

CS286 Programming assignment 1: Finding Decision Reducts

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3-Sep-2020

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1 Introduction

In this programming assignment, you will implement and test an algorithm for finding minimal reducts, presented in the lecture. The implementation is in the programming language of your choice, but the program must compile and run under the indicated environment.

2 Tasks

2.1 Implementation

Implement a discernibility matrix-based algorithm for finding decision reducts. Your program should consist of the following steps:

1. Read in a dataset from a plain text format (.csv preferred).
2. Create a data structure that represents a decision table.
3. Create a data structure that represents a discernibility matrix for a given decision attribute.

4. Create a data structure that represents a discernibility function (in conjunctive normal form - CNF)
5. Perform logic transformation (i.e. the logic law of absorption) on the function in CNF to convert it into DNF.
6. Find prime implicants from function in DNF.
7. Print out all minimal reducts to the console.

2.2 Testing

A simple test case Choose at least one example from the ones presented in the lecture (Examples 1-3 on slides 24-26) to check that your algorithm works correctly.

A real-world large dataset Choose a large dataset, such as the one you are working on in the labs, or another chosen from the URL data sources listed in Lab 1 and run your program using it as a test case.

3 Deliverables

Source code including a short README file on how to run your program. Provide files on which you tested your program - at least two, where one is a small test case and the second is a larger dataset. Please compress all files into one file (i.e. using .zip) and upload it as one compressed file on Canvas.

4 Grading

The assignment will be graded according to the rubric in [Table 1](#).

Table 1: Grading rubric

Rubric	Criteria	Points
1	Input data is parsed and read in	2
2	Chooses a suitable data structure for a decision table and implements it correctly	1
3	Chooses a suitable data structure for a discernibility matrix and implements it correctly	2
4	Chooses a suitable data structure for a discernibility function and implements it	2
5	Implements correct conversion from CNF to DNF	4
6	Prints out minimal reducts from DNF	3
7	Provided a small test-case dataset and program works on it correctly	2
8	Provided a large test-case dataset and program works on it	4
Total		20