A

REPORT

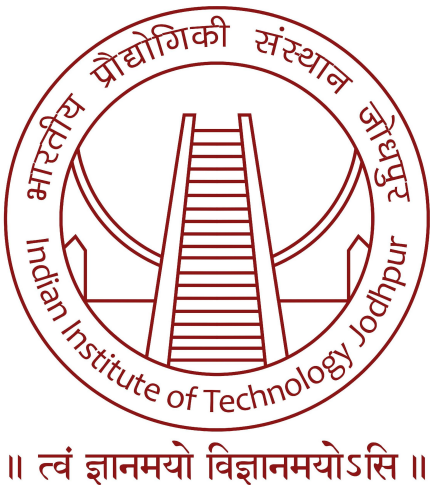
ON

“ADVANCE ARTIFICIAL INTELLIGENCE: ASSIGNMENT 1”

Submitted To

DR. GAURAV HARIT

IIT JODHPUR



Submitted By

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AAI Assignment-1 Report

Task: To Implement HMM Model as presented in the given question paper.

Objectives:

- As per directions in the question paper.
- map the model with the states.
- map the model with the actions.
- find the likely hood of the observable sequences.
- implementation of the model

Procedure:

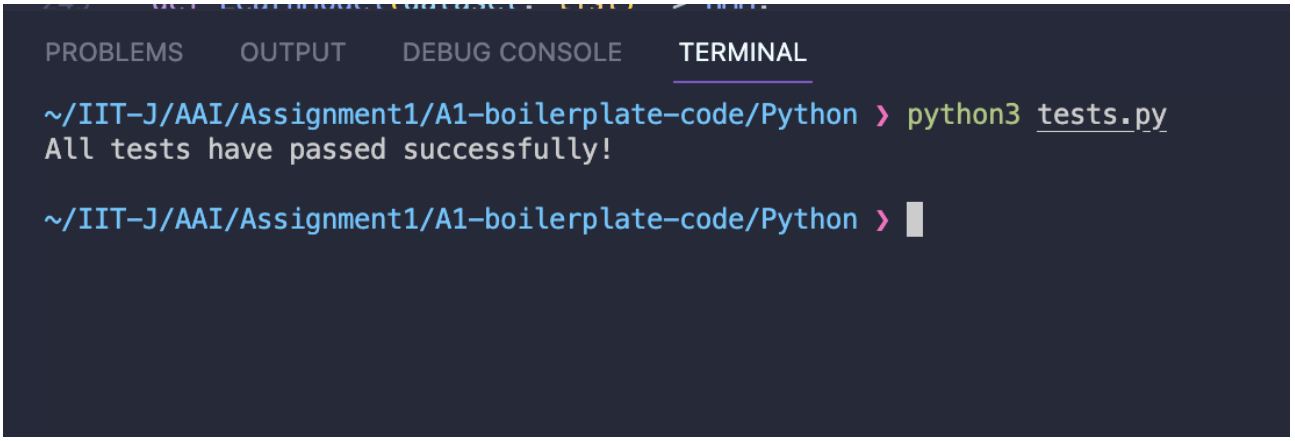
- Import required packages.
- As per mentioned
    - The following assumptions are made for the suspect:
    - The suspect always plans for a few days, then scouts for a few days. Thereafter, the suspect
    - breaks into a house, and then immediately migrates the next day. This patterns is to be
    - expected, with a few miscellaneous activity done in before the burglary.
    - The suspect remains untracked most of the time while burgling, or migrating.
    - While planning, the suspect spends most of their time in the house.
    - The suspect can scout at any time of the day roaming in the streets, and mostly prefers
    - scouting during the night.
    - The suspect prefers to have food at eateries in the evening. It is believed that there is no
    - significance of this action with respect to the burglary.
    - On arriving at a new area after migration, the suspect begins with planning and other
    - miscellaneous activities in the new place all over again.
- For the above, we've translated them into transmission, emission, and pi matrices as below,

```
self.trans_mat = np.array([
[1/3,1/3,0,0,1/3],
[0,1/3,1/3,0,1/3],
[0,0,0,1,0],
[1,0,0,0,0],
[1/3,1/3,0,0,1/3]
])

self.pi = np.array([0,0,0.5,0.5,0])

self.emission_mat = np.array([
[0,0,1/3,0,0,0,1/3,0,0,0,1/3,0],
[0.2,0,0,0,0.2,0,0,0,0.6,0,0,0],
[0,0,0,1/3,0,0,0,1/3,0,0,0,1/3],
[0,0,0,1/3,0,0,0,1/3,0,0,0,1/3],
[0,0.2,0,0,0,0.6,0,0,0,0.2,0,0]
])
```

- Since we are given the list of observables, we are converting them to numbers in the range [0,11], both inclusive, representing the current at the current daytime.
- After that, we can train the hmm model class instance to get updated probability.
- Filling implementation in the boilerplate code.
- After Completing all this, we can test the code by running the test.py file.
- The results of the model have been verified by file and showing the out as below.



Note:- The test.py file has not been altered/modified, and the same goes for the read database.txt file.

New HMM

Objectives:

- As per directions in the question paper.
- update the model to add one more hidden state (i.e., hiding)
- print the results

Procedure:

- update the matrices to consider the newly updated state in the model
- train the new model
- testing both the models and reporting the results
- result: