

# Task

## Task1: 三门问题

计算:

$P(['A', 'C', 'B'])$

$P([( 'A', 'C', 'A')])$

## Task2: Burglary

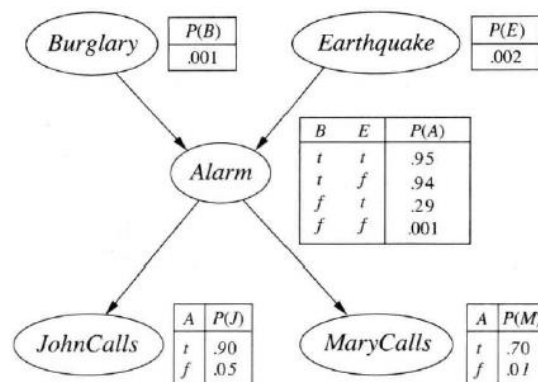
计算:

$P(\text{JohnCalls}, \text{MaryCalls})$

$P(\text{Burglary}, \text{Earthquake}, \text{Alarm}, \text{JohnCalls}, \text{MaryCalls})$

$P(\text{Alarm} \mid \text{JohnCalls}, \text{MaryCalls})$

$P(\text{JohnCalls}, \neg \text{MaryCalls} \mid \neg \text{Burglary})$



### Task3: Diagnosing

Variables and their domains

- (1) PatientAge: ['0-30', '31-65', '65+']
- (2) CTScanResult: ['Ischemic Stroke', 'Hemorrhagic Stroke']
- (3) MRIScanResult: ['Ischemic Stroke', 'Hemorrhagic Stroke']
- (4) StrokeType: ['Ischemic Stroke', 'Hemorrhagic Stroke', 'Stroke Mimic']
- (5) Anticoagulants: ['Used', 'Not used']
- (6) Mortality: ['True', 'False']
- (7) Disability: ['Negligible', 'Moderate', 'Severe']

CPTs

Note: [CTScanResult, MRIScanResult, StrokeType] means:

$P(\text{StrokeType}=\text{'...'} \mid \text{CTScanResult}=\text{'...'} \wedge \text{MRIScanResult}=\text{'...'})$

(1)

[PatientAge]

['0-30', 0.10],

['31-65', 0.30],

['65+', 0.60]

(2)

[CTScanResult]

['Ischemic Stroke', 0.7],

['Hemorrhagic Stroke', 0.3]

(3)

[MRIScanResult]

['Ischemic Stroke', 0.7],

['Hemorrhagic Stroke', 0.3]

(4)

[Anticoagulants]

['Used', 0.5],

['Not used', 0.5]

(5)

[CTScanResult, MRIScanResult, StrokeType])

```
['Ischemic Stroke', 'Ischemic Stroke', 'Ischemic Stroke', 0.8],
['Ischemic Stroke', 'Hemorrhagic Stroke', 'Ischemic Stroke', 0.5],
[ 'Hemorrhagic Stroke', 'Ischemic Stroke', 'Ischemic Stroke', 0.5],
[ 'Hemorrhagic Stroke', 'Hemorrhagic Stroke', 'Ischemic Stroke', 0],

['Ischemic Stroke', 'Ischemic Stroke', 'Hemorrhagic Stroke', 0],
['Ischemic Stroke', 'Hemorrhagic Stroke', 'Hemorrhagic Stroke', 0.4],
[ 'Hemorrhagic Stroke', 'Ischemic Stroke', 'Hemorrhagic Stroke', 0.4],
[ 'Hemorrhagic Stroke', 'Hemorrhagic Stroke', 'Hemorrhagic Stroke', 0.9],

['Ischemic Stroke', 'Ischemic Stroke', 'Stroke Mimic', 0.2],
['Ischemic Stroke', 'Hemorrhagic Stroke', 'Stroke Mimic', 0.1],
[ 'Hemorrhagic Stroke', 'Ischemic Stroke', 'Stroke Mimic', 0.1],
[ 'Hemorrhagic Stroke', 'Hemorrhagic Stroke', 'Stroke Mimic', 0.1],
```

(6)

[StrokeType, Anticoagulants, Mortality]

```
['Ischemic Stroke', 'Used', 'False', 0.28],
['Hemorrhagic Stroke', 'Used', 'False', 0.99],
['Stroke Mimic', 'Used', 'False', 0.1],
['Ischemic Stroke', 'Not used', 'False', 0.56],
['Hemorrhagic Stroke', 'Not used', 'False', 0.58],
['Stroke Mimic', 'Not used', 'False', 0.05],

['Ischemic Stroke', 'Used', 'True', 0.72],
['Hemorrhagic Stroke', 'Used', 'True', 0.01],
['Stroke Mimic', 'Used', 'True', 0.9],
['Ischemic Stroke', 'Not used', 'True', 0.44],
['Hemorrhagic Stroke', 'Not used', 'True', 0.42 ],
['Stroke Mimic', 'Not used', 'True', 0.95]
```

(7)

[StrokeType, PatientAge, Disability]

```
[ 'Ischemic Stroke', '0-30', 'Negligible', 0.80],  
[ 'Hemorrhagic Stroke', '0-30', 'Negligible', 0.70],  
[ 'Stroke Mimic', '0-30', 'Negligible', 0.9],  
[ 'Ischemic Stroke', '31-65', 'Negligible', 0.60],  
[ 'Hemorrhagic Stroke', '31-65', 'Negligible', 0.50],  
[ 'Stroke Mimic', '31-65', 'Negligible', 0.4],  
[ 'Ischemic Stroke', '65+', 'Negligible', 0.30],  
[ 'Hemorrhagic Stroke', '65+', 'Negligible', 0.20],  
[ 'Stroke Mimic', '65+', 'Negligible', 0.1],
```

```
[ 'Ischemic Stroke', '0-30', 'Moderate', 0.1],  
[ 'Hemorrhagic Stroke', '0-30', 'Moderate', 0.2],  
[ 'Stroke Mimic', '0-30', 'Moderate', 0.05],  
[ 'Ischemic Stroke', '31-65', 'Moderate', 0.3],  
[ 'Hemorrhagic Stroke', '31-65', 'Moderate', 0.4],  
[ 'Stroke Mimic', '31-65', 'Moderate', 0.3],  
[ 'Ischemic Stroke', '65+', 'Moderate', 0.4],  
[ 'Hemorrhagic Stroke', '65+', 'Moderate', 0.2],  
[ 'Stroke Mimic', '65+', 'Moderate', 0.1],
```

```
[ 'Ischemic Stroke', '0-30', 'Severe', 0.1],  
[ 'Hemorrhagic Stroke', '0-30', 'Severe', 0.1],  
[ 'Stroke Mimic', '0-30', 'Severe', 0.05],
```

```
[ 'Ischemic Stroke', '31-65', 'Severe', 0.1],  
[ 'Hemorrhagic Stroke', '31-65', 'Severe', 0.1],  
[ 'Stroke Mimic', '31-65', 'Severe', 0.3],  
[ 'Ischemic Stroke', '65+', 'Severe', 0.3],  
[ 'Hemorrhagic Stroke', '65+', 'Severe', 0.6],  
[ 'Stroke Mimic', '65+', 'Severe', 0.8]
```

① 在实验报告中画出该任务的贝叶斯网络结构图

② 计算:

$p_1 = P(\text{Mortality} = \text{'True'} \mid \text{PatientAge} = \text{'0-30'}, \text{CTScanResult} = \text{'Ischemic Stroke'})$

$p_2 = P(\text{Disability} = \text{'Severe'} \mid \text{PatientAge} = \text{'65+'}, \text{MRIScanResult} = \text{'Ischemic Stroke'})$

$p_3 = P(\text{StrokeType} = \text{'Stroke Mimic'} \mid \text{PatientAge} = \text{'65+'}, \text{CTScanResult} = \text{'Hemorrhagic Stroke'}, \text{MRIScanResult} = \text{'Ischemic Stroke'})$

$p4 = P(\text{Mortality} = \text{'False'} \mid \text{PatientAge} = \text{'0-30'}, \text{Anticoagulants} = \text{'Used'}, \text{StrokeType} = \text{'Stroke Mimic'})$

$p5 = P(\text{PatientAge} = \text{'0-30'}, \text{CTScanResult} = \text{'Ischemic Stroke'}, \text{MRIScanResult} = \text{'Hemorrhagic Stroke'}, \text{Anticoagulants} = \text{'Used'}, \text{StrokeType} = \text{'Stroke Mimic'}, \text{Disability} = \text{'Severe'}, \text{Mortality} = \text{'False'})$