

DEDICATION

I thank God Almighty for all the abundance, especially the abundance of health and knowledge in this thesis. I thank my mother, RINI TRI HANTARI, and my father, WIYANTA, and my younger brother, Anggit Mega Setyanta, who has supported me in everything. I thank to Athifah Khairunnisa, who has supported me in this thesis. Finally I dedicate this work to all students and teachers who have similar fields throughout the world.

ACKNOWLEDGMENTS

I would first like to thank my thesis advisor Parman Sukarno, Ph.D. and Dr. Bayu Erfianto of the Master Computing School at Telkom University. The door to Sukarno, Ph.D, and Dr. Erfianto office was always open whenever I ran into a trouble spot or had a question about my research or writing. They consistently allowed this paper to be my own work, but steered me in the right the direction whenever he thought I needed it.

I would also like to thank to all lecturer of Master Computing School at Telkom University who were involved in the design, validation, and implementation process for this research project. Without their passionate participation and input, the whole process could not have been successfully conducted.

I would also like to acknowledge Dr. Vera Suryani, Dr. Maman Abdurohman, and Niken Dwi Wahyu Cahyani, Ph.D. of the Master Computing School at Telkom University as the readers also reviewers of this thesis, and I am gratefully indebted to they for very valuable comments on this thesis.

Finally, I must express my very profound gratitude to my parents, my brother, and to Athifah Khairunnisa for providing me with unfailing support and continuous encouragement throughout my semesters of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them.

Thank you.

Rizka Reza Pahlevi