Course code: CSE3008

Course Title: Introduction to Machine Learning

Model Question paper

Module 1 & 2: 5 Marks

Module 3: SVM
10 Marks

Any conceptual question.

So, better to revise the ppt to clear your concepts

Module 4: Bayesian Learning
20 Marks
(Classification – 10 & Bayesian Network – 10)

Example : Play Tennis

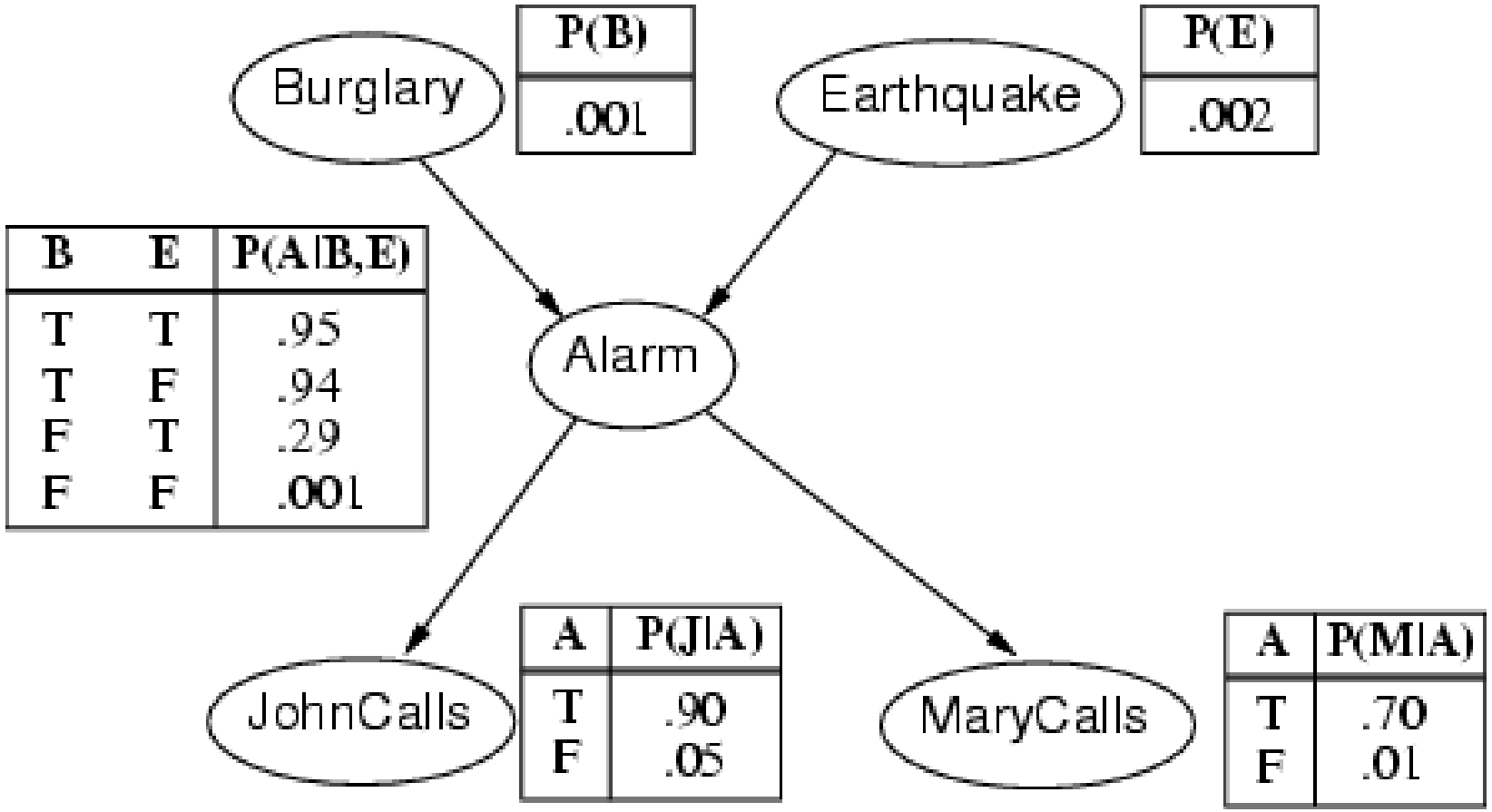
PlayTennis: training examples

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Example

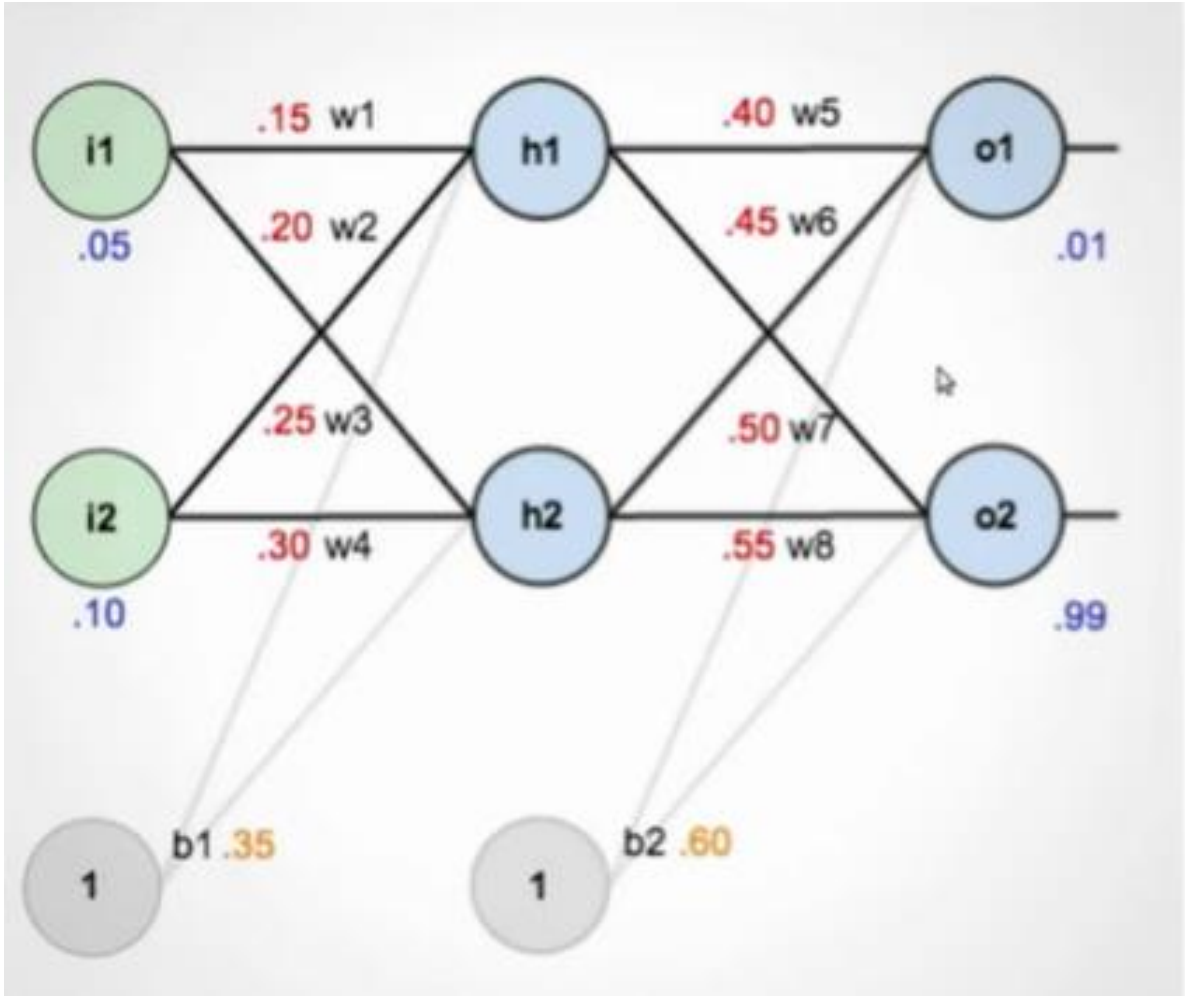
- You have a new burglar alarm installed at home.
- It is fairly reliable at detecting burglary, but also sometimes responds to minor earthquakes.
- You have two neighbors, John and Merry , who promised to call you at work when they hear the alarm.
- John always calls when he hears the alarm, but sometimes confuses telephone ringing with the alarm and calls too.
- Merry likes loud music and sometimes misses the alarm.
- Given the evidence of who has or has not called, we would like to estimate the probability of a burglary.

Example contd.



Module 5: ANN
15 Marks
(Forward + Backpropagation)

Example: Forward + Backward Propagation



i1=0.05, i2=0.10

w1=0.15, w2=0.20
w3=0.25, w4=0.30
b1=0.3

w5=0.4. w6=0.45
w7=0.5, w8=0.55
b2=0.6

o1=0.01, o2=0.99

Slide credit: Andrew Ng

Module 4: HMM

10 Marks

Viterbi Decoding Algorithm

ICE Cream Problem

- Imagine that you are a climatologist in the year 2799 studying the history of global warming. You cannot find any records of the weather in Amaravati, for the summer of 2020, but you do find Jason Eisner's diary, which lists how many ice creams Jason ate every day that summer.
- Our goal is to use these observations to estimate the temperature every day.
- We'll simplify this weather task by assuming there are only two kinds of days: cold (C) and hot (H).
- So the Eisner task is as follows: Given a sequence of observations O (each an integer representing the number of ice creams eaten on a given day) find the 'hidden' sequence Q of weather states (H or C) which caused Jason to eat the ice cream.
- Figure A.2 shows a sample HMM for the ice cream task.
- The two hidden states (H and C) correspond to hot and cold weather, and the observations (drawn from the alphabet O = {1,2,3}) correspond to the number of ice creams eaten by Jason on a given day

ICE Cream Problem

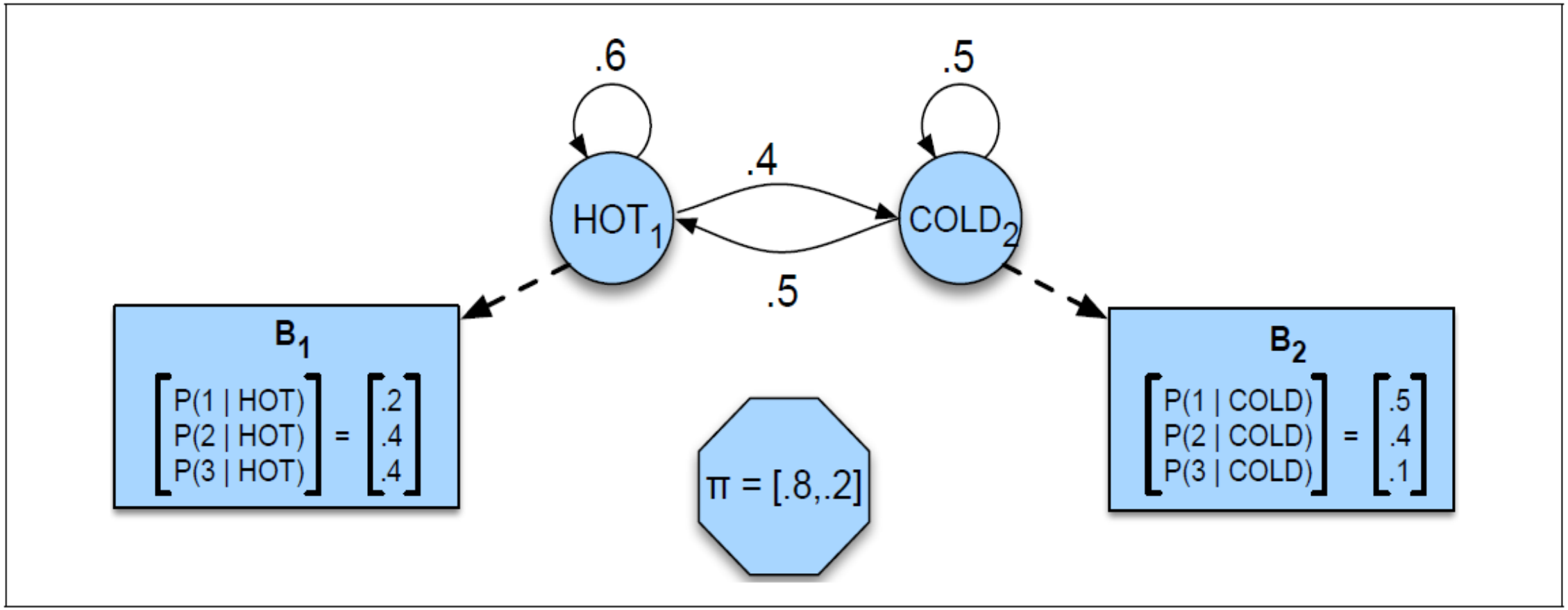


Figure A.2 A hidden Markov model for relating numbers of ice creams eaten by Jason (the observations) to the weather (H or C, the hidden variables).

Question ???

- Compute the probability of ice-cream events 3 1 3 instead by summing over all possible weather sequences, weighted by their probability.
- First, let's compute the joint probability of being in a particular weather sequence Q and generating a particular sequence O of ice-cream events.