

CS 561 Assignment 2

PART A

Literature review on anomaly detection using Bayesian Approach (This part is complete.)

PART B

Due on 15th November 2018, 5:30 PM

A Case Study on Stuck Pipe Problem in Oil Well Drilling

Drilling operation of oil and gas field is complex and involves high expenditure. Various sensors installed at the working units of rigs provide better monitoring of the on-going drilling operations and bottom hole conditions. Multivariate time series data received from these sensors are stored in a three-tier architecture also known as SCADA system (supervisory control and data acquisition system). The stuck pipe is one of the major hazardous problems that may occur during drilling. Early detection of the stuck pipe is helpful to reduce the drilling cost and also prevents the subsequent hazardous events like kick or blowout. The most common parameters that are indicative of stuck pipe problems are Hook load (HL), Stand pipe pressure (STP), Weight on bit (WOB), Rate of penetration (ROP). Early detection of stuck pipe event can be performed by monitoring the deviations in the aforementioned parameters. This task can be considered as anomaly detection where events that lead to stuck pipe need to be identified.

A Bayesian network is a powerful tool that efficiently handles the uncertainty and causal relationships between the parameters.

Task 1: Study the stuck pipe problem in oil well drilling.

Task2: Design the Bayesian network for the stuck pipe problem.

Task3: Apply the same to detect stuck pipe events for the provided real time SCADA data of the oil well drilling operations.

Note: Part B of the assignment will be supervised by Achyut Mani Tripathi (t.achyut). You may contact him for further details.