EC-801

Logic Synthesis Techniques

Assignment-2

Implementation Of Reduced Ordered Binary Decision Diagram

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File name: *ROBDD.py* (python file)

Description:

Program to find the ROBDD of a given Boolean expression and order of variables.

Input format:

Input to code is a SOP representation of a function. Complemented literal is given by upper case letters.

For ex: **complement(A)** = A' is given as "***A***".

Uncomplemented literal is given in form of lower-case letters.

Ex: **Uncomplemented(A)** = "***a***".

Input **SOP** function is given as a ***string***.

Ex: "A'B'C + A'BC + AB'C + ABC" this SOP is given in input as string- '***ABc+Abc+aBc+abc***'.

Order of the variables is given as:

For order a<b<c, input is string '**a<b<c**" here the string should strictly contain only **lowercase** letters.

Output format:

Output is dictionary that contains key value pairs of function of node, function of right child node and function of left child node.

Ex: Output: {'c': ['1', '0'], '0': ['0', '0'], '1': ['1', '1']}

Here one of the key value pair is {'c': ['1','0']}. Key 'c' represents function of a particular node, the value pair ['1','0'] represents right and left node functions i.e.,

'1' represents the right node function '1'

'0' represents the left node function '0'

Example Outputs:

```
PS D:\NITK\5th sem\logic synthesis> python -u "d:\NITK\5th sem\logic synthesis\Assignment2\ROBDD.py"
Enter the expression: ABc+Abc+aBc+abc
Enter the order of ROBDD implementation: a<b<c
{'c': ['1', '0'], '0': ['0', '0'], '1': ['1', '1']}
PS D:\NITK\5th sem\logic synthesis>
```

```
PS D:\NITK\5th sem\logic synthesis> python -u "d:\NITK\5th sem\logic synthesis\Assignment2\ROBDD.py"
Enter the expression: abcd
Enter the order of ROBDD implementation: a<c<d<b
{'abcd': ['bcd', '0'], 'bcd': ['bd', '0'], 'bd': ['b', '0'], 'b': ['1', '0'], '0': ['0', '0'], '1': ['1', '1']}
PS D:\NITK\5th sem\logic synthesis>
```

```
PS D:\NITK\5th sem\logic synthesis> python -u "d:\NITK\5th sem\logic synthesis\Assignment2\ROBDD.py"
Enter the expression: a+b+c+d
Enter the order of ROBDD implementation: a<b<c<d
{'a+b+c+d': ['1', 'b+c+d'], 'b+c+d': ['1', 'c+d'], 'c+d': ['1', 'd'], 'd': ['1', '0'], '0': ['0', '0'], '1': ['1', '1']}
PS D:\NITK\5th sem\logic synthesis>
```

```
PS D:\NITK\5th sem\logic synthesis> python -u "d:\NITK\5th sem\logic synthesis\Assignment2\ROBDD.py"
Enter the expression: abced
Enter the order of ROBDD implementation: a<b<d
Wrong input format
PS D:\NITK\5th sem\logic synthesis>
```