Ethno-informatics for anthroponymy classification in Sumedang District using data mining

A S Abdullah 1, J Rejito, A Pradana 1, M M Zakaria 2, F C Permana 3, B N Ruchjana 4
1Department of Computer Science, Universitas Padjadjaran, Jl. Raya Bandung Sumedang km 21 Jatinangor, Sumedang 45363, Indonesia
2Department of History, Universitas Padjadjaran, Jl. Raya Bandung Sumedang km 21 Jatinangor, Sumedang 45363, Indonesia
3Multimedia Education Study Program, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudhi No. 229, Bandung 40154, Indonesia
4Department of Mathematics, Universitas Padjadjaran, Jl.Raya Bandung Sumedang km 21 Jatinangor, Sumedang 45363, Indonesia

*atje.setiawan@unpad.ac.id

Abstract. Ethnoscience is used to look at culture from a scientific perspective, helping to understand how to develop different forms of knowledge and beliefs. One of the fields studied in Ethnoscience is Ethno-informatics, which is the application of informatics in culture. The methodology used is the process of knowledge discovery in databases in data mining, the process of automatically extracting knowledge from large databases, to get interesting patterns so that knowledge can be obtained. The application of anthroponymy by exploring the population database in Sumedang district, the results of the 2019 census from the Sumedang District Population Office. Then the anthroponymy application was developed in Sumedang district. The results of data processing show that the top ten names of people who are most used or most favorite in Sumedang district are: Muhammad, Muhamad, Asep, Siti, Agus, Dede, Ade, Ai, Tati, Dadang. Muhammad's name has been a favorite since 2000 until now 2020. Meanwhile, the top ten favorite names that have just appeared in the last ten years (2010-2020) are sorted based on ranking including; Naura, Arsyla, Keyla, Raffa, Rafka, Aqila, Zahra, Keusha and Alesha. In general, the Sundanese name in Sumedang district is still widely used, but generally it is relatively down-to-earth, replaced by new names as an uptake of other cultural names. Changes in self-naming in Sumedang regency in particular, generally self-names in Sundanese culture in West Java, were caused by the rapid development of information and communication technology. This research is expected to provide input for the community, especially for the younger generation as a guide in their daily life. It takes a significant effort from the government to maintain it, so that local culture and wisdom, especially the naming of people in Sumedang district, generally Sundanese culture can be well preserved.

1. Introduction
Ethnoscience is used to view cultures from scientific perspectives, and it can give a better understanding of how to develop various forms of knowledge and belief. Ethnoscience study initially focuses on ecology and existing historical contributions. One of the fields studied in ethnoscience is ethno-informatics, which is an application of informatics in cultures. In this study the informatics used
is the knowledge discovery in database process in data mining, which is a process of extracting knowledge automatically from an enormous database in order to obtain interesting patterns so that knowledge can be deducted from it.

The cultural application in question is anthroponymy by exploring the population database in Sumedang region. The database is the result of the census from the Demographic Services in Sumedang in 2019. In this study, the aim to be achieved is exploring the data of the resident names in Sumedang district in the last hundred years, outlined as follows:

1. To describe the information of the resident naming in the last hundred years, including missing names, names that tend to be no longer in use, and names that are relatively new, in the form of tables and graphs.
2. To describe the information of the resident naming in the last hundred years based on urban areas and rural areas, in the form of tables, graphs and location maps.
3. To describe the information of the resident naming in the last hundred years, based on 5 regions (North, South, West, Central and East) in the form of Tables, Graphs and Location Maps.
4. To describe the favorite names of the resident naming in the last hundred years, grouped into the meaning of the resident naming based on certain indicators.
5. To develop an Anthroponymy Etno-informatics Application in Sumedang District in order to manage the resident naming information, including four subsystems in the points above.

Sumedang District has an Administrative map as presented in Figure 1. It describes the Administrative map of Sumedang District, located in the East North of the West Java Province, consisting of 26 sub-districts. The South borders the Bandung District and the Garut District, the North borders the Majalengka District, the East borders the Tasikmalaya District, the East borders the Majalengka District and the Tasikmalaya District, the West borders the West Bandung District and Subang.

As information technology and communication are developing coupled with the increasing demand of the society in obtaining information for the purpose of broadening the knowledge in order to support daily activities or making a decision, the information system becomes the solution for obtaining information quickly and accurately. The Information System can be applied in various fields; Education, Economy, Health, Culture, Environment and many more.

The application of Information Systems in the field of culture has not been commonly used, while this is required in helping explore or maintain the cultural values in certain communities. One of the possible applications is shown by developing Toponymy Information Systems to know the meaning of naming the “kampung” in East Priangan areas. This research took the data on “kampung” names in villages at four districts covering Bandung, Garut, Tasikmalaya and Ciamis.
The result of Ethno-informatics on naming the “kampung” is expected to give the description on the most names used for “kampung”, understanding the background of naming the “kampung” in the Sunda culture in East Priangan in particular, and in West Java in general. This research is expected to provide feedback for the local government and the young generation of the future Sundanese people, and those who care about culture.

This study is aimed to research the role of informatics in culture (Ethno-informatics) especially the Sundanese culture in East Priangan, to describe the followings:

1. Describing the names of “kampung” mostly used in 4 districts in East Priangan area of West Java, based on word structure, prefixes, syllables contained and complete word of “kampung” naming.
2. Classifying names of “kampung” based on various meaning categories of the “kampung” names mostly used in four districts in East Priangan areas.
3. Locating the naming of the “kampung” into the location map, to compare the similarity and typical nature in each location existing in 4 districts in East Priangan area West Java.
4. Developing and implementing the intersect set to seek the uniqueness for study research and the composition of intersection of sets to see the similarity and typical nature of “kampung” naming existing in the East Priangan area of West Java.

2. Method
2.1. Ethnoscience and Anthroponymy
Outlined in this study are various theoretical bases supporting the study, including theories related with anthroponymy culture consisting of ethnoscience, ethno-informatics, onomastics, naming and meaning. Meanwhile the model used for data processing process and system development includes data mining, spatial data mining, information system, development methodology, and set theories and spatial proximity.

a. Ethnoscience
Ethnoscience is the science of observing cultural relationship with scientific perspectives. Ethnoscience can help to understand how human develops various knowledge forms and belief and it is initially focused on ecology contribution and existing histories [1]. Various science branches studied in ethnoscience include ethnoastronomy, ethnobiology, ethnobotany, ethnoecology, ethnomedicine, ethnopharmaceutical, ethnozoology, traditional knowledge, and ethnomathematics.

b. Ethno-informatics
“Ethnomathematics is mathematics practiced between cultural groups identified as national community, ethnic, working class, children of certain age group, and professional class”. Applying the same logic, in this study the author defines ethno-informatics as the application of informatics in culture [2, 3].

c. Onomastic
The science of naming is onomastic, consisting of two branches; anthroponymy, which is a science examining the history or origin of the naming of people and Toponymy, which is a science examining the history or origin of the naming of locations [4].

d. Naming
Naming is a property first given by parents during childbirth. Name is a sign that represents a universe of complex problems that are always attached to each individual. The practice of naming is a manifestation of psychological condition of the society in macro order: how one images oneself and surface one’s image to the outside world, reflecting thinking structure of its citizen. There are three points of view in the cosmology of the self-naming system in a society. The first, the static view, which is a point of view observing name as an object or a static form of speech. The Second, dynamic view, which is a view seeing naming in its moving state from time to time, experiencing changes.
Third, strategic view, which is a strategical aspect from phenomenon accumulation, including its changes and its development and related to the relationship between culture with language in self-naming [5].

e. Meaning
Meaning is the definition concluded from a word, so the meaning of the object is closely linked and one with each other. If a word cannot be related to a particular object, an event or a situation, then we cannot derive the meaning of that word. Semantics is the science that examines meaning, semantics examines symbols or signs that express meaning, the relationship of meaning to one another and their influence on humans [6].

f. Set
A set is a group of objects having certain and clear conditions. The group can be in the form of lists, collections and classes. Objects can be concrete or abstract objects. Set operations consist of a combination, an intersection, a complement, a two-set difference (symmetry difference). The intersection of two sets A and B is the set of all members of set A and set B [7].

h. Location Similarity
To observe the connection between one object and other objects, the first law of geography which states that “one object must be related to another object but objects close in proximity will have higher relationship extent” will be employed [8].

f. Data mining
Data mining is a process of extracting knowledge automatically from an enormous database in order to obtain an interesting pattern so that it forms a knowledge. The process involves data mining, data preprocessing, data cleaning, transformation, merging and data selection, data mining involving model utilization to process data, and postprocessing consisting of visualization, processing results interpretation, and knowledge. The functions of data mining are descriptive and predictive [9].

i. Information System
Information system can be defined technically as a set of components related to each other which gathers (or obtains), processes, stores, and distributes information to support decision making and control in an organization [10].

2.2 Knowledge Discovery in Database
The study method used in this research follows the discovery process stages in database in data mining. The stages are: preprocessing stage, data mining processing stage, and post processing stage followed with system development method [9].

a. System Development Method
The system development method used in this study is the waterfall method (linear sequential model). This method suggests a systematic and consequential approach in the development of software beginning from analysis, design, coding, and testing [11].

b. User Interface Design
In this study, an Ethno-informatics application was built on the naming people Anthroponymy in Sumedang district. One of the designs is shown with the following User Interface Design Diagram as shown in Figure 2 [12].
Figure 2. User interface design

Figure 2 explains the Ethnoinformatics Application in Naming People Anthroponymy in Sumedang district consisting of the main menu and six sub menus which include: First, the Select Location Menu is used to select sub-district locations, village and city locations as well as the location of five regions in Sumedang district. The second menu is the Name search menu to display a person's name, age and district address. The third menu displays select description to show recapitulation of missing names, names that is relatively declining in use, and missing names. The fourth menu displays the graph of the names of the people of the last hundred years. The fifth menu displays the location map of Sumedang district, both for village and city maps, as well as maps of five regions. The sixth menu displays the meaning of the name. The last or seventh menu is a menu displaying the output to the screen, to files and to the printer.

2.3. Classification Distribution of the Study Data

In this study the data of Sumedang District is classified into 3 kinds, first the recapitulation of the data of the population number according to the sub-district in Sumedang District, second the data of the population number is classified according to the urban and rural populations and third the Sumedang district data is divided into 5 locations. These are shown in Table 1, Table 2, and Table 3.

Table 1. Recapitulation on the number of population in Sumedang District based on the number of subdistrict

| NO_PROP | NO_KAB | NO_KEC | Name of Sub District | Population |
|---------|--------|--------|----------------------|------------|
| 1       | 32     | 11     | 1 Wado               | 43,522     |
| 2       | 32     | 11     | 2 Jatinunggal        | 45,454     |
| 3       | 32     | 11     | 3 Darmaraja          | 37,048     |
| 4       | 32     | 11     | 4 Cibugel            | 24,394     |
| 5       | 32     | 11     | 5 Cisitu             | 30,632     |
| 6       | 32     | 11     | 6 Situraja           | 42,231     |
| 7       | 32     | 11     | 7 Conggeang          | 29,331     |
| 8       | 32     | 11     | 8 Paseh              | 38,452     |
| 9       | 32     | 11     | 9 Surian             | 11,596     |
| 10      | 32     | 11     | 10 Buahdua           | 32,874     |
| 11      | 32     | 11     | 11 Tanjungsari       | 83,640     |
| 12      | 32     | 11     | 12 Sukasari          | 32,040     |
| 13      | 32     | 11     | 13 Panulihan         | 60,800     |
| 14      | 32     | 11     | 14 Cimanggung        | 84,910     |
Table 1 describes the total population of Sumedang district as many as 1,151,870 people. The three sub-districts with the largest population are North Sumedang Sub-District (96,762), Jatinangor Sub-District (90,474), and Cimanggung Sub-District (84,910). The three Sub-Districts with the smallest population are Jatigede Sub-District (22,268), Cisarua Sub-District (20,992), and Surian Sub-District (11,596). Meanwhile, the average population in Sumedang District is 44302.69.

Table 2. The number of urban and rural population of Sumedang District

| No. | Location | Population |
|-----|----------|------------|
| 1   | Rural    | 648,709    |
| 2   | Urban    | 503,161    |

Total Population: 1,151,870

Table 2 describes the population of Sumedang District based on rural and urban areas to highlight the differences in the names of people in rural locations with a population of 648,709 and urban locations with a population of 503,161. The sub-districts included in the rural group include 15 sub-districts: Buahdua, Cibugel, Cisitu, Conggeang, Darmaraja, Jatigede, Jatinunggal, Pamulihan, Rancakalong, Sukasari, Surian, Tanjungkerta, Tanjungmedar, Ujungjaya, Wado with a total rural population of 648,709. On the other hand, the Districts included in the urban group are 11 Districts: Cimalaka, Cimanggung, Cisarua, Ganeas, Jatinangor, Paseh, Situraja, Sumedang Utara, Sumedang Selatan, Tomo, and Tanjungsari, with a total rural population of 503161.

Table 3. Population based on 5 areas of Sumedang District

| No. | Location | Population |
|-----|----------|------------|
| 1   | North    | 167,362    |
| 2   | South    | 304,100    |
| 3   | West     | 217,159    |
| 4   | East     | 177,633    |
| 5   | Central  | 285,616    |

Total Population: 1,151,870
Table 3 describes the grouping of names of people in Sumedang district into 5 regions with the following divisions: Northern region location, consisting of sub-districts; Conggeang, Paseh, Surian, Buahdua, Tomo and Ujungjaya, with a total population of 167,362, Southern region location, consisting of Wado Cibugel, Pamulihan, Cimanggung, Jatinangor sub-districts with a total population of 304,100, Western region location, consisting of Tanjungsari, Sukasari, Rancakalong, Tanjungmedar, and Tanjungkerta sub-districts, with a total population of 217,159, Eastern region location, consisting of Jatinunggal, Darmaraja, Cisitu, Situraja and Jatigede sub-districts, with a total population of 177,533, and the location of the Central region consisting of South Sumedang, North Sumedang, Ganeas, Cimalaka, and Cisarua, with a total population of 285,616.

3. Result and Discussion
3.1 Anthroponymy Application
We built an anthroponymy application based on Java programming following an algorithm as seen in Figure 3.

Figure 3. The people naming ethno-informatics application

Examples of several outputs of the anthroponymy application program produced is shown as follows:

a. The distribution of the Sumedang population in the last hundred years
Table 4 shows that in Sumedang District there are people who were born before 1910 or aged approximately 120 years old, as many as 5 people. Meanwhile, the number of people who are born in or after 2020 is relatively small, because the data have not been included in this study. From 2000 to 2010 there was a surge in births, so it is necessary to anticipate this even though the next ten years will be relatively declining.
Table 4. Population distribution of Sumedang district based on year of birth

| NO | Interval of Age | Number of Population |
|----|-----------------|----------------------|
| 1  | X < 1910        | 5                    |
| 2  | 1910<=X<1920    | 96                   |
| 3  | 1920<=X<1930    | 2,509                |
| 4  | 1930<=X<1940    | 15,510               |
| 5  | 1940<=X<1950    | 48,167               |
| 6  | 1950<=X<1960    | 96,474               |
| 7  | 1960<=X<1970    | 140,523              |
| 8  | 1970<=X<1980    | 156,348              |
| 9  | 1980<=X<1990    | 162,280              |
| 10 | 1990<=X<2000    | 177,578              |
| 11 | 2000<=X<2010    | 183,713              |
| 12 | 2010<=X<2020    | 171,479              |
| 13 | X>=2020         | 46                   |
|    | **Total Number of Population** | **1,154,728** |

b. First names mostly used in Sumedang District

Figure 4 shows the most used or the most favorite first names of people in Sumedang District. The top ten names or favorite names in Sumedang District are: Muhammad, Muhamad, Asep, Siti, Agus, Dede, Ade, Ai, Tati, Dadang.

![Figure 4](image1.png)

Figure 4. Favorite names in Sumedang District

c. First names mostly used in the rural areas of the Sumedang District

Table 5 shows the most used or the most favorite first names of people in the rural areas in Sumedang District. The top ten names or favorite names in the rural areas of the Sumedang District are: Siti, Dede, Muhammad, Ade, Muhamad, Asep, Ai, Agus, Amad, and Cucu.
d. First names mostly used in the urban areas in Sumedang District

Table 6 shows the most used or the most favorite first names of people in the urban areas of Sumedang District. The top ten names or favorite names in the urban areas of Sumedang District are: Muhammad, Muhamad, Siti, Dede, Asep, Agus, Ade, Ai, Agus, Sri, Ai, and Ahmad.

Table 6. The favorite names in the urban area in Sumedang district

| No. | Name   | Urban  |
|-----|--------|--------|
| 1   | MUHAMMAD | 3963   |
| 2   | MUHAMAD  | 2516   |
| 3   | SITI    | 2383   |
| 4   | DEDE    | 1694   |
| 5   | ASEP    | 1676   |
| 6   | ADE     | 1406   |
| 7   | AGUS    | 1160   |
| 8   | SRI     | 1118   |
| 9   | AI      | 1030   |
| 10  | AHMAD   | 867    |

3.2. Similarities and differences of first names in the urban and rural areas

There are significant differences in the favorite first names in the urban and rural areas. The first and the second mostly used names are Siti and Dede in rural areas, and Muhammad and Muhamad in the urban areas. Generally, the first names used both in the rural and urban areas have the ones in common, which is 80% of the 10 mostly used names respectively, including: Muhammad, Muhamad, Siti, Dede, Asep, Agus, Ade, Ai, Agus, Sri, Ai, and Ahmad. The difference is in the rural areas, the name Amad can be found while in the urban areas the name Sri can be found. Apart from the names, Mamar, Hencar, Amad, Iing, Emeh, Titing, Ence, Momo, Amah, and Ijah, are more widely
used in rural areas, while the names; Reni, Yeti, Rizky, Yuli, Aditya, Indra, Mohamad, Fajar, Seri and Aman, are more widely used in urban areas.

a. Names that are no longer used in Sumedang District
Based on the database of the name epeople in Sumedang distric there are ten names have disappeared in the past 90 years. The original names of the Sundanese people such as Sunaja, Saim, Sundia, Dvatma, Boelah, Unamah, Entjil, Eyut, Kitji, and Macih are among the 10 names that vanished in the last 90 years, meaning that until now no one has used them anymore. Figure 6 is an example of the name Dvatma that has disappeared in Sumedang District for the last 90 years. This means that the name Dvatma has never been used again.

![Figure 6](image1.png)

**Figure 6.** The name example Dvatma that disappeared in the last 90 year

b. Names that have recently surfaced in Sumedang District
The names that have only appeared in the last 10 years are sorted according to the majority, consisting of Naura, Arsyla, Keyla, Raffa, Rafka, Aqila, Zahra, Keusha, Alesha. They are the favorite names in the last 10 years in Sumedang District. Figure 7 describes that the name NAURA has just recently surfaced in the last 10 years. Until 2001, the name NAURA never appeared. It is only until the 2011-2020 interval the name Naura began to appear with the most frequency, as many as 444 people.

![Figure 7](image2.png)

**Figure 7.** The name example Naura that has recently been popular in the last 10 years
c. Names that are relatively becoming rare in use

Figure 8 describes that the name ASEP is included in the top ten names used in Sumedang District. However, its development is categorized as relatively declining. It started to appear in 1922 (1 person), then continued to rise where it reached its peak in 1982 (2770 people). Soon after it has declined until 2020 (210 people).

![Figure 8. The name example Asep that is relatively declining](image)

3.3 Set composition intersections

The intersections of the name of the people in Sumedang district for the North-South-Central-West-East regions are presented in the Venn Diagram in Figure 9.

Figure 9 is a Venn Diagram chart used to demonstrate the intersections of the naming of the first name of the people used in five region locations in Sumedang district. The division includes the Northern, Southern, Western, Eastern and Central regions whose details are shown in the table of the region division below. The figure can show the first names in each intersection of sets, the typicality of the first names of people included in all regions, and the typicality or identifier of the first names of the people used in each region.

![Figure 9. Intersections of the name of the people in 5 regions at Sumedang district](image)
Figure 9 shows that there are 21 study areas that can be researched, namely a study of 5 locations of the specific members of each region, a study of 5 locations of 2 members of the intersection, a study of 5 locations of 3 members of the intersection, a study of 5 locations of 4 members of the intersection and 1 study of the location of members. The next 5 region slice is called equality. This study will only examine the names of the villages which are typical in each region and the names of the villages which are the similarities of the 5 regions.

If all members in the 21 locations of the study area are added together, then for the intersection of the name of the people with the North-South-Central-West-East composition, the number of members is 133 names. Meanwhile, for the North-East-South-Central-West composition, the total of the 21 study locations is 129. It can be concluded that if the composition of the intersected sets is different, the number of members for each composition will be different. Furthermore, it produces two theorems namely the theorem of the number of study regions and the theorem of the number of set composition intersection members.

**Theorem 1.** If \( n \) is the number of sets with \( n \) integers and \( n \geq 1 \), then the number of regions formed by the intersection of the set is \( [n(n-1) + 1] \) [3].

**Theorem 2.** If \( n \) is the number of sets with \( n \) natural numbers, and \( n \) intersects with each other, then the sum of the composition or order (variation) of the set intersection is equal to \( n! \). Each sequence (composition) of different set of intersection has a different number of members of the set [3].

### 3.4. Uniqueness and Similarity

Based on the application program, we have the uniqueness and similarity name of people in the five regions at Sumedang district as following:

**a. Uniqueness of each region**

- Northern Region = {Adang, Eem, Engkar, Icih, Ika, Jaja, Lili, Momo, Otong}
- Eastern Region = {Cece, Desi, Mimi, Wati}
- Southern Region = {Kiki, Riki}
- Western Region = {Aah, Atang, Atep, Popon}
- Central Region = {Ana, Hendra, Ratna, Yadi, Yana, Yeni, Yudi}

**b. Meaning**

- North: Ancestor-respecting, communicative, religious, loving, happy, brave, hard worker
- South: Having simple characteristic, kind, although being wellborn and wealthy in life
- Central: Has the meaning of someone who has a brave nature, wise, meticulous, and beauty-loving.
- West: Has the meaning of compassion, handsome, smart, talented, creative
- East: Has the meaning of women who are leaders, brilliant, perfect, and communicative

**c. Similarities in each region**

We have the total result as an intersection of the naming people in Sumedang district for region **North-East-South-West-Central** = 62

Here the name of 62 people as an intersection result:

{Aan, Abdul, Asep, Cucu, Dadan, Dadang, Dede, Dedeh, Dedi, Deni, Dewi, Dian, Didi, Didin, Edi, Een, Eman, Endang, Entin, Eti, Euis, Fitri, Heni, Ida Iis, Imas, Iwan, Jajang, Lia, Lilis, Maman, Mimin, Muhammad, Muhammad, Nana, Nani, Neng, Neni, Nia, Nining, Nurung, Nur, Putri, Rina, Rizki, Rizky, Sti, Sri, Tatang, Tati, Teti, Titi, Ujang, Wawan, Wiwin, Yani, Yati, Yana, Yayat, Yahay, Yuyun}
The meaning of the 62 names above of the people signifies that Sumedang people are compassionate, religious, Ancestor-respecting, gentle, hardworking, independent, hopeful and communicative.

4. Conclusion
We have following conclusion of anthroponymy or naming of people in Sumedang district based on the database of population at the year 2019:

a. Naming people begins with how parents perceive hope and realize the contents of prayers based on local wisdom where they live. Each location has its own peculiarity and similarity.

b. Naming people can shift quickly from time to time and it is highly influenced by the development of information and communication technology.

c. The local culture of naming people will eventually disappear so that one day the culture of naming people in Indonesian territories will be the same.

d. The meaning of naming people originates from the prayer of the parents, so that their children will have religious souls, be beautiful like stars and the moon, be strong as mountains and the sun, and love their nation and their environments.

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