

List of Figures

1.1	Structure of Thesis with Proposed Algorithms	11
1.2	Organization of the Thesis	12
2.1	Taxonomy of closed high utility itemsets mining according to mining approaches	27
2.2	Taxonomy of high utility itemsets mining with negative utility according to mining approaches	37
3.1	Set-enumeration tree for $I = \{A, B, C, D, E\}$	49
3.2	Execution times on chess dataset with different <i>max_length</i> constraints	60
3.3	Execution times on mushroom dataset with different <i>max_length</i> constraints	61
3.4	Memory usage on chess dataset with different <i>max_length</i> constraints	62
3.5	Memory usage on mushroom dataset with different <i>max_length</i> constraints	63
3.6	Scalability Runtime Comparison on chess dataset with different <i>max_length</i> constraints	65
3.7	Scalability Runtime Comparison on mushroom dataset with different <i>max_length</i> constraints	66
3.8	Scalability Memory Comparison on chess dataset with different <i>max_length</i> constraints	67
3.9	Scalability Memory Comparison on mushroom dataset with different <i>max_length</i> constraints	68
4.1	Runtime evaluation on accident dataset	84
4.2	Runtime evaluation on chess dataset	84
4.3	Runtime evaluation on mushroom dataset	85
4.4	Runtime evaluation on foodmart dataset	87
4.5	Runtime evaluation on retail dataset	87
4.6	Memory consumption on accident dataset	87
4.7	Memory consumption on chess dataset	87
4.8	Memory consumption on mushroom dataset	88
4.9	Memory consumption on foodmart dataset	88
4.10	Memory consumption on retail dataset	88
4.11	Runtime scalability of the algorithms on accidents dataset	89
4.12	Runtime scalability of the algorithms on foodmart dataset	89

4.13	Memory scalability of the algorithms on accidents dataset	89
4.14	Memory scalability of the algorithms on foodmart dataset	89
5.1	Set-enumeration tree for $I = \{a, b, c, d, e\}$	96
5.2	Comparison of RSU (left) and REU (right) upper bounds	101
5.3	Execution time on dense datasets	109
5.4	Execution time on sparse datasets	110
5.5	Memory usage on dense datasets	112
5.6	Memory usage on sparse datasets	113
5.7	Scalability Runtime Comparison on various datasets	116
5.8	Scalability Memory Comparison on various datasets	117
6.1	Calculate <i>RTWU</i> using utility-array	126
6.2	Runtime performance on accidents dataset	133
6.3	Runtime performance on chess dataset	134
6.4	Runtime performance on mushroom dataset	135
6.5	Runtime performance on T10I4D100K dataset	136
6.6	Runtime performance on T40I10D100K dataset	137
6.7	Memory consumption on accidents dataset	138
6.8	Memory consumption on chess dataset	139
6.9	Memory consumption on mushroom dataset	140
6.10	Memory consumption on T10I4D100K dataset	141
6.11	Memory consumption on T40I10D100K dataset	142
6.12	Runtime scalability on mushroom dataset	143
6.13	Runtime scalability on T10I4D100K dataset	144
6.14	Memory scalability on mushroom dataset	145
6.15	Memory scalability on T10I4D100K dataset	146
7.1	Calculate <i>RTWU</i> using utility-array	153
7.2	Execution time on dense datasets	162
7.3	Execution time on sparse datasets	163
7.4	Memory usage on dense datasets	165
7.5	Memory usage on sparse datasets	167
7.6	Scalability Runtime Comparison on accidents and T40I10D100K datasets	169
7.7	Scalability Memory Comparison on accidents and T40I10D100K datasets	169

List of Tables

2.1	A transaction dataset	19
2.2	External utility value	19
2.3	Transaction Utility (TU)	20
2.4	TWU values of items	21
2.5	An overview of two-phase top-k High utility itemset mining algorithms .	24
2.6	An overview of one-phase top-k High utility itemset mining algorithms .	25
2.7	An overview of closed high utility itemsets mining algorithms	30
2.8	Transactional dataset	32
2.9	External utility of items	32
2.10	Redefined Transaction Utility	34
2.11	$RTWU$ value of each item	35
2.12	Sorted items according to \succ total order	35
2.13	HUIs of the running example	36
2.14	An overview of High utility itemset mining algorithms with negative utility values	40
3.1	Revised TU values in the example	46
3.2	TWU values of items	46
3.3	$RTWU$ values of items	46
3.4	Transaction Merging	51
3.5	Final HUIs of the running example	58
3.6	Statistical information about datasets	59
3.7	Relative runtime improvement analysis on chess dataset	63
3.8	Relative runtime improvement analysis on mushroom dataset	64
3.9	Relative memory consumption analysis on chess dataset	64
3.10	Relative memory consumption analysis on mushroom dataset	64
3.11	Relative runtime best, average and minimum comparison	64
3.12	Relative memory consumption best, average and minimum comparison .	65
4.1	A transaction dataset	72
4.2	External utility value	72
4.3	Transaction Utility	73
4.4	Transaction Weighted Utility	73

4.5	Top-k HUIs for $k = 10$	73
4.6	TWU values of items as \succ order.	75
4.7	$EUCS$ map for transaction T_1 .	75
4.8	$EUCS$ map up-to transaction T_2 .	75
4.9	$EUCS$ Map with all TWU .	76
4.10	Final $EUCS$ Map.	76
4.11	Statistical information about datasets	84
4.12	Improvements of TKEH over kHMC at the highest value of k ($k = 1000$)	89
5.1	Comparison of the characteristics of the existing algorithms with our proposed algorithm EHIN	103
5.2	Transaction Utility (TU)	106
5.3	Redefined Transaction Utility	106
5.4	$RTWU$ values of items based on redefined TU	106
5.5	Final HUIs of the running example	107
5.6	Statistical information about datasets	108
5.7	Relative runtime improvement analysis on dense datasets	114
5.8	Relative runtime improvement analysis on sparse datasets	114
5.9	Relative memory usage analysis on dense datasets	115
5.10	Relative memory usage analysis on sparse datasets	115
5.11	Relative runtime analysis on best, average and minimum case	115
5.12	Relative memory analysis on best, average and minimum case	116
6.1	Redefined Transaction Utility	120
6.2	Sorted items according to \succ total order with their $RTWU$ value	131
6.3	Final HUIs of the running example	131
6.4	Dataset characteristics.	132
6.5	Number of candidates on accidents dataset	133
6.6	Number of candidates on chess dataset	133
6.7	Number of candidates on mushroom dataset	134
6.8	Number of candidates on T10I4D100K dataset	135
6.9	Number of candidates on T40I10D100K dataset	136
6.10	Number of HUIs mined on accidents and chess dataset	137
6.11	Number of HUIs mined on mushroom dataset	138
6.12	Number of HUIs mined on T10I4D100K and T40I10D100K dataset	139
6.13	Runtime improvements of EHNL over EHNL(RSUP) and EHNL(TM)	146
6.14	Memory improvements of EHNL over EHNL(RSUP) and EHNL(TM)	147
7.1	HUIs of the running example	160
7.2	CHUIs of the running example	160
7.3	Statistical information about datasets	160

7.4 Runtime and memory improvements of CHN over CHN(RSU-Prune), CHN(TM) and FHN	168
--	-----