

56:171 Operations Research
Quiz #7 Version A Solution – Fall 2002

Part I:

Consider a decision problem whose payoffs are given by the following payoff table:

Decision	A	B
one	80	25
two	30	50
three	60	70
Prior Probability	0.4	0.6

- c 1. Which alternative should be chosen under the maximin payoff criterion?
a. one b. two c. three d. *NOTA*
- a 2. Which alternative should be chosen under the maximax payoff criterion?
a. one b. two c. three d. *NOTA*
- c 3. Which alternative should be chosen under the maximum expected payoff criterion?
a. one b. two c. three d. *NOTA*
- c 4. What will be the entry in the “regret” table for decision **three** & State-of-Nature **A**?
a. zero b. 10 c. 20 d. 30 e. 40 f. *NOTA*

Suppose that you perform an experiment to predict the state of nature (**A** or **B**) above. The experiment has two possible outcomes which we label as **positive** and **negative**. If the state of nature is **A**, there is a 60% probability that the outcome will be **positive**, whereas if the state of nature is **B**, there is a 20% probability that the outcome will be **positive**.

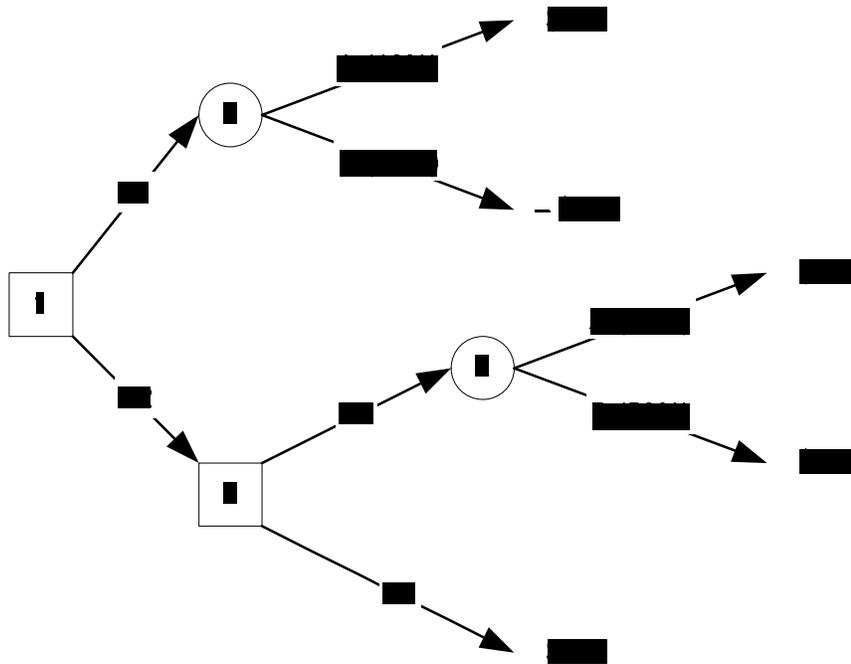
According to Bayes’ rule,

$$P\{A | positive\} = \frac{P\{\alpha | \beta\} P\{\gamma\}}{P\{\delta\}}$$

In this equation, ...

- c 5. $\alpha =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- a 6. $\beta =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- a 7. $\gamma =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- c 8. $\delta =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- c 9. Suppose that the outcome of the experiment is **positive**. Then the probability that the state of nature is **A** is revised to ... (*choose nearest value*):
a. 0.5 b. 0.6 c. 0.7 $\approx 2/3$ d. 0.8 e. 0.9 f. *NOTA*

Part II.



Consider the decision tree above.

Fold back the branches and write the values of each node in the table below:

Node	#1	#2	#3	#4
Value	150	140	150	150

b 5. What is the optimal decision at node #1?

a. A1

b. A2

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Quiz #7 Version B Solution – Fall 2002

Part I:

Consider a decision problem whose payoffs are given by the following payoff table:

Decision	A	B
one	50	30
two	40	50
three	30	70
Prior Probability	0.4	0.6

- b 1. Which alternative should be chosen under the maximin payoff criterion?
a. one b. two c. three d. *NOTA*
- c 2. Which alternative should be chosen under the maximax payoff criterion?
a. one b. two c. three d. *NOTA*
- c 3. Which alternative should be chosen under the maximum expected payoff criterion?
a. one b. two c. three d. *NOTA*
- c 4. What will be the entry in the “regret” table for decision **three** & State-of-Nature **A**?
a. zero b. 10 c. 20 d. 30 e. 40 f. *NOTA*

Suppose that you perform an experiment to predict the state of nature (**A** or **B**) above. The experiment has two possible outcomes which we label as **positive** and **negative**. If the state of nature is **A**, there is a 60% probability that the outcome will be **positive**, whereas if the state of nature is **B**, there is a 20% probability that the outcome will be **positive**.

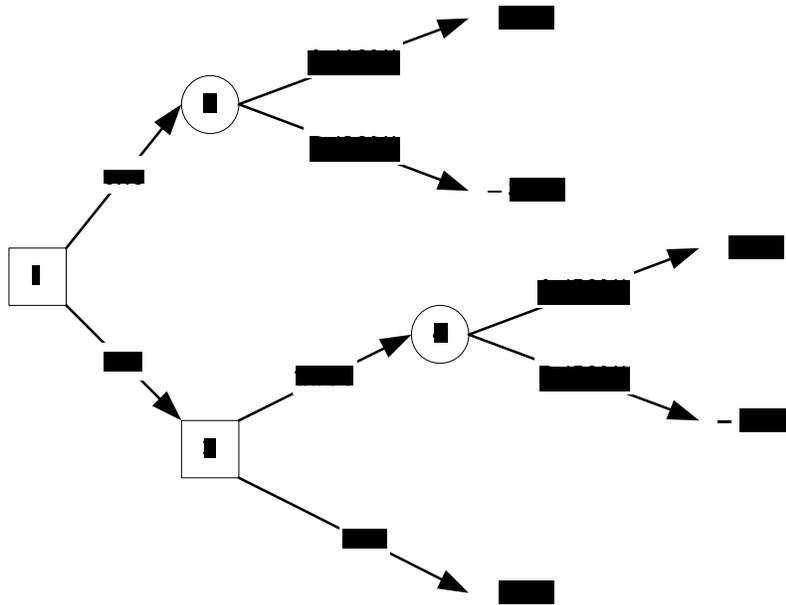
According to Bayes’ rule,

$$P\{A|negative\} = \frac{P\{\alpha|\beta\}P\{\gamma\}}{P\{\delta\}}$$

In this equation, ...

- d 5. $\alpha =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- a 6. $\beta =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- a 7. $\gamma =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- d 8. $\delta =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- d 9. Suppose that the outcome of the experiment is **negative**. Then the probability that the state of nature is **A** is revised to ... (*choose nearest value*):
a. 0.1 b. 0.15 c. 0.2 d. 0.25 e. 0.3 f. *NOTA*

Part II.



Consider the decision tree above.

Fold back the branches and write the values of each node in the table below:

Node	#1	#2	#3	#4
Value	\$140	\$140	\$125	\$50

- a 5. What is the optimal decision at node #1?
a. A1 b. A2

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Quiz #7 Version C Solution –Fall 2002

Part I:

Consider a decision problem whose payoffs are given by the following payoff table:

Decision	A	B
one	70	50
two	40	80
three	60	30
Prior Probability	0.4	0.6

- a 1. Which alternative should be chosen under the maximin payoff criterion?
 a. one b. two c. three d. *NOTA*
- b 2. Which alternative should be chosen under the maximax payoff criterion?
a. one b. two c. three d. *NOTA*
- b 3. Which alternative should be chosen under the maximum expected payoff criterion?
a. one b. two c. three d. *NOTA*
- b 4. What will be the entry in the “regret” table for decision **three** & State-of-Nature **A**?
a. zero b. 10 c. 20 d. 30 e. 40 f. *NOTA*

Suppose that you perform an experiment to predict the state of nature (**A** or **B**) above. The experiment has two possible outcomes which we label as **positive** and **negative**. If the state of nature is **A**, there is a 60% probability that the outcome will be **positive**, whereas if the state of nature is **B**, there is a 20% probability that the outcome will be **positive**.

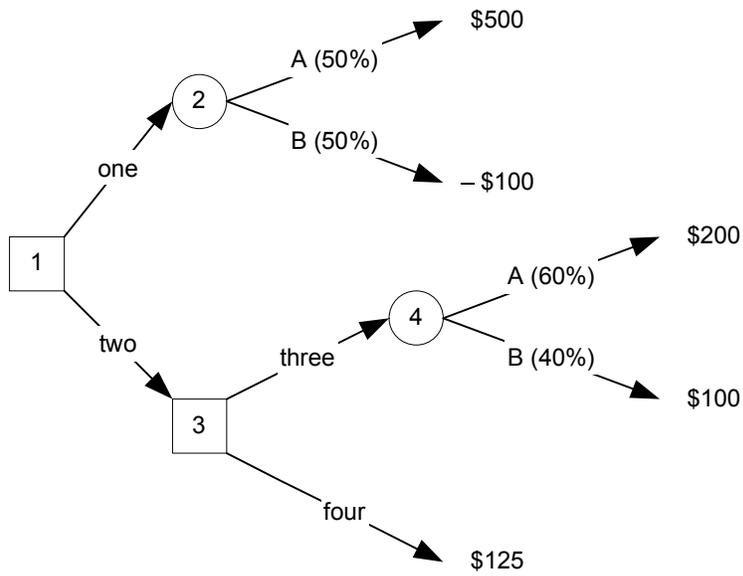
According to Bayes’ rule,

$$P\{B | positive\} = \frac{P\{\alpha | \beta\} P\{\gamma\}}{P\{\delta\}}$$

In this equation, ...

- c 5. $\alpha =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- b 6. $\beta =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- b 7. $\gamma =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- c 8. $\delta =$
a. state of nature is A c. experimental outcome is positive e. *NOTA*
b. state of nature is B d. experimental outcome is negative
- b 9. Suppose that the outcome of the experiment is **positive**. Then the probability that the state of nature is **B** is revised to ... (*choose nearest value*):
a. 0.2 b. 0.3 $\approx 1/3$ c. 0.4 d. 0.5 e. 0.9 f. *NOTA*

Part II.



Consider the decision tree above.

Fold back the branches and write the values of each node in the table below:

Node	#1	#2	#3	#4
Value	\$200	\$200	\$160	\$160

- a 5. What is the optimal decision at node #1?
a. A1 b. A2