Artificial Intelligence

Programming Assignment

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소프트웨어학과 3 학년

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1. Prolog

Prolog_1 실행

```
이한림의 손주 : 숙향
여행자 : 이몽룡
여행자 : 변학도
건강하고 여유있는 사람 : 이몽룡
건강하고 여유있는 사람 : 변학도
부부 : 성참판 월매
부부 : 이한림 몽룡모
성참판 아내 : 월매
이한림 아내 : 몽룡모
이한림은 여행자이다 : False
변학도는 여행자이다 : True
```

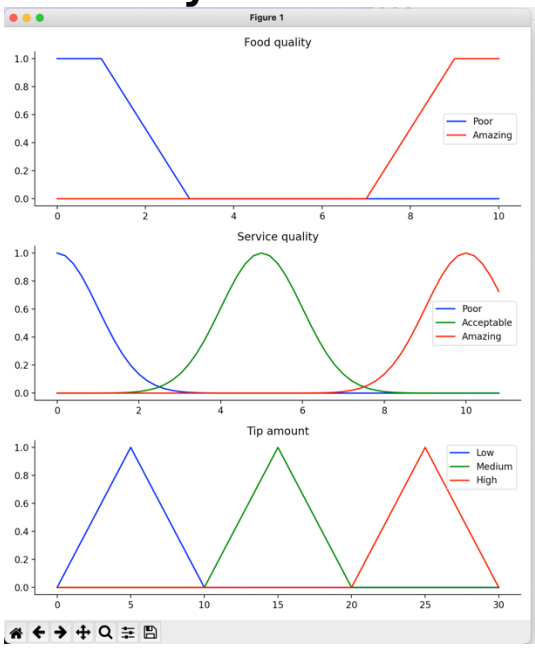
Prolog_2 실행

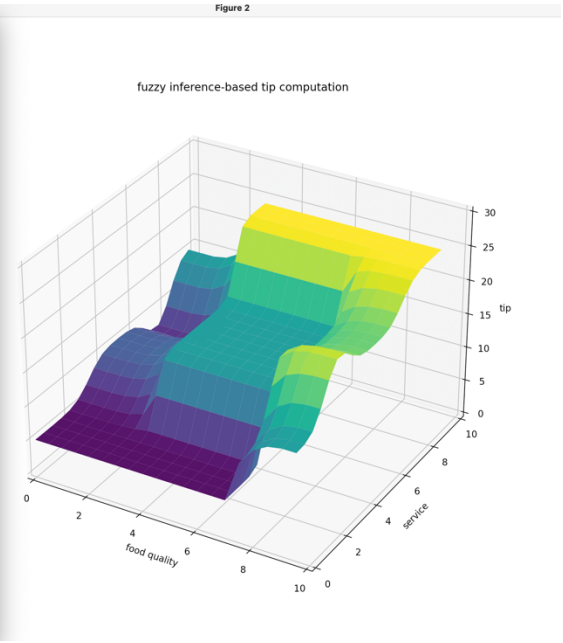
```
cinderella likes 가지
snow_white likes 가지
cinderella likes 사과
cinderella likes 가지
cinderella likes 당근
cinderella likes 오이
cinderella likes 달걀
cinderella 좋아하는 채소 : 사과
cinderella 좋아하는 채소 : 가지
cinderella 좋아하는 채소 : 당근
```

Prolog_3 실행

```
left --> right
left --> center
right --> center
left --> right
center --> left
center --> right
left --> right
```

2. Fuzzy





3. Bayesian Network and Markov Random Field

– Bayesian: Bayesian_inference.py 실행

```
P(E)
+------+-----+
| E(F) | 0.9 |
+------+-----+
| E(T) | 0.1 |
+------+-----+
P(B)
+------+-----+
| B(F) | 0.7 |
+------+-----+
| B(T) | 0.3 |
+------+-----+
P(A|EB)
+------+------+------+------+------+
| E    | E(F) | E(F) | E(T) | E(T) |
+------+------+------+------+------+
| B    | B(F) | B(T) | B(F) | B(T) |
+------+------+------+------+------+
| A(F) | 0.99 | 0.1  | 0.3  | 0.01 |
+------+------+------+------+------+
| A(T) | 0.01 | 0.9  | 0.7  | 0.99 |
+------+------+------+------+------+
P(N|A)
+------+------+------+
| A    | A(F) | A(T) |
+------+------+------+
| N(F) | 0.9  | 0.2  |
+------+------+------+
| N(T) | 0.1  | 0.8  |
+------+------+------+
True
Finding Elimination Order: : 100%|                                                  | 2/2 [00:00<00:00, 1242.39it/s]
Eliminating: E: 100%|                                                             | 2/2 [00:00<00:00, 938.11it/s]
P(A)
+------+----------+
| A    |   phi(A) |
+======+==========+
| A(F) |   0.6720 |
+------+----------+
| A(T) |   0.3280 |
+------+----------+
Finding Elimination Order: : 100%|                                                  | 1/1 [00:00<00:00, 4100.00it/s]
Eliminating: A: 100%|                                                             | 1/1 [00:00<00:00, 1703.62it/s]
P(N | E=F, B=T)
+------+----------+
| N    |   phi(N) |
+======+==========+
| N(F) |   0.2700 |
+------+----------+
| N(T) |   0.7300 |
+------+----------+
Finding Elimination Order: : : 0it [00:00, ?it/s]
0it [00:00, ?it/s]
P(N | A=F, B=T)
+------+----------+
| N    |   phi(N) |
+======+==========+
| N(F) |   0.9000 |
+------+----------+
| N(T) |   0.1000 |
+------+----------+
```

– Markov Random Field: Markov_Random_Field.py 실행

```
분할 함수의 값:  7201840.0
0it [00:00, ?it/s]
phi(A, B, C, D
+------+------+------+------+-----------------+
| A    | B    | D    | C    |   phi(A,B,D,C) |
+======+======+======+======+=================+
| A(0) | B(0) | D(0) | C(0) |    300000.0000 |
+------+------+------+------+-----------------+
| A(0) | B(0) | D(0) | C(1) |    300000.0000 |
+------+------+------+------+-----------------+
| A(0) | B(0) | D(1) | C(0) |    300000.0000 |
+------+------+------+------+-----------------+
| A(0) | B(0) | D(1) | C(1) |        30.0000 |
+------+------+------+------+-----------------+
| A(0) | B(1) | D(0) | C(0) |       500.0000 |
+------+------+------+------+-----------------+
| A(0) | B(1) | D(0) | C(1) |   5000000.0000 |
+------+------+------+------+-----------------+
| A(0) | B(1) | D(1) | C(0) |       500.0000 |
+------+------+------+------+-----------------+
| A(0) | B(1) | D(1) | C(1) |       500.0000 |
+------+------+------+------+-----------------+
| A(1) | B(0) | D(0) | C(0) |       100.0000 |
+------+------+------+------+-----------------+
| A(1) | B(0) | D(0) | C(1) |       100.0000 |
+------+------+------+------+-----------------+
| A(1) | B(0) | D(1) | C(0) |   1000000.0000 |
+------+------+------+------+-----------------+
| A(1) | B(0) | D(1) | C(1) |       100.0000 |
+------+------+------+------+-----------------+
| A(1) | B(1) | D(0) | C(0) |        10.0000 |
+------+------+------+------+-----------------+
| A(1) | B(1) | D(0) | C(1) |    100000.0000 |
+------+------+------+------+-----------------+
| A(1) | B(1) | D(1) | C(0) |    100000.0000 |
+------+------+------+------+-----------------+
| A(1) | B(1) | D(1) | C(1) |    100000.0000 |
+------+------+------+------+-----------------+
0.0416560212390167

0.0416560212390167

0.0416560212390167

4.16560212390167e-06

6.942670206502783e-05

0.6942670206502782

6.942670206502783e-05

6.942670206502783e-05

1.3885340413005566e-05

1.3885340413005566e-05

0.13885340413005565

1.3885340413005566e-05

1.3885340413005566e-06

0.013885340413005565

0.013885340413005565

0.013885340413005565
Eliminating: C: 100%|████████████████████████████████████████| 3/3 [00:00<00:00, 1531.33it/s]
phi(A)
+------+---------------+
| A    |       phi(A) |
+======+===============+
| A(0) | 5901530.0000 |
+------+---------------+
| A(1) | 1300310.0000 |
+------+---------------+
0.8194475300756473

0.18055246992435267

Eliminating: D: 100%|████████████████████████████████████████| 1/1 [00:00<00:00, 1945.41it/s]
phi(A|B=0, C=1)
+------+--------------+
| A    |      phi(A) |
+======+==============+
| A(0) | 300030.0000 |
+------+--------------+
| A(1) |    200.0000 |
+------+--------------+
0.9993338440528928

0.0006661559471072178
```

4. Decision Tree Induction