Integrating Big Data Analysis and CyberGIS into Education

Sujing Wang

Department of Computer Science, Lamar University, Beaumont, TX 77706

Email: Sujing.Wang@lamar.edu

Keywords: Big Data Analysis, CyberGIS, Data Science, Geographic Data Mining and Knowledge Discovery.

CyberGIS represents new-generation GIS based on advanced cyber infrastructure for resolving geospatial big data challenges [1], which require new tools and technologies to store, manage, and analyze massive geospatial data sets. CyberGIS is a promising young discipline. There is an urgent need to bridge the curriculum gaps in teaching foundational knowledge and skills in big data science, cyberinfrastructure, and high-performance computing for various CyberGIS-related scientific domains. This position paper focuses on improving an existing graduate level course (Data Science and Big Data Analysis) by incorporating new geographic information science and systems based on advanced cyberinfrastructure. This course aims to train students’ essential spatial thinking and computational thinking skills. Course materials including slides, hands-on activities, programming assignments, and projects will be designed to create an effective learning experience for students. This course is offered regularly at Lamar University. It covers a broad range of topics related to massive geospatial data analysis, visualization, and CyberGIS software. This course is organized into five main sections:

- State-of-the-art reviews of Geographic Data Mining and Knowledge Discovery.
- Techniques for storing and managing massive geographic datasets.
- Advanced algorithms and analytics techniques for massive geographic datasets based on advanced cyberinfrastructure.
- The emerging area of spatiotemporal data mining techniques, e.g. spatial temporal clustering algorithms and their applications to GIS.
- New trends and advanced technologies used for geographical information science research.

Overall, this course focuses on introduction the state-of-the-art studies and achievements in algorithms, analytics, and applications of Big Data and CyberGIS. It provides students with the basis for further efforts in this challenging CyberGIS field that will play a leading role in next-generation Geographic Data Mining and Knowledge Discovery. This course can serve as a foundation for numerous advanced CyberGIS-based courses.

References: