Penerapan Algoritma Dijkstra Dalam Pencarian Toilet Terdekat di GKU Barat ITB

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*Abstract*—The abstract is to be in fully-justified italicized text, at the top of the left-hand column as it is here, below the author information. The abstract is to be in 9-point, single-spaced type, and may be up to 8 cm long. Define all symbols used in the abstract. Do not cite references in the abstract. Do not delete the blank line immediately above the abstract; it sets the footnote at the bottom of this column. Leave two blank lines after the index terms, then begin the main text. All manuscripts must be in English.

*Keywords*—About four key words or phrases in alphabetical order, separated by commas.

# I. Pendahuluan

Gedung Kuliah Umum Barat ITB (GKUB ITB), sebuah gedung berbentuk oktagon yang berada di dekat Jl. III ITB. Gedung ini memiliki tiga lantai dengan 23 ruang kuliah. Gedung ini umumnya digunakan untuk pelaksanaan mata kuliah umum dan mata kuliah TPB. Rancangan GKUB diprakarsai oleh Ir. Soekarno dan mulai dibangun pada tahun 1984, kemudian mulai digunakan pada tahun 1986.

GKUB memiliki 4 ruang kuliah di lantai 1, 11 ruang kuliah di lantai 2, 8 ruang kuliah di lantai 3, dan beberapa ruang lain seperti toilet, kantin, dan mushola. Ruangan yang berada di lantai 1 dapat diakses dengan cukup mudah karena kondisi atau lingkungan sekitar yang jelas dan mudah dibedakan. Berbeda dengan lantai 1, akses menuju ruangan spesifik yang berada di lantai 2 dan lantai 3 cukup rumit karena karakteristik dari jalur menuju ruangan tersebut secara visual tampak sama. Kondisi ini dapat menyebabkan kesulitan dalam pencarian ruangan, terutama untuk mencari toilet. Tidak hanya karena secara visual area GKUB tampak sama, tetapi papan penanda menuju toilet yang umumnya hanya ada di dekat toilet itu sendiri menambah tingkat kesulitan dalam pencarian toilet di GKUB.

Makalah ini bertujuan untuk menerapkan Algoritma Dijkstra untuk mencari rute terdekat untuk mencari toilet di area GKUB. Dengan memanfaatkan Algoritma Dijkstra, makalah ini diharapkan dapat mengurangi waktu pencarian dan juga mengurangi berputar ataupun naik-turun tangga di area GKUB untuk mencari toilet.

# II. Teori Dasar

## A. Definisi Graf

Graf merupakan himpunan tidak kosong dari simpul-simpul (vertices) dan himpunan sisi (*edges*) yang menghubungkan satu pasang simpul. Graf digunakan untuk merepresentasikan objek-objek dan hubungan antara objek-objek tersebut. Graf dapat dimanfaatkan untuk representasi jaringan sosial, sistem transportasi, routing jaringan komputer, dan sebagainya.

Berikut adalah definisi graf dalam notasi matematika

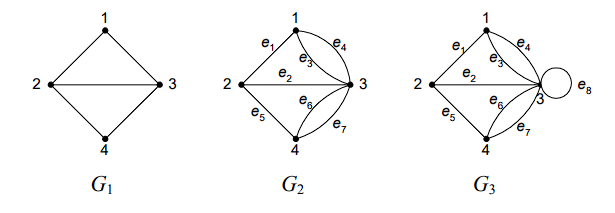
*G* = (*V*, *E*), dengan *V* dan *E :*

*V* = himpunan tidak-kosong dari simpul-simpul​

*=* {*v1,v2,...,vn*}​

*E* = himpunan sisi yang menghubungkan sepasang simpul

*=* {*e1,e2,...,en*}​



Gambar 1 Contoh graf,  
(a) graf sederhana, (b) graf ganda, dan (c) graf semu  
sumber : [Graf (bag.1) - IF2120 - Rinaldi Munir](https://informatika.stei.itb.ac.id/~rinaldi.munir/Matdis/2023-2024/19-Graf-Bagian1-2023.pdf)

## B. Ketetanggaan Simpul dan Sisi Beririsan

Simpul yang bertetangga merupakan dua buah simpul yang terhubung satu sama lain secara langsung.

Tinjau graf G1 pada Gambar 1 :

* Simpul 2 bertetangga dengan simpul 1, 3, dan 4.
* Simpul 1 tidak bertetangga dengan simpul 4.

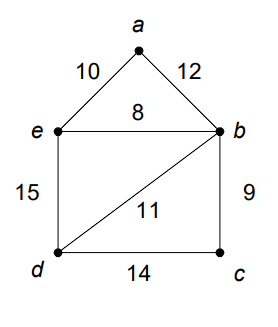
Untuk sembarang sisi *e* = (*vi,vj*) dapat dikatakan bahwa sisi *e* beririsan dengan simpul *vi ­­­­­* atau *e* beririsan dengan simpul *vj*.

Tinjau graf G1 pada Gambar 1 :

* Sisi (1,2) beririsan dengan simpul 1 dan simpul 2
* Sisi (1,3) beririsan dengan simpul 1 dan simpul 3
* Kedua Sisi tersebut tidak beririsan dengan simpul 4

## C. Graf Berbobot (Weighted Graph)

Graf berbobot adalah graf yang setiap sisinya diberi sebuah harga (bobot). Bobot dari sisi dapat merepresentasikan suatu harga, jarak, dan beberapa unit lain relatif dari satu simpul ke simpul lainnya.



Gambar 2 Contoh graf berbobot  
sumber : [Graf (bag.1) - IF2120 - Rinaldi Munir](https://informatika.stei.itb.ac.id/~rinaldi.munir/Matdis/2023-2024/19-Graf-Bagian1-2023.pdf)

## C. Algoritma Dijkstra

Algoritma Dijkstra merupakan suatu algoritma untuk menentukan lintasan terpendek dari dari satu simpul ke simpul lainnya. Algoritma ini dipublikasikan oleh Edsger W. Dijkstra pada tahun 1959. Algoritma ini ditemukan oleh Dijkstra pada tahun 1956 ketika ia sedang di Amsterdam dan mencari rute terpendek dari Rotterdam menuju Groningen.

Algoritma lintasan terpendek disusun berdasarkan langkah per langkah. Pada langkah pertama, dibangun lintasan terpendek pertama, pada langkah kedua dibangun lintasan terpendek kedua, sampai seluruh langkah telah habis dan didapatkan lintasan terpendek. Berikut adalah langkah-langkah dalam menentukan lintasan terpendek dalam konteks pencarian ruangan :

1. Kunjungi posisi ruangan awal mulai, ruangan tersebut menjadi “posisi ruangan saat ini”.
2. Periksa jarak dari posisi ruangan saat ini menuju ruangan yang bertetangga.
3. Jika jarak tempuh menuju ruangan yang bertetangga lebih pendek dibandingkan jarak terpendek menuju ruangan bertetangga saat ini (atau jarak menuju ruangan bertetangga belum tercatat) :
   1. Perbarui jarak terpendek menuju ruangan tersebut
   2. Perbarui ruangan asal menuju ruangan tersebut dengan ruangan asal dengan jarak terpendek
4. Kemudian kunjungi ruangan terdekat dari posisi ruangan saat ini, kemudian ubah ruangan terdekat tersebut menjadi posisi ruangan saat ini.
5. Ulangi langkah 2 hingga 4 sampai seluruh ruangan telah dikunjungi.

## D. GKU Barat ITB

# III. Penerapan Algoritma Dalam Pencarian Toilet

## A. Figures and Tables

Large figures and tables may span both columns. Place figure captions below the figures; place table titles above the tables. If your figure has two parts, include the labels “(a)” and “(b)” as part of the artwork. Please verify that the figures and tables you mention in the text actually exist. Please do not include captions as part of the figures. Do not put captions in “text boxes” linked to the figures. Do not put borders around the outside of your figures. Use the abbreviation “Fig.” even at the beginning of a sentence. Do not abbreviate “Table.” Tables are numbered with Roman numerals.

Figure axis labels are often a source of confusion. Use words rather than symbols. As an example, write the quantity “Magnetization,” or “Magnetization *M*,” not just “*M*.” Put units in parentheses. Do not label axes only with units. As in Fig. 1, for example, write “Magnetization (A/m)” or “Magnetization (Am1),” not just “A/m.” Do not label axes with a ratio of quantities and units. For example, write “Temperature (K),” not “Temperature/K.”

Multipliers can be especially confusing. Write “Magnetization (kA/m)” or “Magnetization (103 A/m).” Do not write “Magnetization (A/m)  1000” because the reader would not know whether the top axis label in Fig. 1 meant 16000 A/m or 0.016 A/m. Figure labels should be legible, approximately 8 to 12 point type.

## B. References

Number citations consecutively in square brackets [1]. The sentence punctuation follows the brackets [2]. Multiple references [2], [3] are each numbered with separate brackets [1]–[3]. When citing a section in a book, please give the relevant page numbers [2]. In sentences, refer simply to the reference number, as in [3]. Do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] shows ... .”

Number footnotes separately in superscripts (Insert | Footnote)[[1]](#footnote-1). Place the actual footnote at the bottom of the column in which it is cited; do not put footnotes in the reference list (endnotes). Use letters for table footnotes.

Please note that the references at the end of this document are in the preferred referencing style. Give all authors’ names; do not use “*et al*.” unless there are six authors or more. Use a space after authors' initials. Papers that have not been published should be cited as “unpublished” [4]. Papers that have been submitted for publication should be cited as “submitted for publication” [5]. Papers that have been accepted for publication, but not yet specified for an issue should be cited as “to be published” [6]. Please give affiliations and addresses for private communications [7].

## C. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations that incorporate periods should not have spaces: write “C.N.R.S.,” not “C. N. R. S.” Do not use abbreviations in the title unless they are unavoidable.

## D. Equations

Number equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). First use the equation editor to create the equation. Then select the “Equation” markup style. Press the tab key and write the equation number in parentheses. To make your equations more compact, you may use the solidus ( / ), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators. Punctuate equations when they are part of a sentence, as in

 (1)

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature, but T is the unit tesla). Refer to “(1),” not “Eq. (1)” or “equation (1),” except at the beginning of a sentence: “Equation (1) is ... .”

## E. Other Recommendations

Use one space after periods and colons. Hyphenate complex modifiers: “zero-field-cooled magnetization.” Avoid dangling participles, such as, “Using (1), the potential was calculated.” [It is not clear who or what used (1).] Write instead, “The potential was calculated by using (1),” or “Using (1), we calculated the potential.”

Use a zero before decimal points: “0.25,” not “.25.” Use “cm3,” not “cc.” Indicate sample dimensions as “0.1 cm  0.2 cm,” not “0.1  0.2 cm2.” The abbreviation for “seconds” is “s,” not “sec.” Do not mix complete spellings and abbreviations of units: use “Wb/m2” or “webers per square meter,” not “webers/m2.” When expressing a range of values, write “7 to 9” or “7-9,” not “7~9.”

A parenthetical statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.) In American English, periods and commas are within quotation marks, like “this period.” Other punctuation is “outside”! Avoid contractions; for example, write “do not” instead of “don’t.” The serial comma is preferred: “A, B, and C” instead of “A, B and C.”

If you wish, you may write in the first person singular or plural and use the active voice (“I observed that ...” or “We observed that ...” instead of “It was observed that ...”). Remember to check spelling. If your native language is not English, please get a native English-speaking colleague to proofread your paper.

# IV. Some Common Mistakes

The word “data” is plural, not singular. The subscript for the permeability of vacuum µ0 is zero, not a lowercase letter “o.” The term for residual magnetization is “remanence”; the adjective is “remanent”; do not write “remnance” or “remnant.” Use the word “micrometer” instead of “micron.” A graph within a graph is an “inset,” not an “insert.” The word “alternatively” is preferred to the word “alternately” (unless you really mean something that alternates). Use the word “whereas” instead of “while” (unless you are referring to simultaneous events). Do not use the word “essentially” to mean “approximately” or “effectively.” Do not use the word “issue” as a euphemism for “problem.” When compositions are not specified, separate chemical symbols by en-dashes; for example, “NiMn” indicates the intermetallic compound Ni0.5Mn0.5 whereas “Ni–Mn” indicates an alloy of some composition NixMn1-x.

Be aware of the different meanings of the homophones “affect” (usually a verb) and “effect” (usually a noun), “complement” and “compliment,” “discreet” and “discrete,” “principal” (e.g., “principal investigator”) and “principle” (e.g., “principle of measurement”). Do not confuse “imply” and “infer.”

Prefixes such as “non,” “sub,” “micro,” “multi,” and “"ultra” are not independent words; they should be joined to the words they modify, usually without a hyphen. There is no period after the “et” in the Latin abbreviation “*et al.*” (it is also italicized). The abbreviation “i.e.,” means “that is,” and the abbreviation “e.g.,” means “for example” (these abbreviations are not italicized).

# V. Conclusion

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

# VI. Appendix

Appendixes, if needed, appear before the acknowledgment.

# VII. Acknowledgment

The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments. Avoid expressions such as “One of us (S.B.A.) would like to thank ... .” Instead, write “F. A. Author thanks ... .” Sponsor and financial support acknowledgments are placed in the unnumbered footnote on the first page.

# References

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5. E. H. Miller, “A note on reflector arrays (Periodical style—Accepted for publication),” *IEEE Trans. Antennas Propagat.*, to be published.
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# PeRNYATAAN

Dengan ini saya menyatakan bahwa makalah yang saya tulis ini adalah tulisan saya sendiri, bukan saduran, atau terjemahan dari makalah orang lain, dan bukan plagiasi.

Bandung, 3 Desember 2023

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