

PROGRAMING AND NEURAL NETWORKS ASSESSMENT QUESTIONS (OBLIGATORY)

1. A = [1, 70, 9, 1, 2, 30 ... 6, 1, 2, 30, 50 ...]
B = [1, 2, 30]

To find the occurrence of a pattern B in an array A like above,

- a) develop an algorithm,
 - b) implement the algorithm using the basics of any programming language (without additional libraries/packages),
 - c) implement the algorithm using Python programming language (you may prefer additional libraries/packages).
2. Give your opinions about the codes below (a, b, c, and d are independent codes) and re-write them if necessary.

a) `from math import *`
`x = ceil(x)`

b) `list_of_fruits = ["apple", "pear", "orange"]`
`for i in range(len(list_of_fruits)):`
`fruit = list_of_fruits[i]`
`process_fruit(fruit)`

c) `class Rectangle:`
`def __init__(self, height, width):`
`self.height = height`
`self.width = width`
`def area(self):`
`return self.height * self.width`

d) `#include <bits/stdc++.h>`
`using namespace std;`
`void do_something()`
`{`
`int* ptr = new int(10);`
`// some math operations`
`return;`
`}`
`int main()`
`{`
`do_something();`
`return 0;`
`}`

3. Consider a 2D CNN having following properties:

- A gray-scaled input image with the height and width of 5 pixels each. Each pixel has one single channel, and the input has a shape of (5, 5, 1).
 - Two convolutions layer.
 - Max-pooling for one of the layers and average-pooling for the other layer.
 - Number of filters: 2, kernel and pool size:(2,2), activation: relu, padding: zero, strides: 2
- a) Perform an experiment using random numerical values step by step.
 - b) Draw illustrative diagram of the model for classification.
 - c) Implement the model using python.
 - d) Evaluate the model.
 - e) Give brief explanation for the hyperparameters.

NATURAL LANGUAGE PROCESSING ASSESSMENT QUESTIONS

1. Collect a named entity recognition dataset from the web. Build a NER system using:
 - a) HMM
 - b) CRF
 - c) RNN
 - Report the success rates on the test data.
 - Report the model latency and memory usage for each given instance. This is a plus.

SPEECH RECOGNITION ASSESSMENT QUESTIONS

1. Perform some Turkish speech recognition tasks using tools such as wav2vec, xlsr, deepspeech, kaldi.
2. Use Google Speech API to perform Turkish speech-to-text tasks (carefully use Google free credits to avoid being charged)

COMPUTER VISION ASSESSMENT QUESTIONS

1. Retrieve faces from a video using tools developed in Python or C++.
2. Perform some face recognition tasks in Python or C++ and compare the tools, which you used, in aspect of processing time, used memory / storage and accuracy.