MNGN 598
Big Data Analytics for Earth Resources Sciences and Engineering

BACKGROUND

Course Learning Outcomes (LO):
After the successful completion of the course, the students should be able to:
1. Evaluate quantitatively, if a given data set exhibits big data characteristics by using the 5V’s (Volume, Velocity, Veracity, Variety and Value) of big data.
2. Apply incremental steps of big data life cycle to a given business case (e.g. predicting maintenance time of trucks in a fleet of open pit mine, monitoring land use and land cover for a mine site, etc.).
3. Analyze use-cases from resource companies considering various big data storage models.
4. Explore a given big data set on Hadoop or Spark platforms using MapReduce programming paradigm.
5. Design big data visualizations for a given data set considering visual design principles and evaluate the design’s efficiency for real time decision making.
6. Select and implement appropriate AI methods to recognize patterns in the data and to develop predictive models by identifying features, coding and running the algorithms on Hadoop or Spark and validating models’ performance using diagnostic measures.

Redesign approach:

SMART LO

Cost Reduction
Multi-granular predictions
Big Data
Real/near Real Time Decisions
New Products/Services

Fig. 1. Big data analytics needs in earth resources engineering

Students:
10-15 graduate students from various disciplines including mining engineering, petroleum engineering, applied mathematics.

Need for redesign:
Offered first time in Spring 2018, course improvements are intended to enhance student performance through active learning strategies.

REDEIGNED COURSE

INTENDED OUTCOMES

Improved learning with coherent assessments and variable CATs, which are well aligned with LO.

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Final Presentation and submission of final report/paper

ASSESSMENT

As the students practice all the concepts in term project designed for a real life big data problem, the following two assessments will be considered to be main assessments:
• improved achievements in project work (rubric for reports, evaluation of presentations, level of detail in the reflections)
• satisfaction of industry experts (survey and in-depth interviews)

The following two assessments already adopted in the course will be taken into account as supporting assessments:
• Student course evaluation
• Midterm feedback

Joy of Collaborative Student Art:
Engagement by Dr. Düzgün and Dr. Trainer-Gulton, (paper on paper)

Trefny I2 Center
Innovative Instruction