Pattern Recognition and Machine Learning: Homework 6

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Problem 1

I use `hmmlearn` module to build HMM models.

(1)

I use the `CategoricalHMM` model in `hmmlearn` to train the dataset, and I obtain from fitting the initial , the transition and emission probabilities, shown respectively in , Fig.2 and Fig.3.

Dice Type	Dice 1	Dice 2
Initial Prob	0.548	0.452

Table 1: The initial probabilities

Dice Type	Dice 1	Dice 2
Dice 1	0.618	0.382
Dice 2	0.897	0.103

Table 2: The transition probabilities

Dice/Point	1	2	3	4	5	6
Dice 1	0.119	0.180	0.165	0.162	0.152	0.223
Dice 2	0.195	0.037	0.109	0.107	0.141	0.411

Table 3: The emission probabilities

(2)

Forward Algorithm

```
iprob = model.startprob_
tprob = model.transmat_
eprob = model.emissionprob_

for t in range(4):
    if t==0:
```

```
 7            a0 = eprob[0, 6]*iprob[0]
 8            a1 = eprob[1, 6]*iprob[1]
 9        else:
10            a0 = eprob[0, 6]*(a0*tprob[0, 0] + a1*tprob[1, 0])
11            a1 = eprob[1, 6]*(a0*tprob[0, 1] + a1*tprob[1, 1])
12    p = a0 + a1
13    # p = 0.002354746869856092
```

Problem 2

2.1

2.2

2.3

Problem 3

3.1