

DEDICATION

This thesis is dedicated first and foremost to Allah SWT, for granting me strength, patience, and guidance throughout this journey. I offer my heartfelt gratitude to my beloved parents, Mr. Syawal and Mrs. Yolan, whose prayers and unwavering support have been my greatest source of courage and my entire extended family—thank you for your encouragement and love. I also wish to acknowledge all my friends, supervisor, and everyone who has inspired and supported me along the way. May this work stand as a small but meaningful contribution to the field of Computer Science and encourage fellow informatics students to keep striving for knowledge.