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Geographic Visualization Of Crime Datasets Using R: Case Study Crime Data From Indonesian Police Department, East Java

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Abstract

Crime is any act against the law, public welfare and morality. It creates violation of law, and is thus punishable. It needs policies and law enforcement to reduce the level of crime. The main challenge that emerges nowadays is how to collect and analyze the growing volume of crime data and how to extract information on crime patterns in certain geographic location. Based on existing data on the web page of the National Crime Information Center (NCIC) of Indonesian Police Department[1], in the year 2012 the police department of East Java province (POLDA Jatim) was able toresolve 66.41% or 21.527 cases from the total number of 32.145 cases reported. From the datasets listed in NCIC, it is shown that the crime number in the area of East Java province in 2012 was ranked second highest after Jakarta on a national scale.

This research presents a framework to explore crime patterns throughout East Java Province. The framework creates two maps: a spatial-temporal map of East Java that provides visualization for the crime data and a cluster map of East Java from crime datasets using K-Means techniques. For the first map, we digitized East Java region in geojson format and visualized the crime data statistically. For the second map, we prepare and extract datasets to create crime clusters using the K-means algorithm and then show the results both in spatial and temporal form. The type of map being used is choropleth maps. The map will display information of crime patterns that is easily understood by a common user.

The case study uses criminal datasets provided by the Police Department of the Province of East Java or Kepolisian Daerah Jawa Timur (POLDA Jatim) from January 2012 until December 2014. The crime data is processed into the visualization to find information specific to the type of crimes defined by the Indonesian Police Department or Kepolisian Republik Indonesia (POLRI). The goal is to raise the awareness of crime patterns and to visualize criminal acts that occurred in specific region, especially in the area of East Java.

The dataset used comes from the 36 police department in city level or Kepolisian Resort (or POLRES) in East Java province. It has 127 attributes from 8 sub-category of attributes, which are the type of conventional crime, offenders, age of the offenders, victims, age of victims, type of crime targets, the time pattern of crime, and modus operandi. We use the package shiny in R programming languange to build the user interface components and package ggvis and k-means to create clusters, chart and transformation of data in graphical form.

Keywords: criminality; visualization; choropleth, geospatial information

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[1] The National Crime Information Center (NCIC) of Indonesian Police Department (or POLRI) website is available at http://ncic.polri.go.id/