SudoCode

Category of Event: Online Coding Event

The reputed coding event of ROBOTIX comes in a whole new avatar this year with **SUDO-CODE**. Multiple problem statements spanning various genres of programming, including path planning, image analysis, natural language processing and more, this mega-event searches for the most comprehensive and versatile coder. There will be several challenges, each difficult in their own way, and each a pleasure to overcome. Only the ones who persist, whose aptitude stand the test of endurance, however, will finally taste victory.
Format :
There are 3 problem statements, outlined here. The overall result will be decided keeping in mind the submissions for each of the three problem statements. All three will carry different weightage depending on the number of submissions per problem statement.

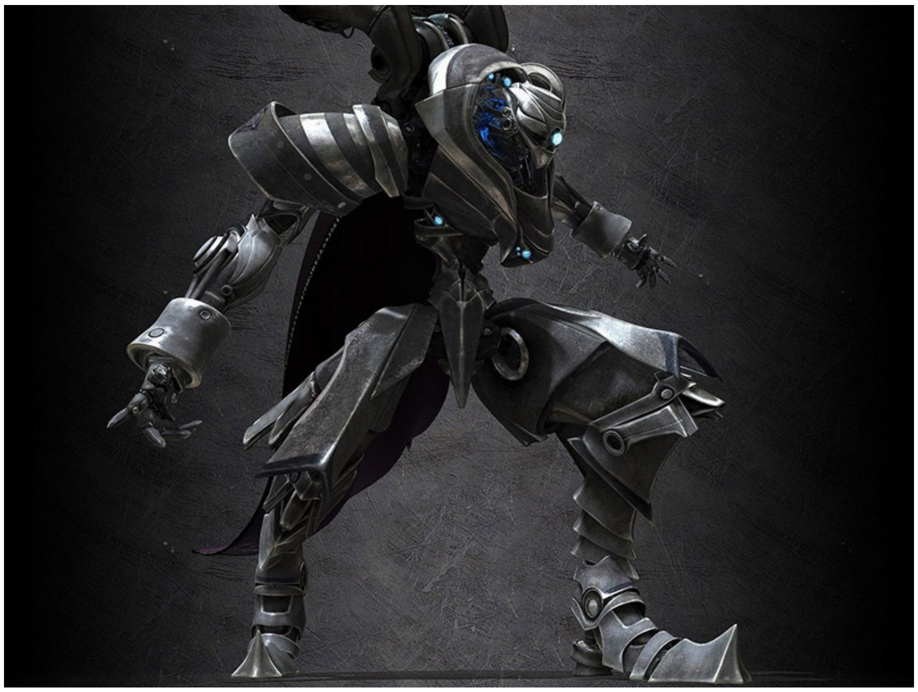
JIGSAW

Problem Statement:
The participant code is supposed to reconstruct a scrambled image and return an unscrambled proper image.

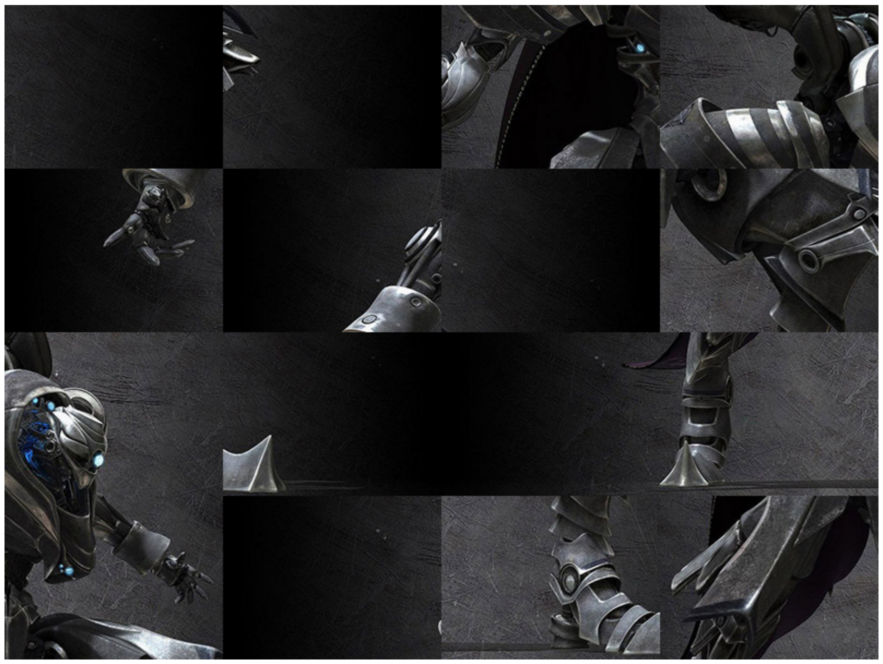
Event Details:
Write a code which can solve a jigsaw picture puzzle

- The participant will get N2 blocks of an image (N x N) where these blocks are of size A X A.
- The participant is supposed to take these image as input and return the original image and coordinates of each of these blocks in the original image.
- Input is a zip file containing the scrambled blocks of the image.
- "A" will keep reducing with passing rounds.
- Participants are allowed to have blank blocks on the image to avoid negative score.
- There will be a time limit of 3 secs on the runtime of your program.

Example: The actual image looks like-



After Scrambling the image looks like-



The value of N here = 4.

Scoring:

- 5 X No of Blocks in correct Positions - 5 X No of blocks in wrong positions.

Input:
The Input given to the participants would be a zip file containing various blocks of the image. These blocks will be n^2 .jpeg files numbered in a random fashion . Sample zip file can be downloaded here.

Output:
Output the unscrambled image as well as a text file containing the coordinate of each block in the n*n grid written against the file number.

WHERE IS IT

Problem Statement: Given a sentence,identify spatial indicators and the corresponding trajectors and landmarks. A sentence may have multiple indicators.

Event Details:

- **Theme**: Natural Language Processing.

- **Motivation**: Simple natural English can express a lot of complex 'spatial' relationships among object. For example, Object A is 'on' Object B, Object A is 'in' Object B etc. These are usually enabled by prepositions like on, in etc. which we call 'spatial indicator'. A spatial indicator is accompanied by a 'trajector' and a 'landmark', which in the above examples are Object A and Object B respectively. One sentence may have multiple spatial indicators. Given a sentence, the programmer has to identify spatial indicators and the corresponding trajectors and landmarks. A sentence may have multiple indicators.

Spatial Indicator- Prepositions linking an object to its location like 'on','at','upon'.
Trajector- The object or subject in discussion.
Landmark- The position of the object in space.

Input: A text file containing the statements-
1. The pencil is on the table.
2. I am on Cloud 9 and the earth is beneath me.
3. The dog is on the footpath.
4. The apples are on the tree
5. The sheep are in the farm.
6. Milk is in the refrigerator.
7. Clothes are hanging on the wire.

Output: A list of all spatial relationships,eg
1. “on” “pencil” “table”
2. “on” “I” “Cloud 9”
2. “beneath” “earth” “me”
3. “on” “dog” “footpath”
4. “on” “apples” “tree”
5. “in” “sheep” “farm”
6. “in” “milk” “refrigerator”
7. “on” “clothes” “wire”

Encounter Specialist

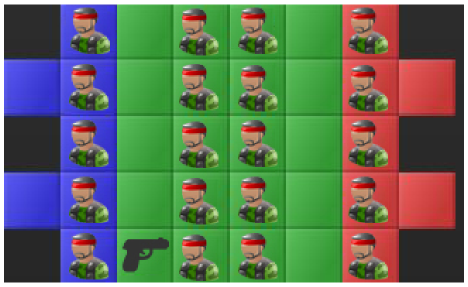
Problem Statement: Write a code to program an imaginative soldier which can kill soldiers by moving to specific locations with a limited instruction set.

Event Details:
You are a programmable Robot Police Officer who is on a mission to eliminate the bad terrorist forces. Your task is to kill as many terrorists as possible while keping in mind the following rules and constraints.

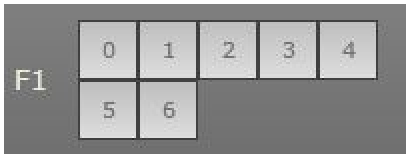
- You are given the starting location of the soldier.
- You are also provided with the path over which the soldier can travel and the location of terrorists over this path.
- A terrorist is considered to be dead if you reach the tile over which the terrorist is standing.
- You can move your soldier by using any one of the three fundamental operations-
    1. Move Forward
    2. Turn Left (While standing on the same tile)
    3. Turn Right (While standing on the same tile)
- To move your soldier, you have to execute a function.
- These functions can have a fixed number of the fundamental operations. This fixed number will be given to you.
- There can be multiple functions too in which case only one primary function can be executed by you. To use other functions, you have to place a call to that function within your primary function.
- The path to terrorists may have multiple colored tiles. In this case the fundamental operations are also available to you in different colors.

- To use a fundamental operation over a tile, the fundamental operation must have the same color as that of the tile.In other words, you have to club a fundamental function with a color.
- You have to kill one or multiple terrorists. Your score is decided by the number of terrorists you kill.

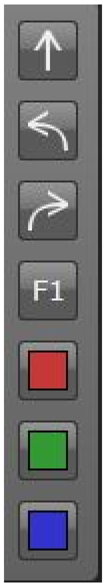
Sample Arena-



Here the Gun is Your Starting position and the figurines are the terrorists. The tiles are colored blue,red and green.



F1 is the function that can be used to perform 7 fundamental operations or recursively call itself.



Above shown are the values that can be filled in the function F1. Each of the fundamental operations can be clubbed with a colored tile.

Your purpose is to write a code such that you can cover maximum tiles with terrorists.

Input:

The first Input will be a text file. The first line of the file will be an Integer(n).This n represents the size of the sqaure grid (Size n*n).
The next n lines contain the n rows of a 2-D array representing the entire grid. The description of the array is given below.
The next line is another Integer (p) giving the number of functions that can be used. The next p lines contain p integers giving the maximum number of fundamental operations in each of the functions.
Description of the array.
The array can have following space seperated values-

1. 0: Means a grey area. You cannot use this tile in anyway to travel.
2. B/G/R : Means an empty tile of colors Blue,Green and Red respectively. These tiles cannot have terrorists and can be used for travelling.
3. BT/GT/RT: Means a tile of colors Blue, Green and Red respectively with a terrorist on it too.
4. BS/GS/RS: Means the starting location of your soldier with colors Blue, Green and Red respectively.

Output:

The output will be another text file of p lines where each line contains details of one function. These line must contain space seperated fundamental operations being used in each function. In case a cell in the function is left empty, then place 0 in that place.
Fundamental operations being denoted in your output file will have following representations-
1.BF/GF/RF - Blue,greeen,red colored tiles coupled with forward movement.
2.BL/GL/RL - Blue,greeen,red colored tiles coupled with left movement.
3.BR/GR/RR - Blue,greeen,red colored tiles coupled with right movement.
4.F1/F2.../FP - Refering to a call to any of the P functions whose values you are defining.