

CONTENTS

COVER	i
APPROVAL PAGE	ii
STATEMENT PAGE	iii
FOREWORD	iv
CONTENTS	v
LIST OF FIGURES	viii
LIST OF TABLE	x
INTISARI	xi
ABSTRACT	xii
CHAPTER I INTRODUCTION	1
1.1 Research Background	1
1.2 Research Problem	3
1.3 Research Objective	3
1.4 Research Scope	4
1.5 Research Advantage	4
CHAPTER II LITERATURE REVIEW	5
CHAPTER III THEORETICAL BASIS	16
3.1 Recommendation System	16
3.2 Content Based Filtering	16
3.3 Collaborative Filtering	18
3.4 Hybrid Recommendation System	21
3.5 Matrix Factorization	21
3.6 Hybrid Matrix Factorization	22
3.7 Feature Embedding	24
3.8 Term Frequency – Inverse Document Frequency	24
3.9 Loss Functions	25
3.9.1 Logistic Loss Functions	25
3.9.2 Bayesian Personalized Ranking Pairwise Loss	26
3.9.3 Weighted Approximate Rank Pairwise Loss	26
3.10 Evaluation Metrics	26
3.10.1 Receiver Operating Characteristics	26
3.10.2 Area Under Curve	27
3.10.3 Mean Reciprocal Rank	28

CHAPTER IV RESEARCH METHODOLOGY	29
4.1 Research Description	29
4.2 Research Phase	29
4.3 Data Collection	29
4.4 Data Preprocessing	31
4.5 Feature Engineering	34
4.6 Modelling	35
4.7 Model Evaluation	39
4.8 Generate Recommendation	40
CHAPTER V IMPLEMENTATION	42
5.1 Tools and Materials	42
5.2 Data Collection	42
5.3 Data Pre-processing	42
5.3.1 Interaction datasets creation	43
5.3.2 Books Datasets Creation	44
5.3.3 User Datasets Creation	44
5.3.4 Selection of top 60 categories that appear in the book dataset	45
5.3.5 Selection of the top 60 categories that appear in the user dataset	46
5.3.6 Category column merge	47
5.3.7 Initializing the book's category reference with 0	47
5.3.8 Creating user's average and total rating columns	48
5.3.9 Creating book's average and total rating columns	49
5.3.10 Converting rating into 1 and -1	49
5.3.11 Clean book and user data skewness	50
5.4 Feature Engineering	50
5.4.1 Creation of user's category tf-idf dataframe	51
5.4.2 Creation of book's category tf-idf dataframe	51
5.4.3 Initializing user's category preference with 0	52
5.4.4 Creation of user book's category preference	52
5.4.5 Creation of book's category reference	53
5.5 Modelling	54
5.5.1 Collaborative Filtering Model	55
5.5.2 Hybrid Recommendation Model	56
5.6 Model Evaluation	61
5.6.1 AUC Score	61

5.6.2	Reciprocal Rank	61
5.7	Generate Recommendations.	62
CHAPTER VI RESULTS AND DISCUSSIONS		68
6.1	Data Preprocessing Results	68
6.2	Feature Engineering Results	68
6.3	Experiment Results	70
6.3.1	Area Under Curve	70
6.3.2	Reciprocal Rank	73
6.3.3	Generate Recommendation Results	76
CHAPTER VII CONCLUSION AND SUGGESTION		79
7.1	Conclusion	79
7.2	Suggestions	79
REFERENCE		80