

**CTIS264 COMPUTER ALGORITHMS**  
**PYTHON LABSTUDY 4**

There is a way to translate the messages with the use of the **decision tree**. A decision tree models a sequence of decisions or choices in which selections are made in stages from among multiple alternatives at each stage. The stages in the decision are represented as nodes while the branches indicate the decisions that can be made at each stage.

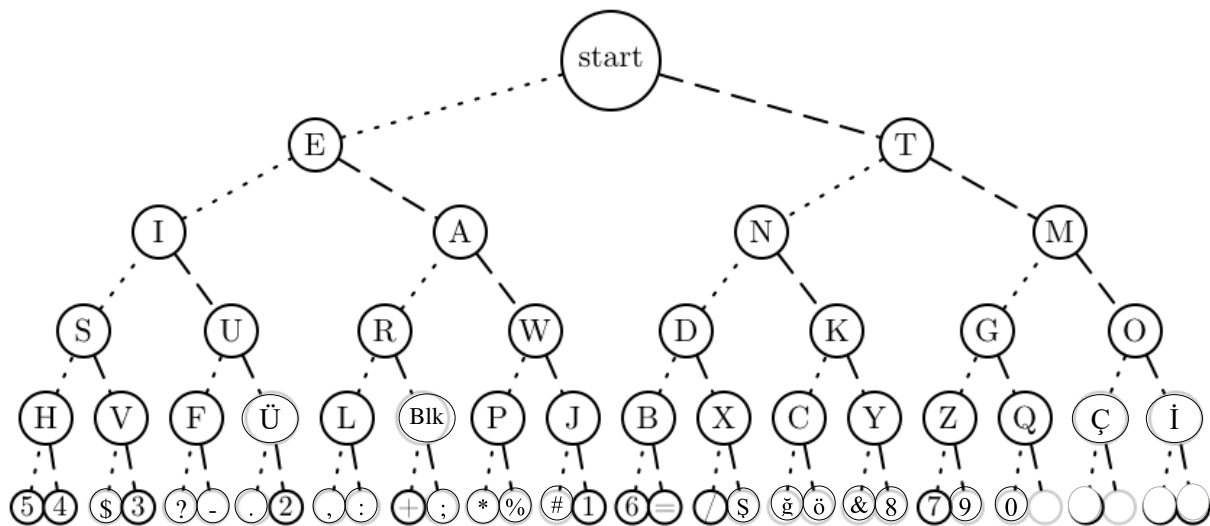
This idea can be used to decode Morse code sequence. Each code sequence is unique and they are separated by blanks.

The below decision tree is in the form of **complete and balanced binary tree** like a **binary-heap**. Starting root node does not contain any value, all the **left nodes** have a **dot (.)** and **right nodes** have a **line (-)** as a decision expansion. Some characters may have 1, some may have 2, 3, 4 or 5 notations.

For example:

**A:**  $\bullet$   $\bullet$   $\bullet$   $\bullet$

**X: -.-**



**Note:** the above Morse Codes are not completely correct Morse Codes. In order to make it applicable with complete balanced binary tree, some of the missing nodes added with some special symbols. “Blk” is the blank, while you are preparing your binary tree array, please use “ ” instead of “Blk”.

Write a python code which will use this binary tree while decoding Morse alphabet. You are asked to implement this tree like a complete **binary-heap tree array**. Find left and right child of each node indexes in this tree with the formulas that we used in binary heap (i.e. left= 2j, right= 2j+1)

For a given Morse code like(given as a string):

Age Group	Male (%)	Female (%)
18-24	~10	~90
25-34	~15	~85
35-44	~20	~80
45-54	~25	~75
55-64	~30	~70
65-74	~35	~65
75-84	~40	~60
85+	~45	~55

This program will display the decoded morse-code string as:

WITH MY BEST WISHES

If the given Morse Code is wrong, it will display an error message like:

Invalid Morse Code at the 23'th position of the code array

Give some more example Morse Code and display the answers within your program.

Also your program should ask an input Morse string and should give the answers.