# Data mining based Strategic Decision Support System for Blood Bank Management

**Oluyinka I. Omotosho, Justice O. Emuoyibofarhe**

**Abstract -** This project work applies the data mining process to derive the rate ratio of donors to recipients of the different blood groups in a bid to identify the most requested blood group, to improve communication and synchronization between the blood bank Management and hospital for reliable blood bank decision making. A set of data was collected as from the case study domain, with data ranging from the year 2015-2019. Data sampling under Data mining technique was applied to generate training data sets and WEKA data mining tool was used to generate pattern using the K-Means algorithm. In addition, statistical analysis was carried out on the obtained pattern -Clusters was analyzed using Microsoft excel to get a to interpret the result. Blood Group $O^+$ has the highest rate of donors and recipients through the years and blood group $AB^-$ has the lowest rate. The rate of donors and recipients varies among the other blood groups including $O^-$, $B^+$, $B^-$, $A^+$, $A^-$, $AB^+$ were established.

**Index Terms -** Blood Bank, Decision Support System, Strategic Management, WEKA, K-Means, Data Analysis

## 1 INTRODUCTION

Blood is essential to life and its Importance to all existence cannot be over emphasized. Blood transfusions are needed to treat patients with acute care needs such as trauma, as well as for ongoing disease management, including cancer, inherited blood disorders, cardiovascular and orthopedic surgeries, and organ and bone marrow transplants. A minimum inventory of fully processed, transfusable components is critical in order to respond adequately to man-made and/or natural disasters that range from supplying immediate patient needs following a mass trauma incident to ensuring an adequate blood supply during extended local or regional system disruptions (e.g. hurricanes, new emerging diseases, etc.) that result in an inability to collect and process blood normally.

Due to the lack of communication between the blood donors and the blood recipients, most of the patients in need of blood do not get blood on time and hence lose their lives safety. Even at most times, the ability to make available the required blood components and type to patients as at when due is still restricted, especially in low-income countries. Since Individual patients may require special blood types, some of which can be very rare. Also, the very short shelf life of platelets (5-7 days) and red cells (21-42 days) presents the biggest challenge to most blood banks in Hospitals of countries across the whole world, as it necessitates the maintenance of a continuous replacement inventory of diverse donors and donations, regardless of the time of year, weather, or other challenges affecting the collection of blood products [1].

- *Oluyinka I. Omotosho is an Associate Professor in the Department of Cyber Security Science, Ladoke Akintola University of Technology, Ogbomosho. E-mail: oluyinkaa14@gmail.com*
- *Justice O. Emuoyibofarhe is Professor in the Department of Information Systems, Ladoke Akintola University of Technology, Ogbomosho, E-mail: joemuoiborfarhe@lautech.edu.*

Apart from cheap patients' immortality rate, these improper management of blood leads to wastage of the available blood inventory and while the improper communication and synchronization between the blood banks and hospitals leads to wastage of the blood available. The healthcare system is dependent on the availability of Blood products on a 24/7 basis [1], hence, an urgent need of synchronization between the blood donors and hospitals and the blood banks [2].

In this paper, The Data mining approach is employed in developing a strategic data driven decision support system for effective blood bank activities monitoring and management. By analyzing the blood bank data histories for anticipatory blood group banking.

## 2. LITERATURE REVIEW

Blood is a body fluid in the circulatory system of humans and other vertebrates that delivers necessary substances such as nutrients and oxygen to the cells, and transports metabolic waste products away from those same cells [3]. Blood circulates through our body and delivers essential substances like oxygen and nutrients to the body's cells. It also transports metabolic waste products away from those same cells. Blood donors plays important role in the healthcare of patients. [4]. A blood bank is a place where blood is collected and stored before it is used for transfusions. World Health Organization (WHO) Supports countries in developing national blood systems to ensure timely access to safe and sufficient supplies of blood and blood products and good transfusion practices to meet patient needs [5].

Blood banking is the process that takes place in the lab to make sure that donated blood, or blood products, are safe before they are used in blood transfusions and other medical procedures. Blood banking includes typing the blood for transfusion and testing for infectious diseases [6]. 38% of the blood collected in low-income countries is separated into components, 75% in lower-middle-income countries, 96% in upper-middle-income countries, and 96% in high-income countries [6].

Quality-assured screening of all donated blood for transfusion-transmissible infections, including HIV, hepatitis B, hepatitis C and syphilis, confirmatory testing of the results of all donors screen-reactive for infection markers, blood grouping and compatibility testing, and systems for processing blood into blood products (blood components for transfusion and plasma derived-medicinal products), as appropriate, to meet health care needs [5]. Strategic management is the ongoing planning, monitoring, analysis and assessment of all necessities an organization needs to meet its goals and objectives. The strategic management process helps organizations take stock of their present situation, chalk out strategies, deploy them and analyze the effectiveness of the implemented management strategies [7].

A decision support system, or DSS, is a computer-based information system that organizes, collects and analyzes business or health data that can be used in decision-making activities for the management, operation and planning in an organization or business. It provide businesses with more accurate projections, better inventory management and data analysis [8]. The typical types of information that are gathered by a DSS include sales figures, projected revenue and inventory data that has been organized into relational databases, which is a collection of data with predefined relationships, for analysis and comparative sales figures between specific, selected time periods. A good DSS helps decision-makers with compiling various types of data gathered from several different sources, including documents, raw data, management, business models and personal knowledge from employees [8].

Data-driven DSSs (as such one implemented in this work) uses quality data to determine a course of action based on a systematic process. They strategically break down questions and goals into pieces based on data [8]. The main techniques that are mostly used in data-based DSS for analyzing the data are online analytical processing (OLAP) and data mining [9]. Data mining involves the process of digging through historical data, to discover hidden connections and predict future trends [10]. It involves analyzing enormous amounts of information and datasets, extracting (or "mining") useful intelligence to help organizations solve problems, predict trends, mitigate risks, and find new opportunities [11].

Data Mining is primarily used by organizations with intense consumer demands. Data mining in healthcare has excellent potential to improve the health system. It uses data and analytics for better insights and to identify best practices that will enhance health care services and reduce costs. Analysts use data mining approaches such as Machine learning, Multi-dimensional database, Data visualization, Soft computing, and statistics. Data mining helps doctors create more accurate diagnoses by bringing together every patient's medical history, physical examination results, medications, and treatment patterns. Mining also helps fight fraud and waste and bring about a more cost-effective health resource management strategy. Mining also helps fight fraud and waste and bring about a more cost-effective health resource management strategy [11]. Data mining tools and applications utilize machine learning algorithms, statistical analysis, artificial intelligence and database systems [12].

Waikato Environment for Knowledge Analysis (WEKA) an open source software provides tools for data preprocessing, implementation of several Machine Learning algorithms, and visualization tools so that you can develop machine learning techniques and apply them to real-world data mining problems [13]. Basically, it is a collection of machine learning algorithms for data mining tasks. It contains tools for data preparation, classification, regression, clustering, association rules mining, and visualization. It can be used to detect the various hidden patterns in your dataset and find the most determining factors out of many [13].

K-means clustering is the most commonly used unsupervised machine learning algorithm for partitioning a given data set into a set of *k* groups (i.e. *k* clusters), where *k* represents the number of groups pre-specified by the analyst. It classifies objects in multiple groups (i.e., clusters), such that objects within the same cluster are as similar as possible (i.e., high intra-class similarity), whereas objects from different clusters are as dissimilar as possible (i.e., low inter-class similarity). In k-means clustering, each cluster is represented by its center (i.e, centroid) which corresponds to the mean of points assigned to the cluster [14].

The basic idea behind k-means clustering consists of defining clusters so that the total intra-cluster variation (known as total within-cluster variation) is minimized. There are several k-means algorithms available. The standard algorithm is the Hartigan-Wong algorithm (1979), which defines the total within-cluster variation as the sum of squared distances Euclidean distances between items and the corresponding centroid:

$$W(C_k)=\sum_{xi\in C_k}(x_i-\mu_k)^2$$

where:

- $x_i$ is a data point belonging to the cluster $C_k$
- $\mu_k$ is the mean value of the points assigned to the cluster $C_k$

Each observation ($x_i$) is assigned to a given cluster such that the sum of squares (SS) distance of the observation to their assigned cluster centers ($\mu_k$) is minimized.

We define the total within-cluster variation as follows:

$$\text{tot.withiness} = \sum_{k=1}^{k} W(C_k) = \sum_{k=1}^{k}{}_{k=1}\sum_{xi\in C_k}(x_i-\mu_k)^2$$

The *total within-cluster sum of square* measures the compactness (i.e goodness) of the clustering and we want it to be as small as possible [14].

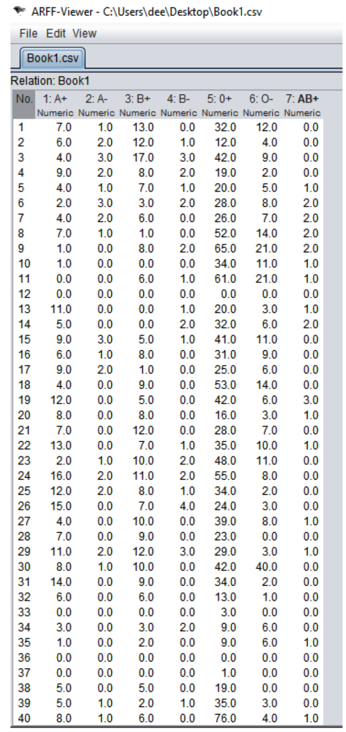
## 3. METHOD

In this work, the Data mining Technique is used, with WEKA as the Data mining tool. Figure 1 Shows the Weka's Graphic Interface. Basically, in order to achieve the required result in this work, Data Acquisition, Data Integration, Data Preprocessing, Data Segration and Result analysis stages were explored in WEKA:


**Fig. 1: Weka's Graphical Interface**

### 3.1 Data Analysis Procedure

Raw data used in this work was collected from the Hematology department of a metropolitan hospital. The data acquired are based on the number of donors, blood groups, accumulated number of blood received by the patients over a period of four (4) years. The raw data acquired were integrated by importing them to Microsoft Excel, summarizing them on yearly basis and storing them in the CSV format in order to have a feel of the Data. The dataset were then opened in WEKA for Preprocessing in ARFF format. Figure 2 shows ARFF format of data. . Figure 3 shows a Visualized Preprocessing Page.



ARFF-Viewer - C:\Users\dee\Desktop\Book1.csv

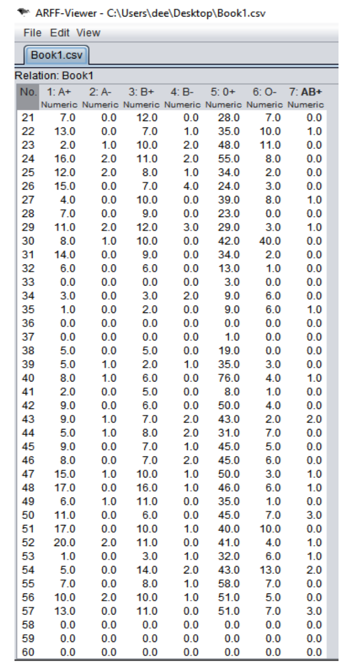
File Edit View

Book1.csv

Relation: Book1

| No. | 1: A+ Numeric | 2: A- Numeric | 3: B+ Numeric | 4: B- Numeric | 5: 0+ Numeric | 6: O- Numeric | 7: AB+ Numeric |
|---|---|---|---|---|---|---|---|
| 1 | 7.0 | 1.0 | 13.0 | 0.0 | 32.0 | 12.0 | 0.0 |
| 2 | 6.0 | 2.0 | 12.0 | 1.0 | 12.0 | 4.0 | 0.0 |
| 3 | 4.0 | 3.0 | 17.0 | 3.0 | 42.0 | 9.0 | 0.0 |
| 4 | 9.0 | 2.0 | 8.0 | 2.0 | 19.0 | 2.0 | 0.0 |
| 5 | 4.0 | 1.0 | 7.0 | 1.0 | 20.0 | 5.0 | 1.0 |
| 6 | 2.0 | 3.0 | 3.0 | 2.0 | 28.0 | 8.0 | 2.0 |
| 7 | 4.0 | 2.0 | 6.0 | 0.0 | 26.0 | 7.0 | 2.0 |
| 8 | 7.0 | 1.0 | 1.0 | 0.0 | 52.0 | 14.0 | 2.0 |
| 9 | 1.0 | 0.0 | 8.0 | 2.0 | 65.0 | 21.0 | 2.0 |
| 10 | 1.0 | 0.0 | 0.0 | 0.0 | 34.0 | 11.0 | 1.0 |
| 11 | 0.0 | 0.0 | 6.0 | 1.0 | 61.0 | 21.0 | 1.0 |
| 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 | 11.0 | 0.0 | 0.0 | 1.0 | 20.0 | 3.0 | 1.0 |
| 14 | 5.0 | 0.0 | 0.0 | 2.0 | 32.0 | 6.0 | 2.0 |
| 15 | 9.0 | 3.0 | 5.0 | 1.0 | 41.0 | 11.0 | 0.0 |
| 16 | 6.0 | 1.0 | 8.0 | 0.0 | 31.0 | 9.0 | 0.0 |
| 17 | 9.0 | 2.0 | 1.0 | 0.0 | 25.0 | 6.0 | 0.0 |
| 18 | 4.0 | 0.0 | 9.0 | 0.0 | 53.0 | 14.0 | 0.0 |
| 19 | 12.0 | 0.0 | 5.0 | 0.0 | 42.0 | 6.0 | 3.0 |
| 20 | 8.0 | 0.0 | 8.0 | 0.0 | 16.0 | 3.0 | 1.0 |
| 21 | 7.0 | 0.0 | 12.0 | 0.0 | 28.0 | 7.0 | 0.0 |
| 22 | 13.0 | 0.0 | 7.0 | 1.0 | 35.0 | 10.0 | 1.0 |
| 23 | 2.0 | 1.0 | 10.0 | 2.0 | 48.0 | 11.0 | 0.0 |
| 24 | 16.0 | 2.0 | 11.0 | 2.0 | 55.0 | 8.0 | 0.0 |
| 25 | 12.0 | 2.0 | 8.0 | 1.0 | 34.0 | 2.0 | 0.0 |
| 26 | 15.0 | 0.0 | 7.0 | 4.0 | 24.0 | 3.0 | 0.0 |
| 27 | 4.0 | 0.0 | 10.0 | 0.0 | 39.0 | 8.0 | 1.0 |
| 28 | 7.0 | 0.0 | 9.0 | 0.0 | 23.0 | 0.0 | 0.0 |
| 29 | 11.0 | 2.0 | 12.0 | 3.0 | 29.0 | 3.0 | 1.0 |
| 30 | 8.0 | 1.0 | 10.0 | 0.0 | 42.0 | 40.0 | 0.0 |
| 31 | 14.0 | 0.0 | 9.0 | 0.0 | 34.0 | 2.0 | 0.0 |
| 32 | 6.0 | 0.0 | 6.0 | 0.0 | 13.0 | 1.0 | 0.0 |
| 33 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| 34 | 3.0 | 0.0 | 3.0 | 2.0 | 9.0 | 6.0 | 0.0 |
| 35 | 1.0 | 0.0 | 2.0 | 0.0 | 9.0 | 6.0 | 1.0 |
| 36 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 37 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 |
| 38 | 5.0 | 0.0 | 5.0 | 0.0 | 19.0 | 0.0 | 0.0 |
| 39 | 5.0 | 1.0 | 2.0 | 1.0 | 35.0 | 3.0 | 0.0 |
| 40 | 8.0 | 1.0 | 6.0 | 0.0 | 76.0 | 4.0 | 1.0 |

**Figure 2 (a) ARFF view of 2015-2019 Donors**



ARFF-Viewer - C:\Users\dee\Desktop\Book1.csv

File Edit View

Book1.csv

Relation: Book1

| No. | 1: A+ Numeric | 2: A- Numeric | 3: B+ Numeric | 4: B- Numeric | 5: 0+ Numeric | 6: O- Numeric | 7: AB+ Numeric |
|---|---|---|---|---|---|---|---|
| 21 | 7.0 | 0.0 | 12.0 | 0.0 | 28.0 | 7.0 | 0.0 |
| 22 | 13.0 | 0.0 | 7.0 | 1.0 | 35.0 | 10.0 | 1.0 |
| 23 | 2.0 | 1.0 | 10.0 | 2.0 | 48.0 | 11.0 | 0.0 |
| 24 | 16.0 | 2.0 | 11.0 | 2.0 | 55.0 | 8.0 | 0.0 |
| 25 | 12.0 | 2.0 | 8.0 | 1.0 | 34.0 | 2.0 | 0.0 |
| 26 | 15.0 | 0.0 | 7.0 | 4.0 | 24.0 | 3.0 | 0.0 |
| 27 | 4.0 | 0.0 | 10.0 | 0.0 | 39.0 | 8.0 | 1.0 |
| 28 | 7.0 | 0.0 | 9.0 | 0.0 | 23.0 | 0.0 | 0.0 |
| 29 | 11.0 | 2.0 | 12.0 | 3.0 | 29.0 | 3.0 | 1.0 |
| 30 | 8.0 | 1.0 | 10.0 | 0.0 | 42.0 | 40.0 | 0.0 |
| 31 | 14.0 | 0.0 | 9.0 | 0.0 | 34.0 | 2.0 | 0.0 |
| 32 | 6.0 | 0.0 | 6.0 | 0.0 | 13.0 | 1.0 | 0.0 |
| 33 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| 34 | 3.0 | 0.0 | 3.0 | 2.0 | 9.0 | 6.0 | 0.0 |
| 35 | 1.0 | 0.0 | 2.0 | 0.0 | 9.0 | 6.0 | 1.0 |
| 36 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 37 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 |
| 38 | 5.0 | 0.0 | 5.0 | 0.0 | 19.0 | 0.0 | 0.0 |
| 39 | 5.0 | 1.0 | 2.0 | 1.0 | 35.0 | 3.0 | 0.0 |
| 40 | 8.0 | 1.0 | 6.0 | 0.0 | 76.0 | 4.0 | 1.0 |
| 41 | 2.0 | 0.0 | 5.0 | 0.0 | 8.0 | 1.0 | 0.0 |
| 42 | 9.0 | 0.0 | 6.0 | 0.0 | 50.0 | 4.0 | 0.0 |
| 43 | 9.0 | 1.0 | 7.0 | 2.0 | 43.0 | 2.0 | 2.0 |
| 44 | 5.0 | 1.0 | 8.0 | 2.0 | 31.0 | 7.0 | 0.0 |
| 45 | 9.0 | 0.0 | 7.0 | 1.0 | 45.0 | 5.0 | 0.0 |
| 46 | 8.0 | 0.0 | 7.0 | 2.0 | 45.0 | 6.0 | 0.0 |
| 47 | 15.0 | 1.0 | 10.0 | 1.0 | 50.0 | 3.0 | 1.0 |
| 48 | 17.0 | 0.0 | 16.0 | 1.0 | 46.0 | 6.0 | 1.0 |
| 49 | 6.0 | 1.0 | 11.0 | 0.0 | 35.0 | 1.0 | 0.0 |
| 50 | 11.0 | 0.0 | 6.0 | 0.0 | 45.0 | 7.0 | 3.0 |
| 51 | 17.0 | 0.0 | 10.0 | 1.0 | 40.0 | 10.0 | 0.0 |
| 52 | 20.0 | 2.0 | 11.0 | 0.0 | 41.0 | 4.0 | 1.0 |
| 53 | 1.0 | 0.0 | 3.0 | 1.0 | 32.0 | 6.0 | 1.0 |
| 54 | 5.0 | 0.0 | 14.0 | 2.0 | 43.0 | 13.0 | 2.0 |
| 55 | 7.0 | 0.0 | 8.0 | 1.0 | 58.0 | 7.0 | 0.0 |
| 56 | 10.0 | 2.0 | 10.0 | 1.0 | 51.0 | 5.0 | 0.0 |
| 57 | 13.0 | 0.0 | 11.0 | 0.0 | 51.0 | 7.0 | 3.0 |
| 58 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 59 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Figure 2 (b) ARFF view of 2015-2019 Recipients**




**Fig. 3: Visualized View of the ARFF Data**

### 3.2 WEKA K-Means Clustering Result

To achieve the basic goal of auto pattern derivation and Clustering, K-Means Clustering technique is used. K-means clustering is an algorithm used to classify or to group the data based on attributes/features into k number of group, known as Clusters. K is positive integer number. The main idea is to define k centroids, which are points at random as clusters centers for each cluster. Then the algorithm automatically normalize the numerical attribute during the distance computations. This work uses the WEKA simple k-means algorithm Euclidean distance measure to compute distance between instances and clusters. After mining the data using clustering technique, it became possible to identify pattern from the dataset. The pattern which are considered here are Number of people that donated blood from the year 2015-2019 and Number of people that

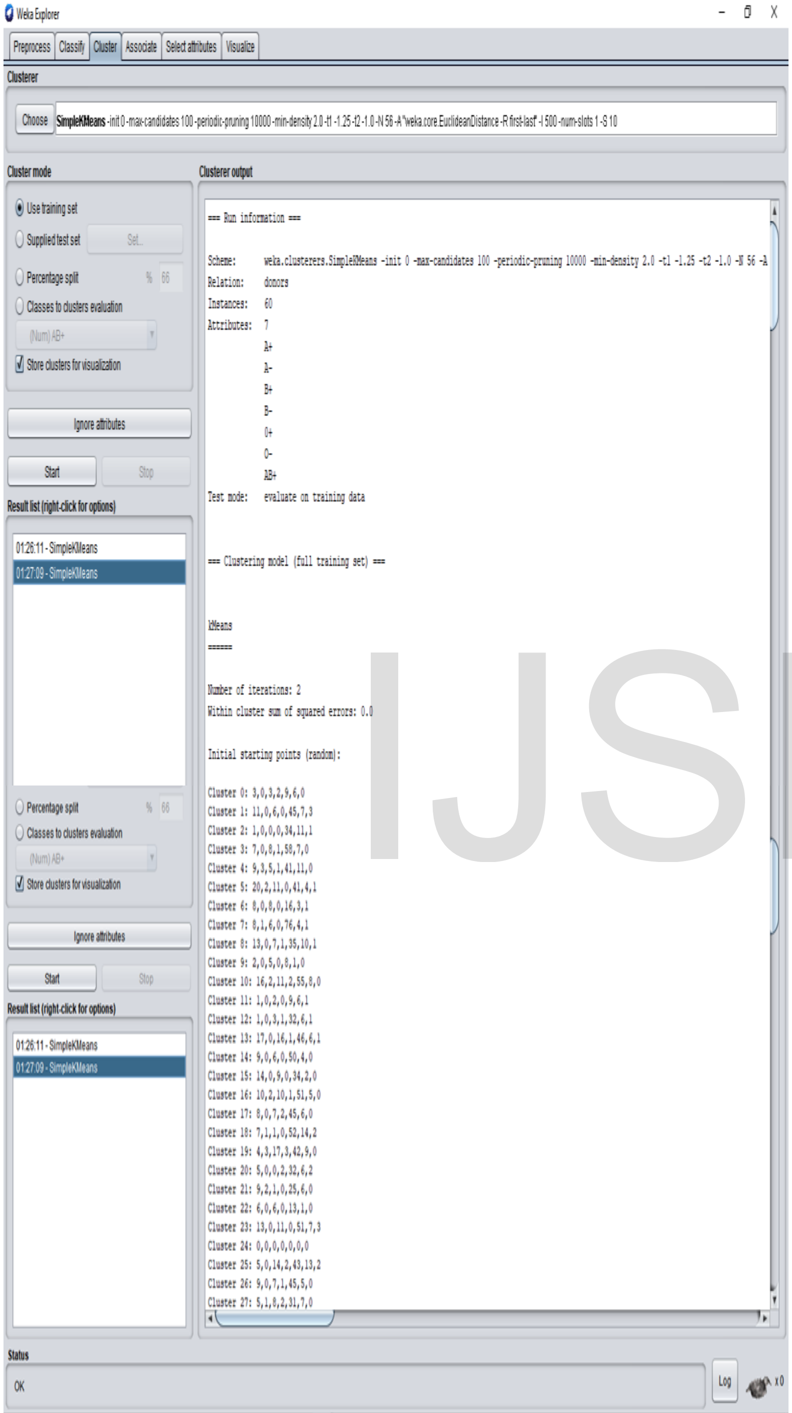



**Figure 4. Outcome from donor dataset using k-means cluster**

From the Clustered Output interface, 55 Clusters are generated on two iterations with 0.0 Clusters sum of squared errors from the Donors Data set. Figure 5 show the Final display of the Clusters Centroids.

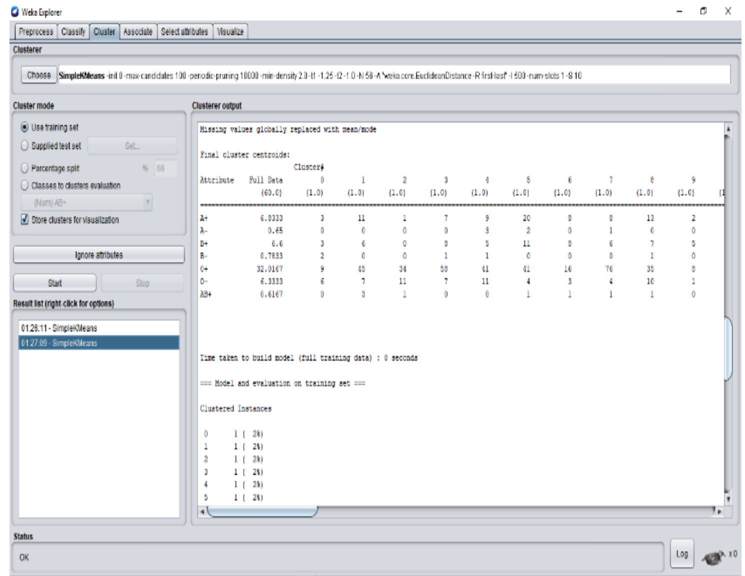



**Figure 5 shows Donors' Clusters associated Centroids**

Figure 6 shows the Outcome of the Clustering on the Recipients dataset. In this case, 57 Clusters are generated on two iterations with 0.0 Clusters sum of squared errors from the Recipients Data set based on the based on seven blood group attributes. Also, Figure 7 show the Final display of the Clusters Centroids.

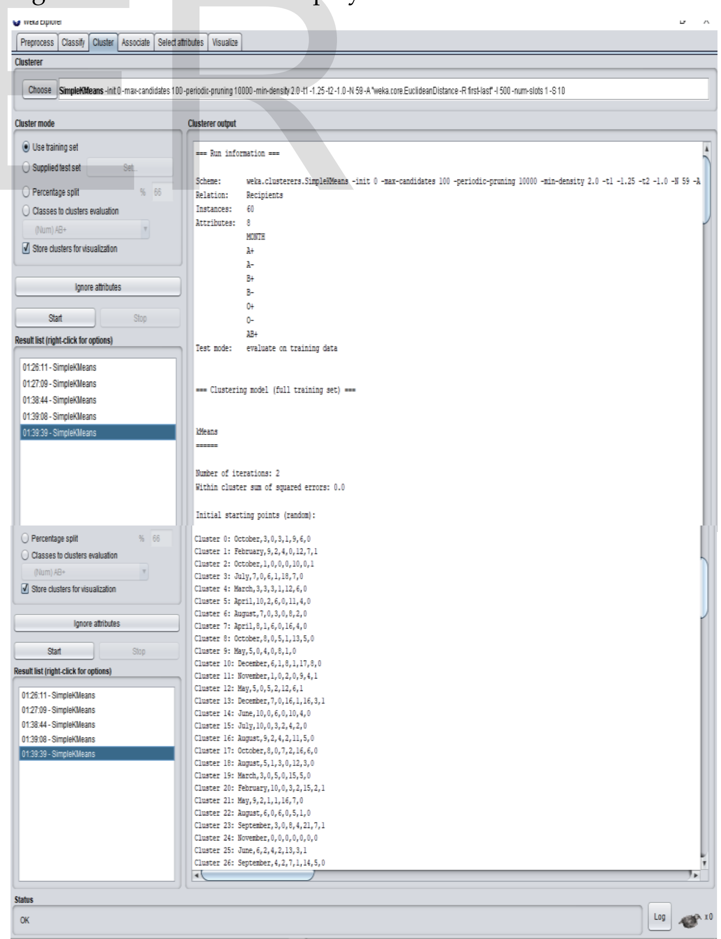



**Figure 6. Outcome from recipients' dataset using k-means cluster**

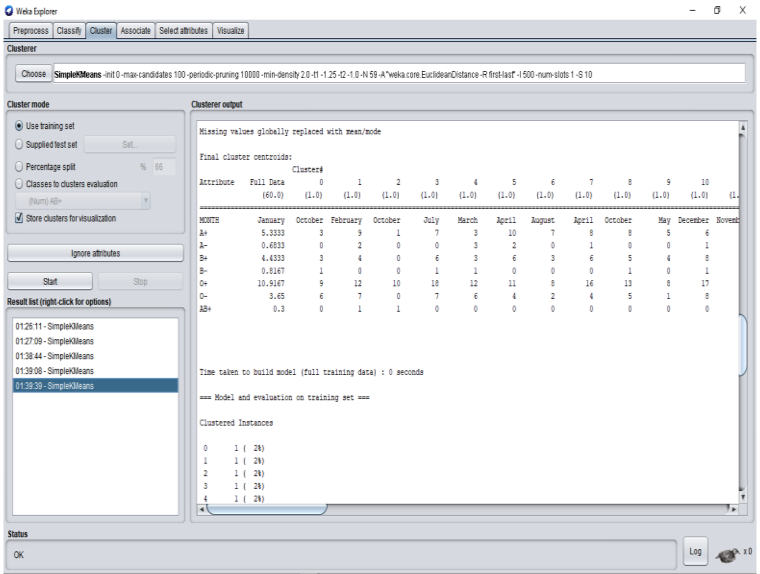


**Figure 7 shows Recipients' Dataset Clusters associated Centroids**

The Weka analysis and shows that the percentage of the total donors and Recipients patients' based on the different blood group, the result from the information shown that the instance are perfect, except for that of 2018 data set. All instances were clustered correctly in a total number of 2 iterations and has its sum of squared error to be 0 which means it error free. The first column gives us the overall population centroid. The second give you the centroid for cluster 0 and 1, respectively. Each row gives the centroid coordinate for the specific dimension.

The clusters centroids are the mean vectors for each cluster (so, each dimension value in the centroid represent the mean value for that dimension in the clusters). Hence, the centroid is majorly used to characterize the clusters. Figures 8, 9, 10 and 11 shows the Final Total Outcomes of Both Donors and Recipients dataset from the K-Means Clustering based on the Cluster Centroids.

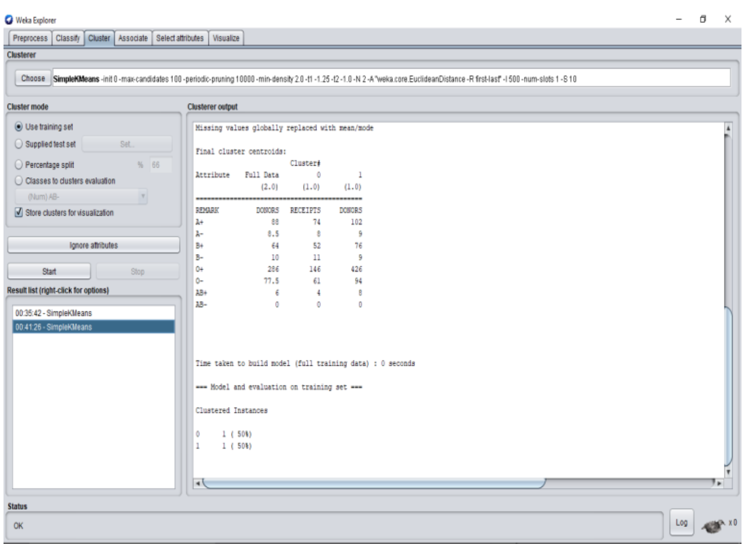


**Figure 8: Outcome of 2016 Donors versus Recepients' dataset based on their Clusters Centroids**

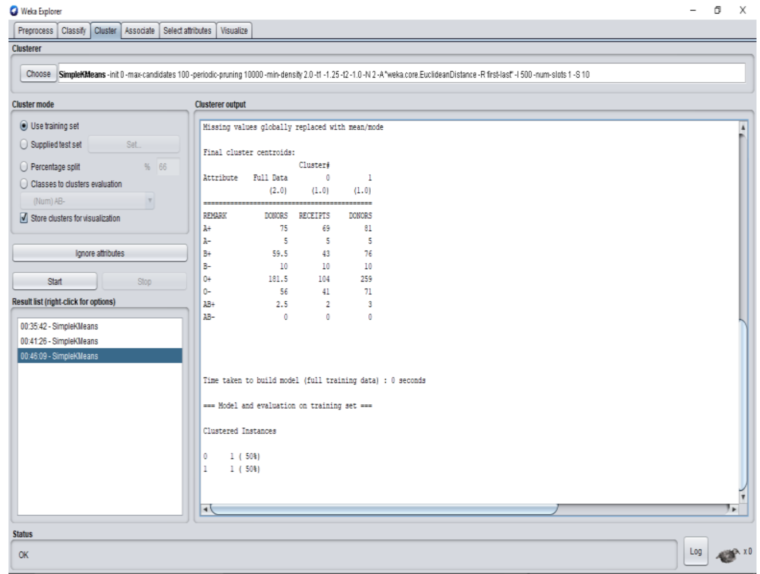


**Figure 9: Outcome of 2017 Donors versus Recepients' dataset**

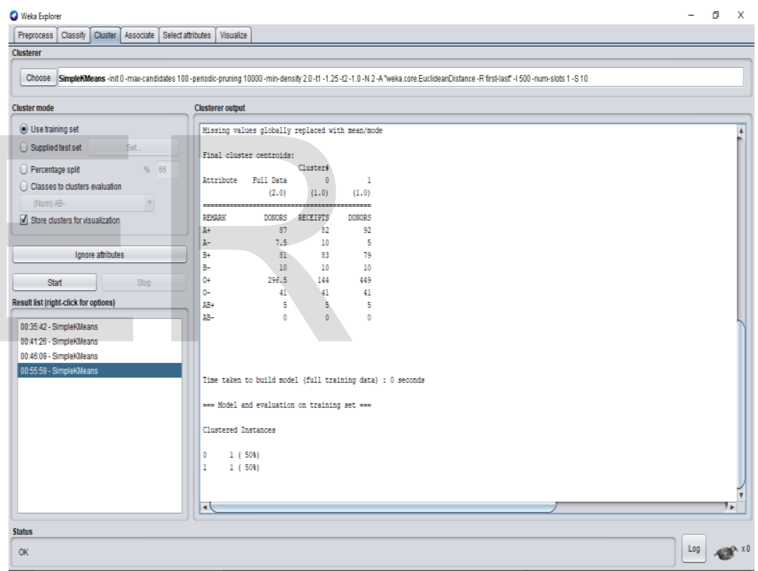


**Figure 10: Outcome of 2018 Donors versus Recepients' dataset based on their Clusters Centroids**

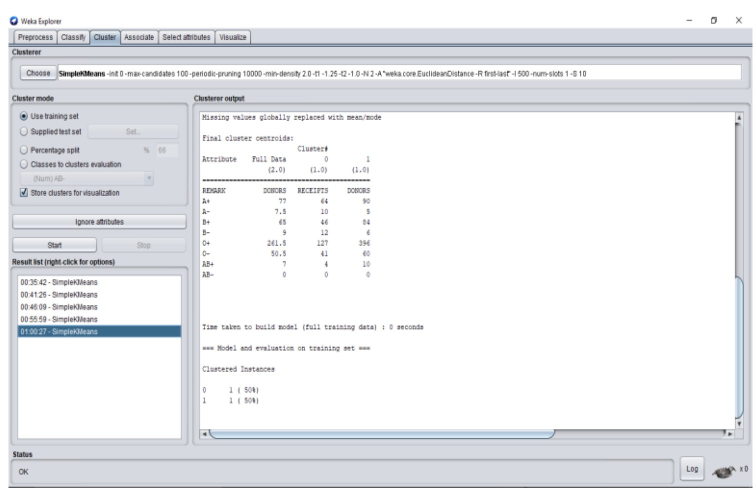


**Figure 11: Outcome of 2019 Donors versus Recipients' dataset based on their Clusters Centroids**

### 4. Descriptive Analysis of Result

Weka results of the derived patterns of clustering (k – means) were analyzed statistically using a pivot chart in Microsoft excel. Figures 12 to 16 show the statistical analysis of the rate of donors to the rate of recipients from the year 2015 to 2019.

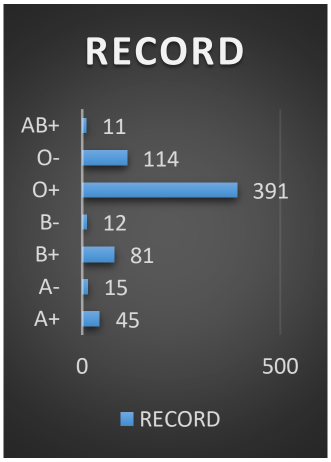



Figure 12(a) pivot chart of 2015 DONORS' Clustering

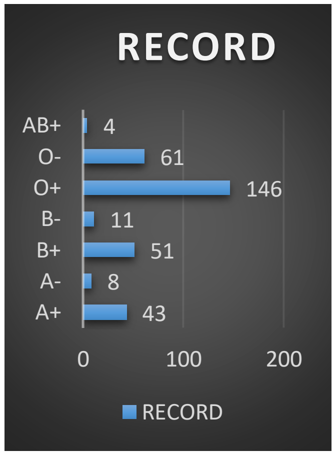



Figure 12(b) pivot chart of 2015 Recipients' Clustering

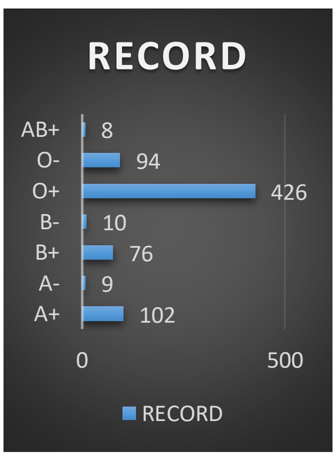



Figure 13(a) pivot chart of 2016 DONORS' Clustering

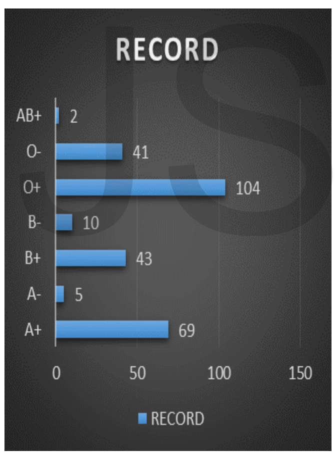



Figure 13(b) pivot chart of 2016 Recipients' Clustering

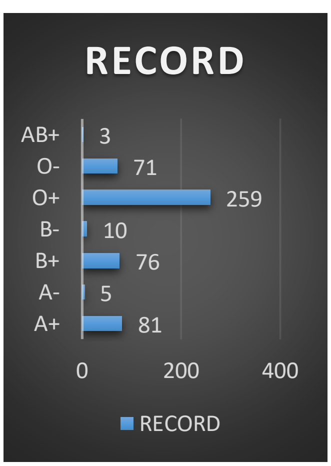



Figure 14(a) pivot chart of 2017 DONORS' Clustering

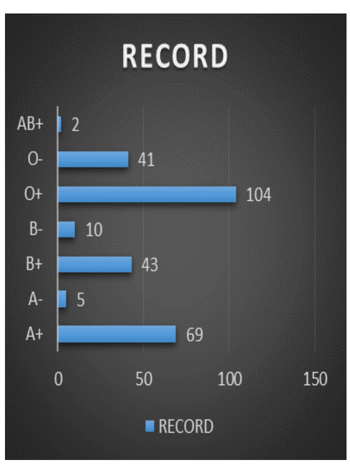



Figure 14(b) pivot chart of 2017 Recipients' Clustering

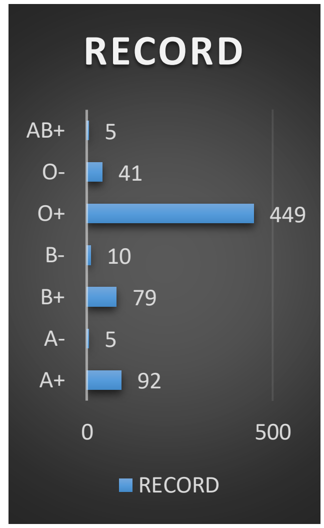



Figure 15(a) pivot chart of 2018 DONORS' Clustering

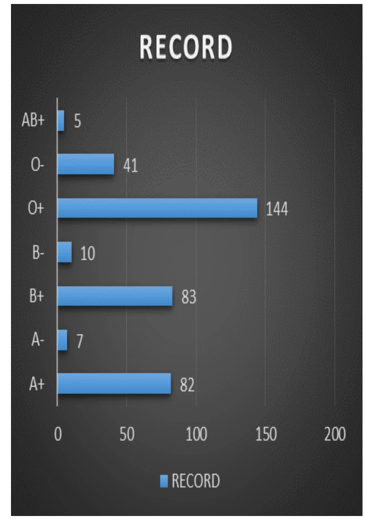



Figure 15(b) pivot chart of 2018 Recipients' Clustering

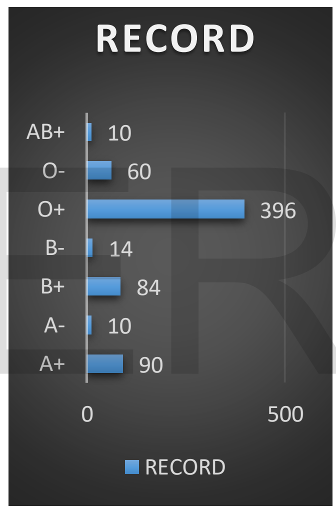



Figure 16(a) pivot chart of 2019 DONORS' Clustering

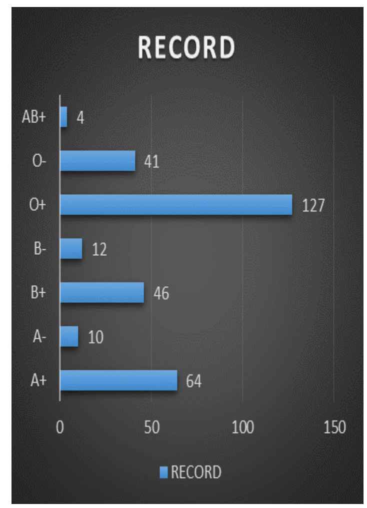



Figure 16(b) pivot chart of 2019 Recipients' Clustering

The Pivot Chart of the summarized Donors and Recipients Clustering Result for the Years 2015 to 2019 are shown in Figures 17 and 18.

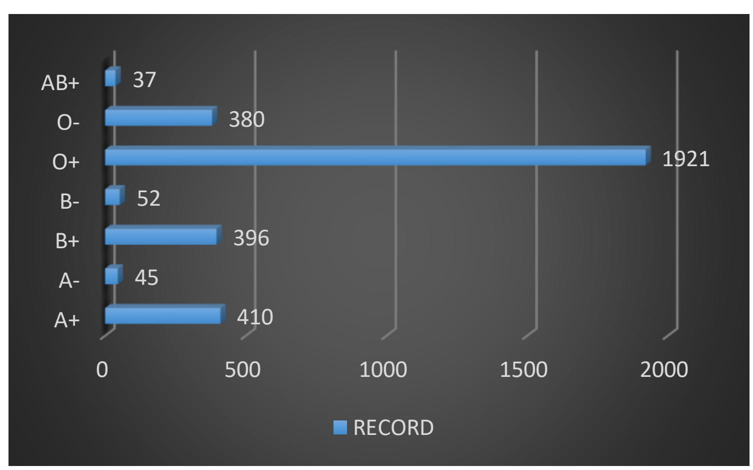



Figure 16: Pivot Chart of 2015-2019 Recipients' Clustering Result

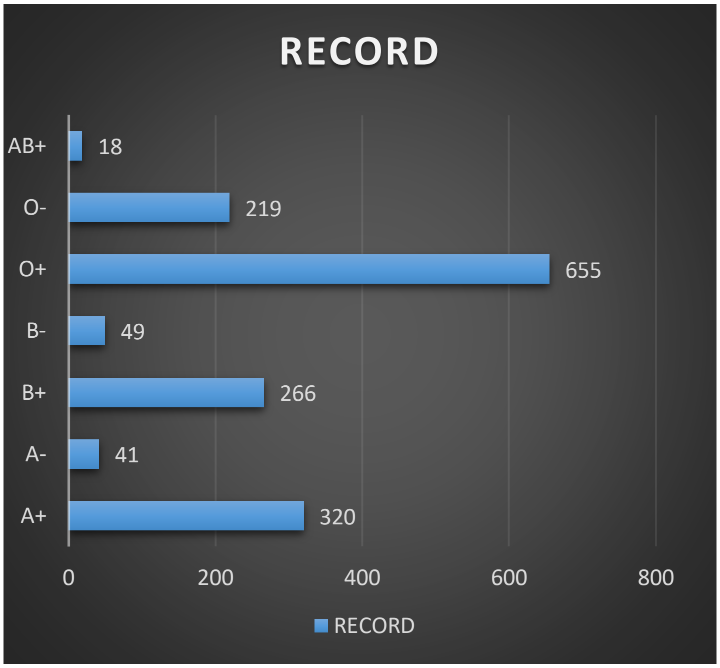



Figure 17: Pivot Chart of 2015-2019 Recipients' Clustering Result

## 5. DISCUSSION OF FINDINGS

With respect to the result of the data mining, the statistical result has shown that in year 2015, the rate of donors and recipients with blood group $O^+$ is higher than other blood groups. The rate increased progressively among the donors and recipients of blood group $O^-$, $B^+$, $B^-$, $A^+$, $A^-$, $AB^+$ but blood group $AB^-$ had neither donors nor recipients.

In the year 2016, blood group $O^+$ had the highest rate and $AB^-$ had the lowest rate of donors and recipients. The rate varied between other blood groups $O^-$, $B^+$, $B^-$, $A^+$, $A^-$ and $AB^+$. For 2017, the statistical result was similar to that of year 2016 with blood group $O^+$ having the highest rate of donors and recipients. Blood groups $A^+$, $B^+$, $O^-$, $B^-$, $A^-$ and $AB^+$ had progressive increase in the rate of donors and recipients. Blood group $AB^-$ had neither donors nor recipients.

The rate of donation for each blood groups is more than the rate of blood that is been given out Except for the year 2018 where we have 7 recipients and 5 donors for A Negative and 83 recipients and 79 donors for B Positive respectively (shown in Figure. This implies that other blood banks were are contacted for the blood group needed and Patients' Life could be endangered on non-availability of such needed Blood Group.

Also, the statistical analysis shows that rate of donors and recipients among some of the blood groups are balanced in year 2016 to 2019. These includes the B-, A-, AB+, O- and A- Blood Groups. Summarily, the Analysis shows that the Mean rate of Donors is higher than the Mean rate of Recipients, which implies availability of the associated Blood Group. Nevertheless, the implication of the former as Lifesaving Strategy also implies Wastage of scarce Resources such as Blood. Blood has a life span once it's out of the Donor and unused.

## 6. CONCLUSION

This work has shown that Data mining offers a better means of providing the major the strategies that must be in place for an effective blood bank management. This includes taking appropriated Decision based on the Analysis Result Finding which is vital in safeguarding patients' Life from untimely death based on lack of blood. The result from the study however reveals that Blood group $O^+$ has the highest number of donors and highest numbers of Recipients while $AB^+$ has the lowest number of donor and lowest number of Recipients.

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