PROJECT REPORT

COMPARATIVE CLUSTERING ANALYSIS OF EARTHQUAKE PATTERNS IN INDONESIA USING K-MEDOIDS AND K-MEANS++

GREGORIUS ARDHITO MAHENDRA WIBOWO
21.K1.0049

Faculty of Computer Science
Soegijapranata Catholic University
2025

ABSTRACT

Indonesia is a country that is susceptible to earthquakes. This is because of its geographical location on the Pacific Ring of Fire and the junction of three major tectonic plates. The purpose of this study is to see what are the best algorithms to cluster earthquakes in Indonesia and to identify the region that had the most earthquakes. The data is obtained from Meteorology, Climatology, and Geophysics Agency (BMKG) repositories containing 10,354 earthquakes data from January to December 2023. This study was conducted using K-medoids and K-means++ as the algorithms. The results showed that the K-means++ algorithm is better at clustering this dataset with a Silhouette Score of 0.589 at K=6, while K-medoids at K=4 had 0.561. This indicates that K-means++ is better at grouping similar data and distinguishing it from others. Furthermore, this study found that the Banda Sea and around the North Sulawesi had a particular high seismic activity. These results have significant implications for disaster risk reduction and mitigation efforts, especially areas where it is susceptible to earthquakes.

Keywords: earthquake, clustering analysis, k-means++, k-medoids