generated multimodal datasets from infrared cameras and applications. Analysis and mining of these datasets are expected to result in several publications at the junction of artificial intelligence, data mining, engineering design, and STEM learning.

The UF team will specifically investigate design, develop, and apply supervised and unsupervised learning algorithms including, but not limited to, clustering, association rule mining, sequential pattern mining, hidden Markov modeling, and classification models for modeling learning processes and predicting learning outcomes. UF will also explore the application of techniques such as text mining and various natural language processing methods when the contexts and data are appropriate for such applications.

In addition, the UF team will also actively participate in the design and development tasks related with artificial intelligence, infrared related applications and Internet of Things (IoT) led by Dr. Charles Xie. Dr. Xing will recruit, hire, and work with new graduate researchers for exploring, design, and developing applications related with IoT and other cyber-physical systems. These tasks include but are not limited to identifying various kinds of sensors, actuators, and controllers related to STEM education, exploring the linkage of computational thinking across the cyber-physical boundary in the context of STEM education, and helping with the development tasks related to IoT.