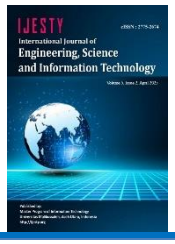
International Journal of Engineering, Science and Information Technology
Volume 5 No. 2 (2025) pp. 314-319
ISSN 2775-2674 (online)
Website: http://ijesty.org/index.php/ijesty
DOI: https://doi.org/10.52088/ijesty.v5i2.839
Research Paper, Short Communication, Review, Technical Paper



Application Dictionary of Scientific Plants and Animals Android-Based Algorithm Using Jaro Winkler Distance

Rasna[1]*, Ni Wayan Emmy Rosiana Dewi[2], Alexius Ulan Bani[3], Seno Lamsir[4], Fifto Nugroho[5]

[1]Department of Information System, Universitas Yapis Papua, Indonesia
[2]Department of Information Technology, Universitas Udayana, Bali, Indonesia
[3]Department of Computer Systems, Universitas Bung Karno, Indonesia
[4]Department of Theology, STT Samuel Elizabeth, Indonesia
[5]Department of Computer Systems, Faculty of Computer Science, Universitas Bung Karno, Indonesia

**Corresponding author Email: razna.anwar@gmail.com*

The manuscript was received on 22 June 2024, revised on 25 October 2024, and accepted on 23 February 2025, date of publication 8 April 2025

Abstract

The dictionary is a kind of reference book composed of abjad and contains terms of terms and their meanings. Dictionaries are needed in education to figure out the word or term you want to know its meaning. In education, it is found in many terms, for example, in the biological sciences. In biology, there is the term a scientific term that must be known to every student, especially those who pursue the field of biology. The scientific term, or scientific name, is the Latin name of plants and animals and is one of the critical discussions in the biology field contained in the course curriculum of elementary school, junior high school, and senior high school lectures. The field of biology is the subject of the taxonomy of plants and animals, and each student is required to know the Latin of every plant and animal. This is because plants and animals in the world of biology are known to scientists with scientific language. In this research, the author applies the scientific language dictionary of plants and animals using an algorithm based on the Android Jaro Winkler distance. Jaro Winkler's distance algorithm searches for the desired plants and animals. In this study, the plant names and scientific names are taken from existing books and journals. Each name consists of 1000 names of plants and animals, with each of the 500 names of plants and 500 animal names along with scientific language and the images, respectively. The system will generate output from the scientific names of plants and animals and be equipped with pictures and explanations. The results from this study use an algorithm called Jaro Winkler Distance to search for the names of the desired plants and animals by matching each character entered with the characters in the database.

Keywords: *Android, Language Scientific, Jaro Winkler Distance.*

1. Introduction

The development of information and communication technology is currently increasing. This development has caused changes in people's behaviour and activities in their daily lives [1]. One technology that is developing very quickly is mobile information and communication technology (cell phones). Mobile technology is currently used as a communication tool to facilitate users' daily lives [2], [3]. This can happen because mobile technology has many facilities, including accessing the internet, e-mail, organizers, music, games, dictionaries, and so on, that can be used anywhere, anytime, faster, and more accessible [4].
A dictionary is a reference book arranged alphabetically and contains terms and their meanings [5]. Dictionaries are needed in education to discover words or terms you want to know the meaning of [6]. In education, many terms are used, such as in biology. In biology, there are scientific terms that every student must know, especially those who pursue the field of biology.
Scientific terms or scientific names are the Latin names of plants and animals, which are one of the critical discussions in the field of biology contained in the curriculum of elementary school (SD), junior high school (SMP), and senior high school (SMA) study programs to lectures [7]. In biology, there is a discussion of plant and animal taxonomy, where each plant and animal must be recognized in scientific language, often called the Latin name of the plant and animal [8]. Students are required to know the names of every plant and

animal that exists. An example of a rice plant in biology is known as Oriza Sativa, the plant's scientific name in Latin. The many names of plants and animals require students to know them in scientific terms, causing difficulties in remembering them, especially scientific terms that are a very foreign language.

For this reason, an Android-based plant and animal scientific language dictionary application must be used whenever and wherever we can quickly help students find the scientific language of plants and animals they want. The dictionary of scientific terms is composed of various names of plants and animals, which, if made into an application, then the search for the word will take a long time because the mobile provides a lot of scientific language terms that require a long time to search for existing terms, to simplify the word search problem, this dictionary is designed using a string matching algorithm. The string matching algorithm solves the problem of matching a text against another text [9], [10].

The problem in a search algorithm is to find a word of length m, called a pattern, in a text of length n. The solution has various advantages and disadvantages. In this case, the author solves the problem by using the jaro Winkler distance algorithm, which is one of the string-matching methods that work by measuring the level of similarity of two strings, thus affecting the speed of each search.

2. Literature Review

2.1. Dictionary

The word dictionary is derived from the Arabic qamus, with its plural form qawamis. The Arabic word comes from the Greek word Okeanos, which means “sea.” The word's history clearly shows the meaning of the root word in the word dictionary, which is a container of knowledge, especially language knowledge, which is infinite in its breadth [11], [12].

2.2. Plants and Animals

Indonesia is a country that has a diverse wealth of plants and animals. This diversity is due to differences in climate and natural conditions in Indonesia. The distribution of plants and animals is determined by several factors, such as climate, soil type, relief, and biotic surroundings [13].

2.3. Algorithm

An algorithm is a logical train of thought that can be put into writing. An algorithm is correct if it produces the proper output for all possible inputs [14].

2.4. Jaro-Winkler Distance String Matching Algorithm

A String-matching algorithm matches a specific word pattern against a sentence or long text. The string-matching algorithm can be done in several ways [15], [16].

2.5. Android

Android is an operating system for smartphones and tablets. The operating system can be illustrated as a 'bridge' between the device and the user so that the user can interact with the device and run applications available on the device [17].

2.6. Java

Java is an object-oriented language that can be used to develop standalone applications, internet-based applications, and applications for smart devices that can communicate via the internet or communication networks [18].

2.7. Eclipse

Eclipse is an application development tool classified as an IDE (integrated development environment), providing various application creation facilities. This software can be an application development tool for Java, C++, and Python languages. By using this IDE, android applications are built [19].

2.8. Sqlite Database

SQLite is a tool for handling data (data store), which Android has included. SQLite is famous as a small database that requires no administration, server, or configuration files. It has also been used in well-known applications such as Browser, Firefox, and iPhone [20].

2.9. Database

The base can be more or less interpreted as a headquarters or warehouse, a nesting/gathering place. Meanwhile, data is a representation of real-world facts that represent an object such as humans (employees, students, buyers, customers), goods, animals, events, concepts, conditions, and so on, which are realized in the form of numbers, letters, symbols, text, images, sounds, or combinations thereof [21].

2.10. Unified Modelling Language (UML)

UML is a visual language for modelling and communicating about a system using diagrams and supporting text [22].

3. Method

3.1. Data Collection Technique

Data collection is done by collecting reading and understanding references related to various scientific language terms and theories from several sources such as library books, articles from the internet, scientific journals, and references from research results related to the Jaro Winkler distance algorithm.

3.2. System Analysis

Researchers analyze existing systems and systems to be built, understand how string matching works using the Winkler distance algorithm, and see the method's accuracy regarding the word search process.

3.3. Designing the Program

Researchers design programs so that the application to be built can search for scientific languages using the Jaro Winkler distance string matching method. The first step of this stage is to design the flow of system performance using UML (Unified Modeling Language) and flowcharts that will explain the processes in the system in detail. In the next step, the author designs the database and user interface; the last step is the coding process.

3.4. Flowchart of Search Process on Jaro Winkler Distance Method

The flowchart of the Search Process in the Jaro Winkler Distance Method is shown in Figure 1:

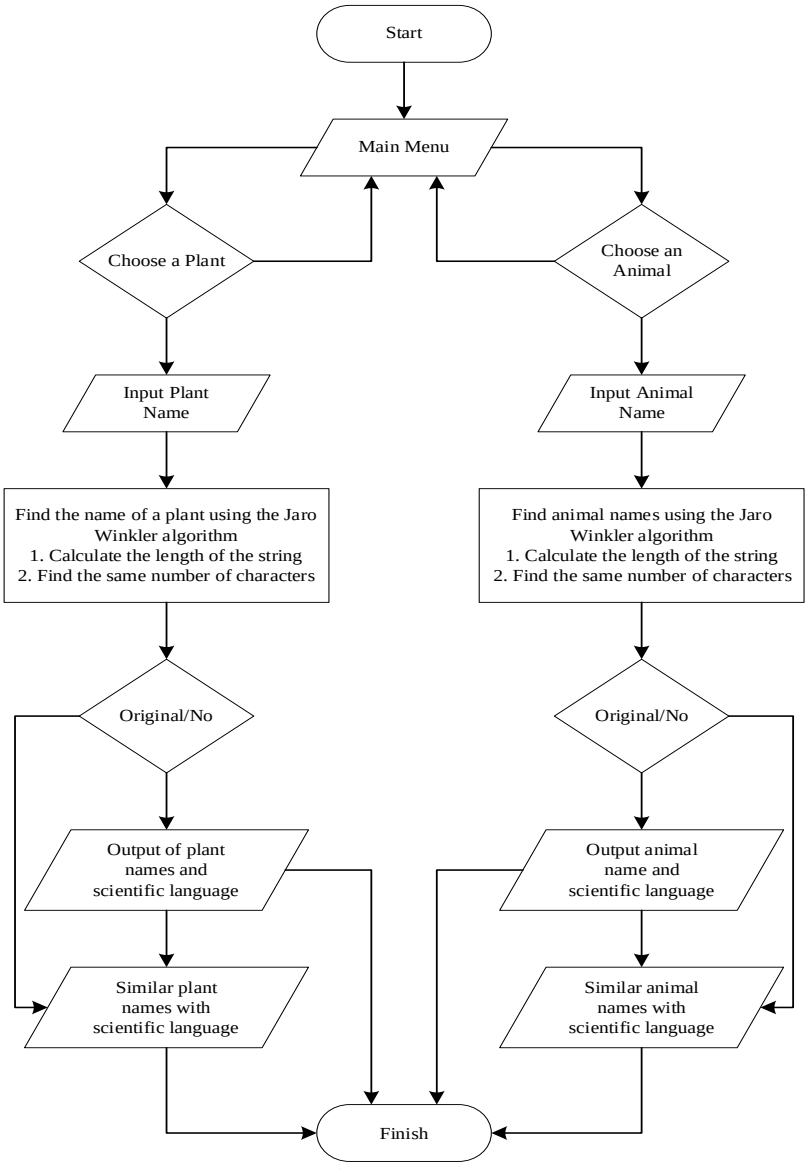


Fig 1. Flowchart of Jaro Winkler Distance Algorithm

The flowchart above shows the search process flow in the Jaro Winkler distance method menu. When the user enters the Jaro Winkler distance method, there will be a ListView to select the scientific language category and a text view (text page) that receives input from keywords/phrases to be searched. The system will immediately work on this page when the user inputs keywords into the text view. The search process results will be attached to the listview section of the search results form in the form of common names of plants or animals. Suppose the user chooses the desired plant or animal word. In that case, the user will be able to see the scientific language of the plant or animal along with pictures and brief information about each plant and animal.

4. Result and Discussion

4.1. Testing Methods in the Application

Testing the method is done by performing a random word search. The process begins with opening the application and then continuing with the menu selection. For the first test, the plant menu is selected; after the menu is selected, the system will display a search form using the jaro Winkler distance method, and then the user enters the keyword. After entering the keyword, the user presses the search button. The system will display the search results using the desired word. After the user chooses one of the results to be seen, the details of the contents of the plant word will be displayed, followed by the Indonesian and Latin language images and descriptions of plants. Likewise, the process must be done when selecting the animal menu. The number of words tested for plants and animals is 24 words for each plant and animal.

Table 1. Test Results of Plant Data

No.	Tested Word	Expected	Output	Information
1.	Apple	Apple	Apple	Valid
2.	Mango	Mango	Mango	Valid
3.	Red spinach	Red spinach	Red spinach	Valid
4.	Papaya	Papaya	Papaya	Valid
5.	Salak	Salak	Salak	Valid
6.	Cherry	Cherries	Cherries	Valid
7.	Durian	Durian	Durian	Valid
8.	Pear	Pear	Kecipir	Invalid
9.	Rice	Rice	Rice	valid
10.	Angggrek eria	Eria orchid	Eria deer orchid	Invalid
11.	Areca nut	Areca nut	Areca nut	Valid
12.	Nutmeg	Nutmeg	Nutmeg	Valid
13.	Col	Col	Broccoli	Invalid
14.	Water hyacinth	Water hyacinth	Hyacinth	Valid
15.	Srikaya	Srikaya	Ironwood	Valid
16.	Teak	Teak	Teak	Valid
17.	Kedondong	Kedondong	Kedondong	Valid
18.	Coconut	Coconut	Coconut	Valid
19.	Galangal	Galangal	Red galangal	Invalid
20.	Cucumber	Cucumber	Cucumber	Valid
21.	Yam	Yam	Cabbage	Invalid
22.	Peacock flower	Peacock flower	Peacock flower	Valid
23.	Lotus	Lotus	Lotus	Valid
24.	Pete	Pete	Petai	Valid

From Table 1 of the results of testing plant words using the jaro Winkler distance algorithm above, it can be seen that six words do not match the 24 words tested. The mismatch occurs because the word order first displayed by the system is not the word inputted by the user.

Table 2. Results of Animal Test Data

No.	Tested Word	Expected	Output	Keterangan
1.	Teri	Anchovy	Anchovy	Invalid
2.	Emu	Emu	Emu	Invalid
3.	Anoa	Anoa	Anoa	Valid
4.	Horse	Horse	Horse	Valid
5.	Lion	Lion	Lion	Valid
6.	Aedes mosquito	Aedes mosquito	Aedes mosquito	Valid
7.	Eagle	Eagle	Eelang	Invalid
8.	Parrot	Parrot	Parrot	Valid
9.	Tiger	Tiger	Tiger	Valid
10.	Flies	Flies	Flies	Valid
11.	Dog	Dog	Dog	Invalid
12.	Fireflies	Fireflies	Fireflies	Valid
13.	Snake	Snake	Starfish	Invalid
14.	Quail	Quail	Quail	Valid
15.	Lizards	Lizards	Lizards	Valid
16.	Sumatran elephant	Sumatran elephant	Sumatran elephant	Valid
17.	Deer	Deer	Pig deer	Invalid
18.	One-horned rhino	Rhinoceros with horns	One-horned rhino	Valid
19.	Bull	Bull	Bull	Valid
20.	Rat	Rat	Rat	Valid
21.	Fleas	Fleas	Polar bear	Invalid

22.	Camel	Camel	Ostrich	Invalid
23.	Squid	Squid	Squid	Valid
24.	Partridge	Partridge	Partridge	Valid

From Table 2 of the results of testing animal words using the jaro Winkler distance algorithm above, it can be seen that eight words do not match the 24 words tested. Similar to the test results of plant data, the mismatch is that the word order first displayed by the system is not the word inputted by the user.

From the two descriptions of the test results of plant and animal data, the amount of accuracy of the Jaro Winkler algorithm in the system can be calculated:

1. Jaro Winkler algorithm on plant data:

Number of test words: 24
Number of valid words: 18
Number of invalid words: 6
Accuracy of Jaro Winkler algorithm on plant data:

$$\frac{number\ of\ matching\ words}{amount\ of\ test\ data}\ x\ 100\ \%$$

$$\frac{18}{24}\ \text{x}\ 100\ \% = 75\%$$

2. Jaro Winkler algorithm on animal data:

Number of test data: 24
Number of valid words: 16
Number of invalid words: 8
Accuracy of Jaro Winkler algorithm on animal data:

$$\frac{number\ of\ matching\ words}{amount\ of\ test\ data}\ x\ 100\ \%$$

$$\frac{16}{24}\ x\ 100\ \% = 67\%$$

5. Conclusion

The conclusions obtained from this study are as follows:

1. This scientific dictionary application for plants and animals can help junior high school (SMP), high school (SMA), and college students find the scientific names of plants and animals they want.
2. Using the Jaro Winkler Distance algorithm to search for plant and animal words can help users find plant or animal words that are known for sure or still do not know the full name of the plant or animal they want.
3. In this dictionary application, searches are carried out on plant and animal words stored in the database. The search is carried out evenly across the entire existing database by comparing the input string to the string in the database.
4. This scientific dictionary of plants and animals can also be used as learning material for users because this application, in addition to the Latin/scientific names of plants and animals, is also equipped with pictures and brief information about the plants and animals.
5. In this study, the system cannot display words with affixes, considering that the names of plants and animals are essential, so the words in the database do not contain affixes but rather the exact words of the desired names of plants and animals.

References

[1] F. A. Hibatullah, "Pengaruh globalisasi terhadap pembangunan karakter generasi muda bangsa indonesia," *Pesona Dasar J. Pendidik. Dasar dan Hum.*, vol. 10, no. 1, pp. 1–9, 2022.
[2] A. Mufidah, "Pengembangan Edukasi Berbasis Self Efficacy dan Self Care pada Pasien Diabetes Mellitus Tipe 2 Menggunakan Aplikasi Android," UNIVERSITAS AIRLANGGA, 2020.
[3] S. F. Zahra and others, "Aplikasi Game Media Pembelajaran Siswa Sekolah Dasar (Studi Kasus: SDN Marga Mulya)," *INFOTEX J. Ilm. Bid. Ilmu Tek.*, vol. 2, no. 1, pp. 189–201, 2023.
[4] L. Fujianti, S. Irviati, K. Harisandi, and others, "Meningkatkan Keahlian Pembukuan Berbasis Handphone bagi UMKM Posdaya Cempaka," *SULUH J. Abdimas*, vol. 3, no. 1, pp. 81–88, 2021.
[5] Z. Sanakulov, "Typology of Dictionaries: on the Example of Dictionaries Created with the Participation of German and Uzbek Languages," *Eur. J. Res. Reflect. Educ. Sci. Vol*, vol. 8, no. 7, 2020.
[6] A. Salgado, "Terminological methods in lexicography: conceptualizing, organizing and encoding terms in general language dictionaries," Doctoral dissertation. Lisbon. https://run. unl. pt/handle/10362/137023, 2021.
[7] N. T. Sirajuddin *et al.*, *Pengantar Ilmu Biologi*. CV. Gita Lentera, 2024.
[8] L. ASRI, "TELAAH ISLAM DAN PERKEMBANGAAN ILMU BIOLOGI," UIN RADEN INTAN LAMPUNG, 2022.
[9] R. Rismayani, N. S. Layuk, S. Wahyuni, H. Wali, and N. K. Marselina, "Pencarian Kata Pada Aplikasi Kamus Istilah Komputer dan Informatika Menggunakan Algoritma Brute Force Berbasis Android," *Komputika J. Sist. Komput.*, vol. 10, no. 1, pp. 43–52, 2021.
[10] M. A. Afandy, S. Praja, and T. Andriansah, "Implementasi Algoritma Greedy dan String Matching Penukaran Uang Menjadi Koin,

Pencarian Pola dalam Teks yang Berisi Nama" Indomaret"," *J. Multimed. dan Teknol. Inf.*, vol. 6, no. 02, pp. 123–133, 2024.
[11] R. Nurdiana, "The Komponen Mu'jam Al Lughah Al Arabiyyah Al Mu'ashiroh (Studi Analisis Ditinjau Dari Ilmu Leksikografi)," *Tarling J. Lang. Educ.*, vol. 7, no. 1, pp. 97–112, 2023.
[12] P. Acquaviva, "Word meaning: a linguistic dimension of conceptualization," *Synthese*, vol. 200, no. 5, p. 427, 2022.
[13] G. T. ARSYA, "PENGARUH MODEL PEMBELAJARAN DOUBLE LOOP PROBLEM SOLVING TERHADAP KEMAMPUAN PEMECAHAN MASALAH DAN KETERAMPILAN BERPIKIR KRITIS PESERTA DIDIK PADA MATERI KEANEKARAGAMAN HAYATI (Studi eksperimen di kelas X MIPA SMAN 4 Tasikmalaya Tahun Ajaran 2022/2023)," Universitas Siliwangi, 2023.
[14] S. Suhartini, Y. Purbasari, and E. M. S. Sakti, "Implementasi Algoritma Pada Perancangan Database E-Commerce (Studi Kasus Toko Prabu Computer)," *IKRA-ITH Inform. J. Komput. dan Inform.*, vol. 7, no. 1, pp. 136–143, 2023.
[15] Y. A. Sihotang, "Implementasi Algoritma Approximate String Matching Pada Aplikasi Pengarsipan Dokumen Ekspor Barang," *Bul. Ilm. Inform. Teknol.*, vol. 2, no. 3, pp. 109–114, 2024.
[16] P. Neamatollahi, M. Hadi, and M. Naghibzadeh, "Simple and efficient pattern matching algorithms for biological sequences," *IEEE Access*, vol. 8, pp. 23838–23846, 2020.
[17] A. M. Lukman and O. Rahmanto, "Aplikasi Panduan Pola Hidup Sehat," *Indones. J. Softw. Eng.*, vol. 6, no. 1, pp. 64–70, 2020.
[18] D. H. Sulaksono, C. N. Prabiantissa, G. E. Yuliastuti, and A. R. Taqwa, "Implementasi Kriptografi dengan Metode Elliptic Curve Cryptography (ECC) untuk Aplikasi Chatting Berbasis Android," in *Prosiding Seminar Nasional Sains dan Teknologi Terapan*, 2021, pp. 570–576.
[19] E. S. PUTRI, "DESAIN APLIKASI MOBILE VOICE OVER INTERNET PROTOKOL (VoIP) DENGAN SISTEM DETEKSI LOKASI LAWAN BICARA BERBASIS ANDROID," Politeknik Negeri Sriwijaya, 2021.
[20] R. Habibi, D. A. Masruro, and N. H. Khonsa, *Aplikasi inventory barang menggunakan QR code*, vol. 1. Kreatif, 2020.
[21] S. Pakpahan, A. Faâ, and others, "Sistem Informasi Pengelolaan Dana Desa Pada Desa Hilizoliga Berbasis Web," *J. Tek. Inform. UNIKA St. Thomas*, pp. 109–117, 2020.
[22] S. Y. Putri, "Sistem Informasi Pengelolaan Pembayaran Sewa Penginapan Hostel Pada Bait Sa'Da," *J. Inform. Dan Rekayasa Perangkat Lunak*, vol. 1, no. 2, pp. 167–173, 2020.