COMPARISON OF *DEMPSTER-SHAFER* AND *CERTAINTY FACTOR* METHODS IN DIAGNOSING CAR DAMAGE

As A Requirement To Complete
Strata-1 Education Program at the Informatics Engineering Department
Faculty of Computer Science, Sriwijaya University

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INFORMATICS ENGINEERING
FACULTY OF COMPUTER SCIENCE SRIWIJAYA UNIVERSITY
2018

ENDORSEMENT OF FINAL ASSIGNMENT SHEET

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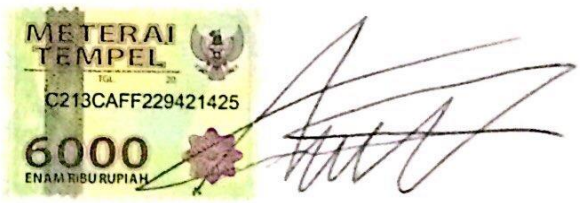

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MOTTO AND SUBMISSION

"Live like a crow, fly freely everywhere. Instead of being a bird in a cage, being a crow is much better"

I present this paper to: :

- Allah SWT
- My Family
- My Supervisor and Examiner
- My Bestfriends
- My Almamater

COMPARISON OF *DEMPSTER-SHAFER* AND *CERTAINTY FACTOR* METHODS IN DIAGNOSING CAR DAMAGE

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ABSTRACT

Diagnosing car damage is a complicated thing for workshop mechanics who have not had much experience in diagnosing car damage, especially time issues. *Dempster-shafer* is a method used to determine the level of certainty of the symptoms given by the user where each symptom has a density probability value. *Certainty Factor* is where this method is used to overcome certainty difficulties and symptoms of damage in the process of diagnosing car damage. From the test results, there is a difference in the percentage value of the diagnosis of damage from these two methods. The results of the diagnosis of damage using the *Dempster-shafer* method obtained an accuracy value is 90.66%, while the *Certainty Factor* method obtained an accuracy value is 96%. So it can be concluded that the *Certainty Factor* method is better at diagnosing car damage than the *Dempster-Shafer* method.

Keywords: *Dempster-Shafer*, *Certainty Factor*, Expert System, Comparison, Car Damage

PERBANDINGAN METODE *DEMPSTER-SHAFER* DAN *CERTAINTY FACTOR* DALAM MENDIAGNOSA KERUSAKAN PADA MOBIL

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ABSTRAK

Mendiagnosa kerusakan mobil menjadi hal yang rumit bagi para montir bengkel yang belum banyak pengalaman dalam mendiagnosa kerusakan mobil, terutama masalah waktu. *Dempster-shafer* merupakan metode yang digunakan untuk mengetahui tingkat kepastian dari gejala-gejala yang diberikan *user* dimana masing-masing gejala terdapat nilai *probabilitas densitas*. *Certainty Factor* yaitu dimana metode ini digunakan untuk mengatasi kesulitan kepastian dan gejala-gejala kerusakan dalam proses mendiagnosa kerusakan mobil. Dari hasil pengujian, terdapat perbedaan nilai persentase hasil diagnosa kerusakan dari kedua metode ini. Hasil diagnosa kerusakan menggunakan metode *Dempster-shafer* diperoleh nilai akurasi sebesar 90.66%, sedangkan metode *Certainty Factor* diperoleh nilai akurasi sebesar 96%. Sehingga dapat disimpulkan bahwa metode *Certainty Factor* lebih baik dalam mendiagnosa kerusakan pada mobil dibandingkan metode *Dempster-Shafer.*

Kata kunci: *Dempster-Shafer*, *Certainty Factor*, Sistem Pakar, Perbandingan, Kerusakan Mobil

FOREWORD

Alhamdulillahi Robbil'Alamin, all praise and gratitude to Allah SWT for His blessings and gifts. Alhamdulillahi Djazakumullahu Khaira, all thanks for the Prophet Muhammad SAW because of his struggle and guidance so that the writer can finish this Final Project well. This final project is prepared to fulfill one of the requirements to complete the Bachelor of Informatics Engineering Study Program study program at the Faculty of Computer Science at Sriwijaya University.

In completing this Final Project many parties have provided assistance and support both directly and indirectly. For this reason the author would like to express my sincere gratitude to :

1. Dear parents, Ir. Agus Mulyadi and Ir. Lisa Noor who always gives extraordinary love, attention, advice, prayer, motivation and support to the author, and also the author's brother, M. Hanura Nooryadi who is a friend at home and entertains the writer when bored;
2. Mr. Jaidan Jauhari, S.Pd., M.T. as Dean of the Faculty of Computer Science;
3. Mr. Rifkie Primartha, M.T. as Chair of the Informatics Engineering Department and as the author's academic supervisor;
4. Mr Rusdi Efendi, M.Kom. as Advisor I and Mrs. Yunita, M.Cs. as the second supervising lecturer who has provided direction, guidance, knowledge, advice and facilitated the author in the process of work;
5. Mrs. Dian Palupi Rini, Ph.D as the examiner I and Mrs. Desty Rodiah, M.T. as the second examiner who has provided input and knowledge to the author;
6. All of Mr. and Mrs. Informatics Engineering Study Program lecturers and staff of the Faculty of Computer Science at Sriwijaya University who have helped in the smooth running of the writer during the lecture activities;

7. My beloved Nindi Anggraini, S.H. which is very meaningful for writers who always give encouragement, prayer, and teachings about life to be better, also as a mood booster when the writer is tired, sad and bored, always accompany the author to be able to complete this final project;
8. Pakwo Marlizam and Bunda Jumaiyah, the authors consider to be like their own parents, who often give advice and motivation to the writer to be a better person;
9. Bang Rizqi Ayunda Pratama, Bang Danil Ayunda Febrian and Kak Roza Ayunda Putri, which the author considers to be like his own brother, has helped many writers to date, the author hopes to be successful like you;
10. Junaidi, a bestfriend and also a writer spiritual teacher, always teaches about goodness and always reminds about religion.
11. Writer's friends, Yusnanda Priadinata, Razali Taher, M. Adha Aji Pratama, joking friends who always connect when invited to chat about anything, often entertaining and giving input to the author if the writer needs an idea.
12. The childhood friend, M. Andre Apriansyah, M. Ihsan Kamil, Shaqillah Az-zahra, Hazli Rizqi, Reza Maulidin, who made my childhood full of color.
13. Startup Commit Members, Kevin Fadillah, Razin Anggiardi, Margono Saftian, Deo Wicaksono, Anugerah Fadhila who have worked closely with the authors;
14. Denny Marantha, Akhmad Rizki T, Anggita Dewintiara L, Doni Mikha, Alberthus Dimas, Sefty Arita Sari, Charles, Steven William and friends of IF BIL 2014 that the authors cannot mention one by one, who have helped and worked together with writers during lectures;
15. Watermelon & Golden Deer Squad, Anugerah Fadhila, Rendi Dwi Julian, Didi Pramudya who have lived with the author for about 2 years, playing online games and helping each other if there is a problem;
16. BPH HMIF 2016 which has trusted the author to join for 1 period, thank you and sorry for all the stories that have been in it;
17. All parties that the writer cannot mention one by one who have helped and played a role for the writer especially in completing this final project, thank you very much for everything.

The author realizes that in the preparation of this Final Project there are still many shortcomings due to limited knowledge and experience.

Therefore, constructive criticism and suggestions are highly desirable, may Allah SWT always bestow His Grace and Hidayah. End of words with all humility, hopefully this Final Project can be useful and beneficial for all of us.

Palembang, September 2018

Author

TABLE OF CONTENTS

Page

CHAPTER II THEORETICAL STUDY

CHAPTER III RESEARCH METHODOLOGY

CHAPTER IV DEVELOPMENT OF SOFTWARE

CHAPTER V RESULTS AND ANALYSIS OF RESEARCH

CHAPTER VI CONCLUSIONS AND SUGGESTIONS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

1.1 Introduction

This chapter discusses the background of the problem, the formulation of the problem, the purpose and benefits of the study, the problem boundaries and the systematic writing. This chapter will provide a general explanation of the entire study.

1.2 Background Problems

Today many people have private vehicles such as cars. Cars have an important role in land transportation, but most people can only use them and do not know about the damages that occur when the car has problems. The role of the car workshop is needed to repair the damage to the car. But there are not a few car repair mechanics that take a long time to diagnose damage to a customer's car especially if the damage is severe.

Therefore we need a system that helps the role of the car workshop in handling car damage cases, where the system can diagnose the damage to the car accurately and quickly so that the solution to the problem is based on the symptoms of damage. The system applied is an expert system. Expert systems are intelligent computer-based systems used in solving problems that can only be done by experts / experts in a field. With this system the general public can do calculations like an expert (Kusumadewi, 2003).

An expert system is a system full of elements of uncertainty and obscurity. Methods that can work in uncertainty include Dempster Shafer (Arthur, and Glenn 1976) and Certainty Factor (Shortliffe B, 1975). Both methods have different settlement processes and concepts, but the information that will be taken into account has similarities, as in each piece of information the two methods have an assessment taken from the beliefs or hypotheses of an expert. Therefore the Dempster-Shafer method with Certainty Factor is worthy to be compared with each other in order to know the difference.

In previous studies, research with different objects but with the same method, namely, Comparative Analysis of the Dempster-Shafer Method with the Certainty Factor Method in the Diagnosis of Childhood Diseases. In this study the method was compared quantitatively, namely the Confusion Matrix theory taken from the calculation results of the occurrence of disease symptoms and assessed based on the beliefs of expert knowledge. So that the accuracy value can be produced that is 94.44% in the Dempster-Shafer method and 96.03% in the Certainty Factor method (Emanuel, 2006). Subsequent research, Analysis of Comparison of Expert Systems with Certainty Factor Method with the Dempster-Shafer Method in Rabbits. The purpose of this study tried to analyze the comparison of the results of the diagnosis of expert systems of rabbit disease by using the Certainty Factor method and the Dempster-Shafer method by comparing the suitability of the diagnosis results between the system and the diagnosis of an expert so that it can be known which method is better in diagnosing rabbit disease. Based on the test results with the level of accuracy,

obtained the results that the accuracy value of the Certainty Factor method is 80% while the accuracy of the Dempster-Shafer method is 85% so it can be concluded that the Dempster-Shafer method is better than the Certainty Factor method in diagnosing rabbit disease (Ricky, Hengky, and Helen 2017).

Based on the explanation that has been explained, then in this final project the author wants to compare the Dempster-Shafer and Certainty Factor methods in diagnosing car damage to find out which method has better accuracy with the same amount of input through the symptoms of car damage.

1.3 Problem Statements

The problem formulation discussed in this study are as follows:

1. How to compare the accuracy of car damage between the Dempster-Shafer method and Certainty Factor?
2. Which method is the best in diagnosing car damage?

1.4 Research Objectives

The purpose of this study is as follows:

1. Comparing the value of the accuracy of the diagnosis of car damage between the Dempster-Shafer method and Certainty Factor to find out which method is better in diagnosing damage.
2. Providing diagnostic results namely the name of the damage, the percentage value of the diagnosis of damage and the correct and correct solution regarding the damage to the car.

1.5 Benefits of Research

The benefits of this study are:

1. Simplify and speed up the user in the process of diagnosing damage to the car.
2. Can be a reference for further research on expert systems.

1.6 Limitation of Problems

The limitations of this research problem are as follows :

1. The symptoms used in this study are 21 car symptoms and damage discussed in this study, there are 5, namely Accu Low, Starter Motor, Ignition Coil Circuit, Leakage on Fuel Systems, and ISC Valve Circuit.

1.7 Writing Systematics

The systematic writing of this thesis is as follows :

CHAPTER I INTRODUCTION

This chapter discusses the background of the problem, the formulation of the problem, the purpose and benefits of the study, the problem boundaries and the systematic writing. This chapter will provide a general explanation of the entire study.

CHAPTER II. THEORETICAL STUDY

This chapter will discuss the theoretical basics used in research, such as expert system definitions, characteristics of expert systems, advantages and

disadvantages of expert systems, Dempster Shafer method and Certainty Factor, damage to cars, and car components.

CHAPTER III. RESEARCH METHODOLOGY

This chapter will discuss the stages that will be carried out in this study. Each research stage plan is described in detail by referring to a framework. At the end of this chapter contains scheduling of planning in the implementation of research.

CHAPTER IV. SOFTWARE DEVELOPMENT

This chapter will discuss the design and implementation environment of the comparison of the Dempster-Shafer method and Certainty Factor in diagnosing damage to the car, the results of the execution, and the results of testing.

CHAPTER V. RESEARCH ANALYSIS

In this chapter will be discussed about the results of research trials, the results of testing the Dempster-Shafer method and Certainty Factor in diagnosing damage to the car, calculating the accuracy and analysis of the research.

CHAPTER VI. COVER

This chapter will discuss conclusions and suggestions.

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