1. **Title:** **Segmentation of seismic image for detection of salt below the earth surface**
2. **Introduction:** Different areas of earth have a large accumulation of oil, gas and also huge deposit of salt below the earth surface. However, precisely detecting the exact location of salt deposits is very difficult. Therefore, professional seismic imaging still requires expert human interpretation of salt bodies. This leads to very subjective, highly variable renderings. More alarmingly, it leads to potentially dangerous situations for oil and gas company drillers. Hence, to create the most accurate seismic images and 3D renderings, we need a robust algorithm that automatically and accurately identifies if a surface target is salt or not.
3. **Description:** A seismic image is produced from imaging the reflection coming from rock boundaries. The seismic image shows the boundaries between different rock types. In theory, the strength of reflection is directly proportional to the difference in the physical properties on either side of the interface. While seismic images show rock boundaries, they don't say much about the rock themselves; some rocks are easy to identify while some are difficult. There are several areas of the world where there are vast quantities of salt in the subsurface. One of the challenges of seismic imaging is to identify the part of subsurface which is salt. Therefore, a set of images have been chosen at various locations and chosen at random in the subsurface. The images are 101 x 101 pixels and each pixel is classified as either salt or sediment. In addition to the seismic images, the depth of the imaged location has been recorded for each image. In this project data driven techniques, especially deep learning techniques (CNN, R-CNN, FAST-RCNN etc.) or Bayesian Network, will be used to develop a model which will be trained with those images and then the model will be validated.
4. **Programming language/tools:** In this project Python will be used as the programming language along with TensorFlow to develop Deep learning models or pgmpy for Bayesian network. Python is used for this project because it has a huge set of libraries and tool box and most of the machine learning experts are using it for their projects. The python community is huge and active. TensorFlow is used for deep learning framework because it has efficient GPU implementation of tensors. So, with simple or no change same code can be run on CPU and GPU. Along with these tools pandas, NumPy, matplotlib or scikit-learn may be used.
5. **Block diagram of the system:**
6. **Possible outcomes:**
   1. A new system will be developed, which will use state-of-the-art machine learning technique to segment seismic image into salt or sediment
   2. The system will substitute human expert and automate the process of analysis of seismic image
   3. The system will reduce the cost of identifying an earth surface before mining
   4. Based on the result and novelty, the project can be published as a journal or conference paper
7. **Gantt Chart:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Literature Review |  |  |  |  |  |  |  |  |  |  |
| Learning of Python Tools |  |  |  |  |  |  |  |  |  |  |
| Data Visualization |  |  |  |  |  |  |  |  |  |  |
| Coding of simple model |  |  |  |  |  |  |  |  |  |  |
| Development of main codebase |  |  |  |  |  |  |  |  |  |  |
| Fine Tuning Of the model |  |  |  |  |  |  |  |  |  |  |
| Documentation of the result |  |  |  |  |  |  |  |  |  |  |
| Preparing the final paper |  |  |  |  |  |  |  |  |  |  |
|  | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 |

**N.B.:** W stands for Week