

Educational Data Mining with Clustering technique on the Distribution of Civil Servant Teachers in Indonesia

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Abstract-The teacher is a professional educator with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students in early childhood education through formal education, basic education and secondary education. The purpose of this research is to analyze the distribution of teachers in Indonesia by utilizing data mining techniques. Research output in the form of mapping results in the form of clusters of regions in Indonesia. The data source was obtained by the Ministry of Education and Culture data in 2019 consisting of 35 data records. The technique used is K-Means which is part of clustering. Attributes on the study are the name of the province and the number of teachers distribution of Civil Servants (abbreviated as PNS). The calculation and analysis process uses the RapidMiner 5.3 software as a tool. To maximize the cluster, the Davies-Bouldin Index calculation result is done with the number of clusters ($k = 2$): 0.126. The results state that the high cluster label (C1) consists of 3 provinces namely West Java, Central Java, East Java. The rest are in the lower cluster (C2) consisting of 32 provinces (91%). This result shows that almost all regions in Indonesia the teacher distribution process is uneven and is only centered on the island of Java.

Keywords: Teacher Distribution, Data Mining, K-Means, Clustering, Indonesia

Introduction

According to Law No. 14 of 2005, teachers are professional educators with the main task of educating, teaching, guiding, directing, training, evaluating, and gathering students in early childhood education through formal education, basic education and secondary education. In Indonesia, the government continues to make priority policies to strengthen the role of teachers issued by the government and to arrange the needs of teachers; Improvement of academic qualifications; completion of teacher certification; Competency improvement based on professional work groups; also the awarding, welfare and protection. Because the main role of civil servant teachers (abbreviated as PNS) plays a very important role. However, what is most important is the uneven distribution of teachers. According to the Ministry of Education and Culture, the low national teacher ratio shows that Indonesia does not lack teachers but an unequal distribution of teachers. Based on these problems, it is necessary to have an intelligent system that can map regions in Indonesia concerning special teachers of civil servants in Indonesia.

Many branches of computer science can do mapping in the form of clusters. One of them is data mining [1]-[4]. Data mining is a technique used to explore by taking patterns in the data to be processed and then the output in the form of very important information [5], [6]. One of the most popular data mining techniques in clustering is k-means [7]. The k-means method is one of the well-known simple and easy learning methods for solving the problem of grouping from a dataset [8]. Besides this method is commonly used because it is relatively fast and easy to adapt [9]. Many previous studies have used the k-means method as a solution to the problem. One of them was done [8] with the title Analysis of the K-Means Algorithm on Clean Water Customers Based on the Province. The results of the study state that the k-means method can be applied in classifying the number of clean water customers by province (1995-2015) into 3 clusters. Based on these advantages, it is expected that the results of the study can provide information in the form of cluster mapping of the distribution area of PNS teachers in Indonesia so that the government can follow up to immediately conduct teacher distribution in Indonesia.