

THESIS

**PERSPECTIVE OF SENIOR CITIZENS REGARDING
INTERSECTIONAL EQUITY ON WALKABILITY**



**AURELIA KRISHNA ADISAPUTRO
NPM : 6101801044**

ADVISOR: Prof. Tri Basuki Joewono, Ph.D.

**PARAHYANGAN CATHOLIC UNIVERSITY
FACULTY OF ENGINEERING
CIVIL ENGINEERING UNDERGRADUATE PROGRAM
(Accredited by SK BAN-PT Number: 11370/SK/BAN-PT/AK-ISK/S/X/2021)
BANDUNG
AUGUST 2023**

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AURELIA KRISHNA ADISAPUTRO
NPM : 6101801044

BANDUNG, 08 August 2023
ADVISOR:

A handwritten signature in blue ink, appearing to be 'Tri Basuki Joewono', is written over a red digital signature line.

Digitally signed by Tri Basuki
Joewono
DN: cn=Tri Basuki Joewono,
o=Universitas Katolik
Parahyangan, ou,
email=vftribas@unpar.ac.id, c=ID
Date: 2023.08.09 18:12:41 +07'00'

Prof. Tri Basuki Joewono, Ph.D.

PARAHYANGAN CATHOLIC UNIVERSITY
FACULTY OF ENGINEERING
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o=Universitas Katolik Parahyangan, ou,
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Date: 2023.08.09 18:12:41 +07'00'

EXAMINER 1: Prof. Dr. Ir. Budi Hartanto Susilo, M.Sc.



EXAMINER 2 Santoso Urip Gunawan, Ir., M.T.



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FACULTY OF ENGINEERING
CIVIL ENGINEERING UNDERGRADUATE PROGRAM
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BANDUNG
AUGUST 2023

STATEMENT LETTER

I hereby signed below,

Name : AURELIA KRISHNA ADISAPUTRO
City, date of birth : Bandung, 03 May 2000
NPM : 6101801044
Thesis title : **PERSPECTIVE OF SENIOR CITIZENS
REGARDING INTERSECTIONAL EQUITY
ON WALKABILITY**

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Aurelia Krishna Adisaputro

PERSPEKTIF LANSIA TERHADAP *INTERSECTIONAL EQUITY* DALAM *WALKABILITY*

Aurelia Krishna Adisaputro
NPM: 6101801044

Pembimbing: Prof. Tri Basuki Joewono, Ph.D.

UNIVERSITAS KATOLIK PARAHYANGAN
FAKULTAS TEKNIK
PROGRAM STUDI SARJANA TEKNIK SIPIL
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AGUSTUS 2023

ABSTRAK

Walkability adalah pengukuran terhadap bagaimana lingkungan binaan dapat mendukung aktivitas pejalan kaki. Variabel-variabel yang mempengaruhi *walkability* dapat dikelompokkan menjadi aspek keselamatan, keamanan, kemudahan, dan keindahan fasilitas pejalan kaki. Banyak studi terdahulu yang telah mencetuskan variabel-variabel yang mempengaruhi *walkability*. Namun, studi-studi tersebut hanya melakukan penilaian variabel secara objektif dan tidak memperhitungkan penilaian subjektif dari pejalan kaki. Usia sebagai faktor dari *intersectionality* dapat mempengaruhi sudut pandang lansia terhadap *walkability*. Lansia pada umumnya mengalami kesulitan dalam berjalan kaki karena penurunan dalam kemampuan fisik dan mobilitas. Dalam penelitian ini, 392 orang lansia diminta untuk menilai variabel yang mempengaruhi *walkability*. Penilaian mereka kemudian dianalisis untuk mencari variabel yang lebih baik dalam memprediksi kesediaan lansia untuk berjalan kaki. Studi menemukan bahwa penerangan yang cukup, kerataan trotoar, waktu tempuh ke tempat rekreasi terdekat, ketersediaan bangku atau tempat istirahat lainnya, ketersediaan teman atau keluarga ketika berjalan kaki, ketersediaan petugas keamanan, ketersediaan trotoar, dan ketersediaan aktivitas dan perkumpulan sosial adalah variabel-variabel *walkability* yang berhubungan positif terhadap kesediaan lansia untuk berjalan kaki.

Kata Kunci: *intersectionality*, lansia, pejalan kaki, *walkability*

PERSPECTIVE OF INTERSECTIONAL EQUITY ON WALKABILITY FOR SENIOR CITIZENS

**Aurelia Krishna Adisaputro
NPM: 6101801044**

Advisor: Prof. Tri Basuki Joewono, Ph.D.

**PARAHYANGAN CATHOLIC UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
BACHELOR PROGRAM
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AUGUST 2023**

ABSTRACT

Walkability is a measure of how well a built environment can support its pedestrian activities. The variables that affect walkability can be grouped into safety, security, convenience, and attractiveness of pedestrian facilities. There have been many studies that proposed variables and methods of measuring walkability. However, these studies tend to only see the objective values of pedestrian facilities and did not consider the subjective view of the pedestrians. Age as a factor of intersectionality may affect senior citizens' view on walkability. Senior citizens are at a disadvantage when walking due to their mobility issues related to old age. In this study, 392 senior citizens were asked to rate different variables that affect walkability. Their rating is then analyzed using Random Forest Classifier to see which variables are better to predict their willingness to walk. This study finds that adequate lighting, evenness of pedestrian walks, travel time to nearest recreational facilities, availability of benches or other resting space, presence of family or friends during walks, presence of security officer, availability of pedestrian walks, and availability of social activities and gatherings are walkability variables that are positively associated with senior citizens' willingness to walk.

Keywords: intersectionality, pedestrian, senior citizens, walkabil

PREFACE

This thesis is written as a requirement on the completion of Civil Engineering Undergraduate study in Parahyangan Catholic University. The completion of this thesis would only be possible with the grace of Lord Almighty and the endless support of many parties that were involved. In this section, the writer would like to extend their deepest gratitude to the following parties that were involved:

1. The writer's family that has shown support during the process of writing this thesis.
2. Prof. Tri Basuki Joewono, Ph.D. as the advisor of this thesis who has provided his time, consideration, and great insights to help the completion of this thesis.
3. Santoso Urip Gunawan, Ir., M.T., as a beloved lecturer who has provided his time and consideration, along with many suggestions for this thesis.
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5. The lecturers and staffs of Parahyangan Catholic University who has helped the writer during the process of writing this thesis.
6. The writer's colleagues who have provided their valuable time, support, and keep the writer motivated during the completion of this thesis.

The writer is aware of the many shortcomings of this thesis. Therefore, suggestions and constructive criticism of this thesis would be highly appreciated. It is within the writer's best interests that this thesis can provide valuable knowledge for its readers.

Bandung, 07 August 2023



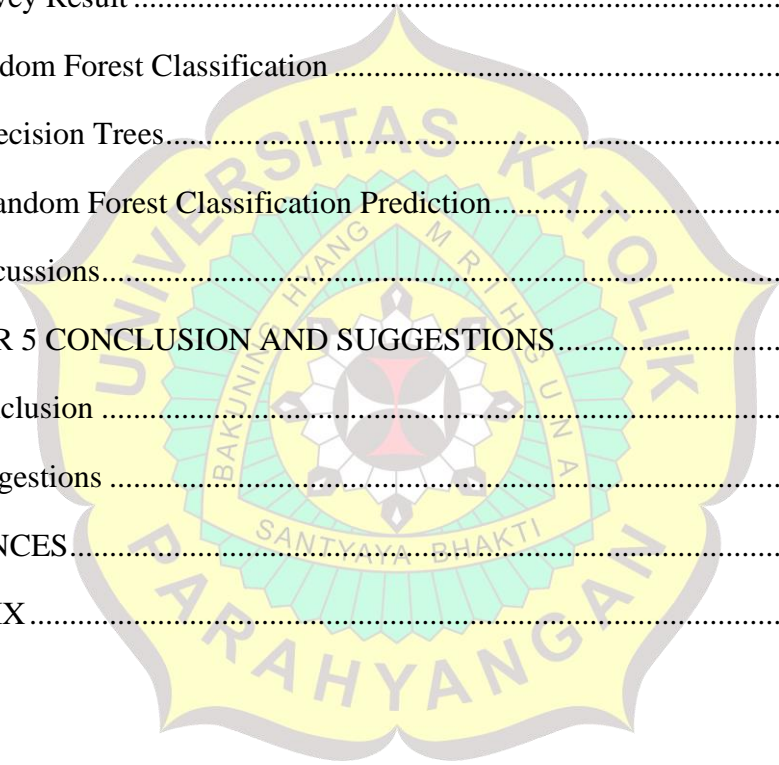
Aurelia Krishna Adisaputro

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LIST OF NOTATIONS

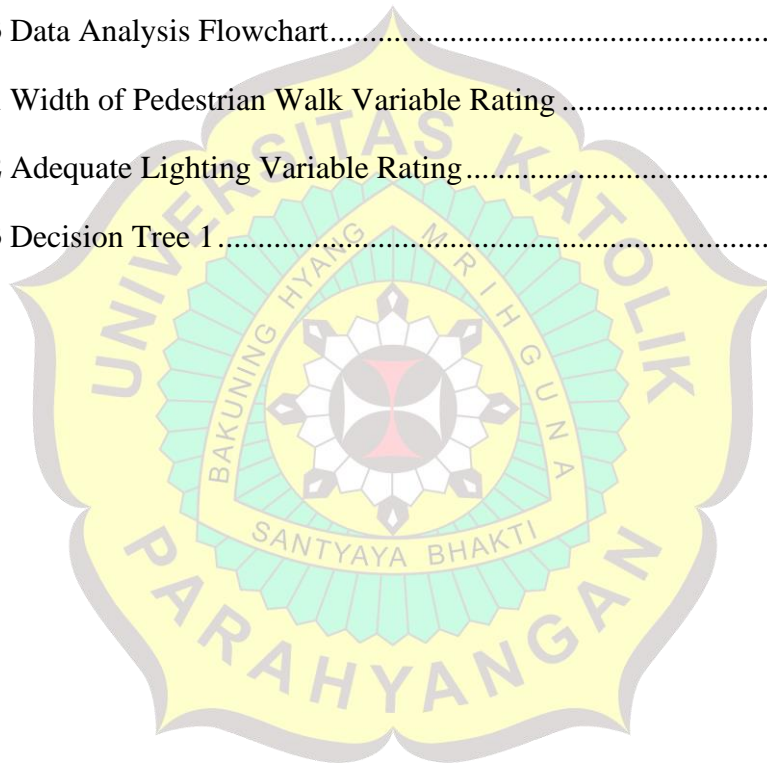
The following are the notations used in this study.

- c : Number of classes
- $E_{(X)}$: Entropy of X
- n : Data Amount
- $p_{(X)}$: probability of X
- Σ : summation of terms



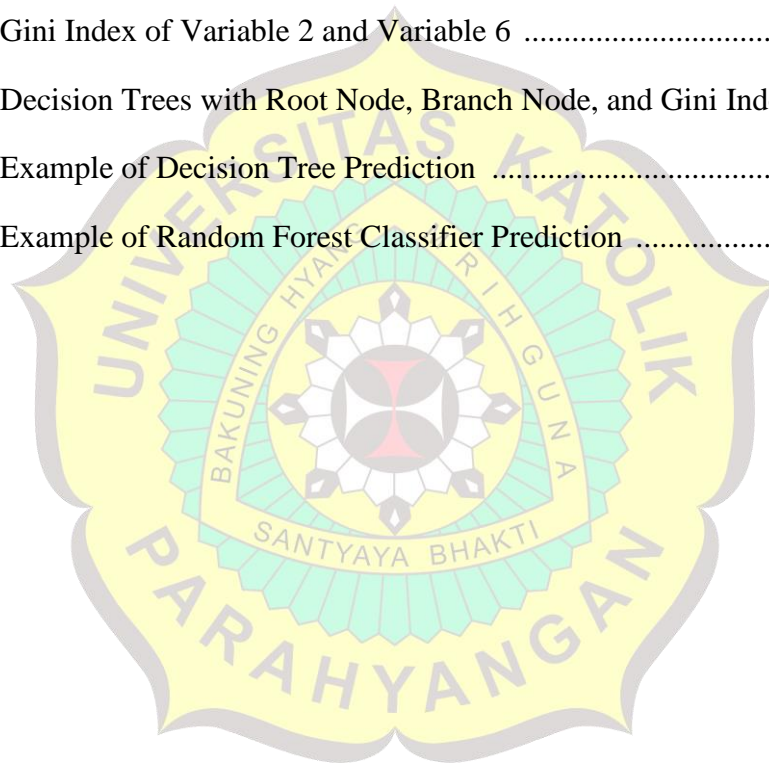
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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Intersectional equity is a concept proposal by Kimberly Crenshaw that focuses on how different characteristics of a person can correlate and form advantages or disadvantages for said person. Intersectional equity also promotes equal rights to people irrespective to their social identity, such as: race, religion, ethnicity, economic condition, gender, and age (Delgado-Ron and Erdman, 2020). One of the rights that could be promoted by intersectional equity is the right to be able to travel safely and comfortably with various modes, including walking.

Walkability measures the capabilities of a built environment to enable walking condition by being easily traversable, compact, physically-enticing, or safe (Forsyth, 2015). Many variables can affect a neighborhood's walkability, such as residential density, street connectivity, traffic conditions, and aesthetics. Increased walkability can encourage people to use public transportation, which may become a solution to high traffic issues, whilst also bringing a positive trend to public health and economy (Wang and Yang, 2019).

Maintaining a healthy physique is essential, especially for senior citizens, as people's physical capabilities tend to dwindle as they age. The diminishing physical capabilities may discourage senior citizens to make more travels, even though physical activities can improve the psychological and physical health of senior citizens (Wrosch et al., 2006). An increase to walkability can encourage walking as a physical activity for senior citizens. Thus, improving walkability of a neighborhood while prioritizing senior citizens' inputs may prove to be beneficial to the general health of senior citizens (Van Holle et al., 2014).

Walking should be an activity that can be enjoyed by people of all social status and of all life stages. Walking also promotes the use of public transportations and gives a positive impact on public health (Su et al., 2017). Existing methods to determine walkability such as "Global Walkability Index" by H. Krambeck has taken pedestrian preferences into consideration (Gota, Fabian, and Center, 2010).

However, those study has yet to consider how the intersectionality of pedestrians such as their age, gender, race, or ethnicity might affect their perceptions on walkability. In this study, perspectives on how to improve walkability provided by senior citizens will be used to create a list of variables that needs to be improved upon to achieve intersectional equity in walkability.

1.2 Statement

Current public transportation systems are not yet capable of incentivizing people to get out of their private-owned vehicles, which lead to traffic congestion (Farda and Balijepalli, 2018). To combat this problem, further development of public transportation infrastructures needs to consider pedestrians as top priority to make walkable environments that promotes the use of public transportation (Muhammad Mulyadi et al., 2022).

Most measures that are used for walkability only considers the objective parameters of built infrastructures. However, those measures do not take into consideration the subjective aspects in a community, such as perceived safety and general felt experience during a walk that is just as important in determining walking behavior (Lee and Dean, 2018). Intersectional equity discusses how different characteristics of a person can cause advantages and disadvantages in their daily life. Thus, intersectional equity may help with integrating subjective measures in determining walkability.

Age is one aspect of a person that builds their intersectionality and determine their walking behavior. Senior citizens are more likely to experience physical limitations that discourage them from walking (Luoma-Halkola and Häikiö, 2022). These physical limitations may also be shared by other individuals with mobility issues. Thus, working on ways to improve walkability from the perspectives of senior citizens may also improve walkability for other groups, including those with mobility disadvantages.

1.3 Purpose of Study

The purpose of this study are as follows:

1. To analyze variables that affects perspective on walkability of senior citizens;
2. To analyze the priority of each variable that affects perspective on walkability of senior citizens.

1.4 Scope of Study

The scope of this study are as follows:

1. The location used for this study is Braga Street, Bandung City;
2. Primary source of the data used in this study comes from the senior citizens;
3. The method used for this study is Random Forest Classification.

1.5 Methods

The study will proceed based on the current issues on walkability that applies to senior citizens and how they perceive the walkability on pedestrian facilities in the area of study. Thus, it is important to define the vocabularies that relates to the study, such as walkability, pedestrian, pedestrian walk, senior citizen, intersectional equity, and Random Forest Classification.

The data that will be used for this study will come from a survey conducted on senior citizens in the area of study. Respondents will be asked to fill a questionnaire that will determine how different variables affect walkability. Respondents will be asked to rate the significance of each variable by a scale from 1 to 5, with 1 being not significant and 5 being very significant. The variables will be determined by compiling different variables of walkability that comes from multiple studies. The survey result will then be analyzed using Random Forest Classification.

Random Forest Classification will be used to set weights on the variables. The variables will then be ranked by their weight from the highest to the lowest, with higher weighted variables being more consequential to the walkability of

senior citizens. The study will be concluded with concluding remarks and suggestions for future studies. The flow chart of this study can be seen in Figure 1.1.

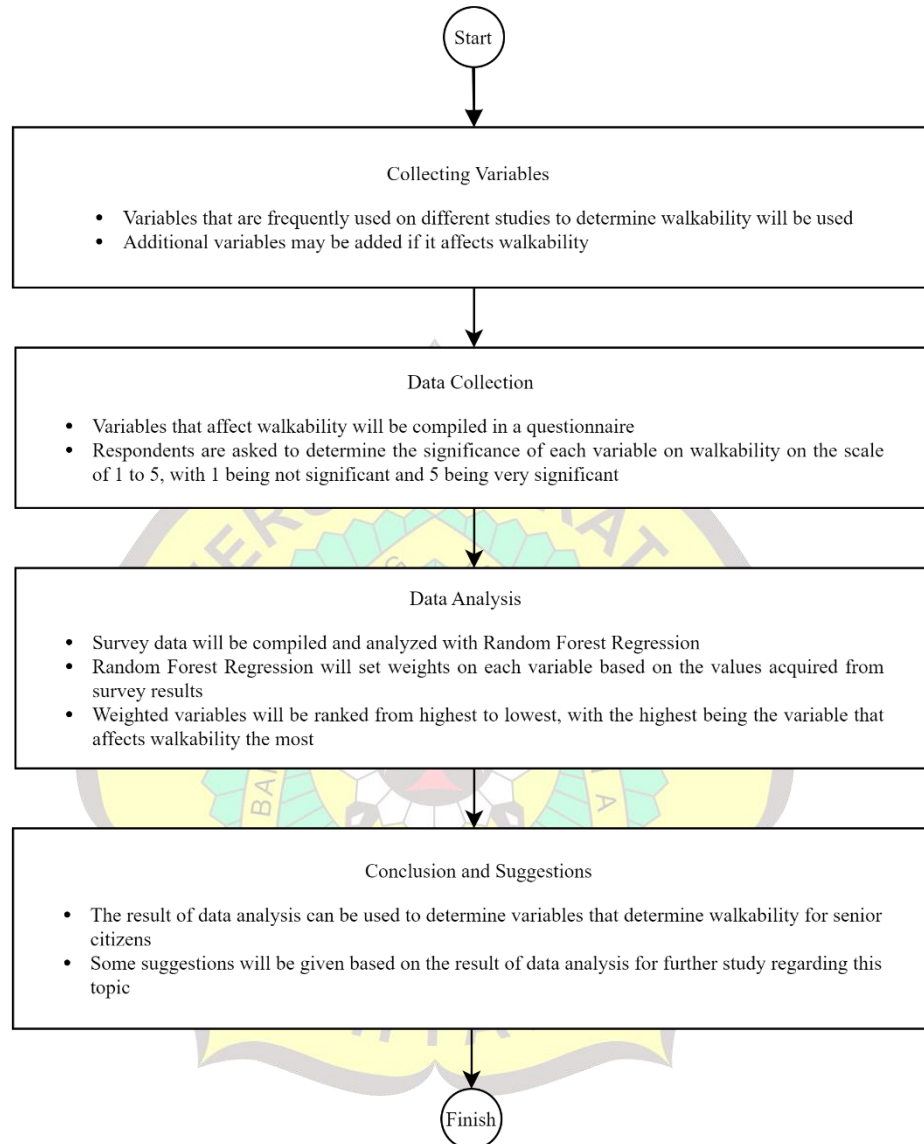


Figure 1.1 Study Flowchart