

# Implementing EQTransformer and creating a simpler model for earthquake detection in Indian subcontinent

**GROUP 4**

**Vanshaj Vidyan  
Saptarshi Datta**

under the TA-ship of  
**Aniket Nath**

supervised by  
**Dr Subhankar Mishra**

**Project Proposal**  
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# Summary

**Idea:-** We aim to implement EQTransformer<sup>[1]</sup> and optimise it for Indian seismic data. Considering it as the golden standard, we aim to create a model approaching its performance.

## Datasets used:-

- 1 STanford EArthquake Dataset (**STEAD**) : 2613 Stations, 19000 Hours of data, 1.2M Labeled Waveforms, 450K Earthquakes. [[STEAD GitHub link](#)]
- 2 Earthquake data of Palghar, Maharashtra; collected from National Centre for Seismology, Delhi and NGRI, Hyderabad; 1500 labelled waveforms. [proprietary]

## References:-

- 1 Earthquake transformer—an attentive deep-learning model for simultaneous earthquake detection and phase picking, SM Mousavi, WL Ellsworth, W Zhu, LY Chuang, GC Beroza, Nature Communications 11 (1), 1-12.
- 2 Earthquake detection and P-wave arrival time picking using capsule neural network. Saad, and Chen. IEEE Transactions on Geoscience and Remote Sensing, 59(7), 6234-6243.
- 3 A machine-learning approach for earthquake magnitude estimation, SM Mousavi, GC Beroza, Geophysical Research Letters 47 (1), e2019GL085976.

# Work Outline

## Work Distribution:-

- Vanshaj – Literature review on EQT and similar works, Tuning of hyper-parameters.
- Saptarshi – Study and analysis of various algorithms to be used for the new model, Identification of relevant features.
- Both – Creating the new model, Documentation

## Algorithms to be implemented:-

Random Forest, Neural Network

## Midway Targets:-

- 1 Implementing EQTransformer on open-access labelled data
- 2 Testing it on cluster earthquake data from Palghar, Maharashtra
- 3 Tuning EQTransformer hyper-parameters appropriately to improve its performance in the target region (India).

**Expected Results:-** Implementing EQT; testing it on Indian data set and analyzing shortcomings, accordingly tuning EQT parameters to improve performance. Taking EQT as golden standard, creating a new ML model for earthquake detection.