AE6102-Spring-2023: 3D Visualization and Analysis of Seismic Volumes

Release 0.1

Team Sifar

Apr 22, 2023

CONTENTS:

CHAPTER

ONE

TITLE

3D Visualization and Analysis of Seismic Volumes

CHAPTER

TWO

TEAM NAME

Sifar

CHAPTER

THREE

TEAM MEMBERS

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CHAPTER

FOUR

ABSTRACT

The project aims to provide a comprehensive and interactive visual representation of subsurface geology by creating three-dimensional images of seismic volumes in **MayaVI** library. The project will facilitate a better understanding of subsurface geology by allowing users to interact with the data in a more intuitive and efficient manner utilizing **TraitsUI** library. Visualization of seismic volumes is a very crucial component of interpretation workflows, be it to pick salt domes, interpret horizons, identify fault planes, or classify rock facies.

CHAPTER

FIVE

OUTLINE

The project will involve the following steps:

- Collecting seismic data and processing it to generate seismic volumes.
- Converting the seismic volumes into 3D models (numpy arrays) using a specialized python module *segyio*.
- Developing an interactive user interface that allows the user to visualize and manipulate the 3D models, using **TraitsUI**.
- Adding functionalities for analysis using *matplotlib* and **mayaVI** to be able to identify fault planes, classification of rock structures, etc.
- Adding features such as colouring, slicing, and annotation to enhance the interpretability of the data.
- Experiments with popular datasets and demonstration of results of our application corresponding to multiple use cases.

CHAPTER

SIX

DOCUMENTS

S.No	Name	Date of Submission
1	Project - Grading & Guidelines(2022-2)	
2	Project Proposal (draft)	18/02/2023 23:59 IST
3	Project Proposal (final)	20/03/2023 09:00 IST
4	Project Update-01	20/03/2023 09:00 IST
5	Project Update-02	03/04/2023 09:00 IST
6	Project Update-03	14/04/2023 23:59 IST

CHAPTER

SEVEN

DATASETS

S.No	Name	Description
1	3D seismic data NZPM	Seismic data is publicly available and provided by New Zealand Petroleum and Minerals (NZPM)
2	3D seismic data Netherlands F3 Block	Developed by the OLIVES lab at Georgia Tech
3	3D seismic data US	3D seismic data provided by the USGS

CHAPTER

EIGHT

SETUP

- Clone the repository
  - `git clone https://github.com/rajagond/AE6102_sifar.git`
- On **Ubuntu 22.04** with **python 3.10**, `libxcb-xinerama0` need to be installed with `apt`
  - `sudo apt install python3.10`
  - `sudo apt install python3-pip`
  - `sudo apt install libxcb-xinerama0`
- Install Required Packages
  - `pip install -r docs/requirements.txt`
- Virtual Environment
  - `python3.10 -m venv venv`
  - `source venv/bin/activate`
  - `pip3 install -r requirements.txt`
- Documentation Generation (Sphinx)
  - `sphinx-build --version`
  - `sphinx-quickstart docs`
  - `sphinx-build -b html docs/source/ docs/build/html`
  - `google-chrome docs/build/html/index.html`

CHAPTER

NINE

REFERENCES

- https://wiki.seg.org/wiki/Open_data
- http://article.nadiapub.com/IJSIP/vol9_no5/39.pdf
- https://github.com/equinor/segyio

CHAPTER

TEN

INDICES AND TABLES

- genindex
- modindex
- search