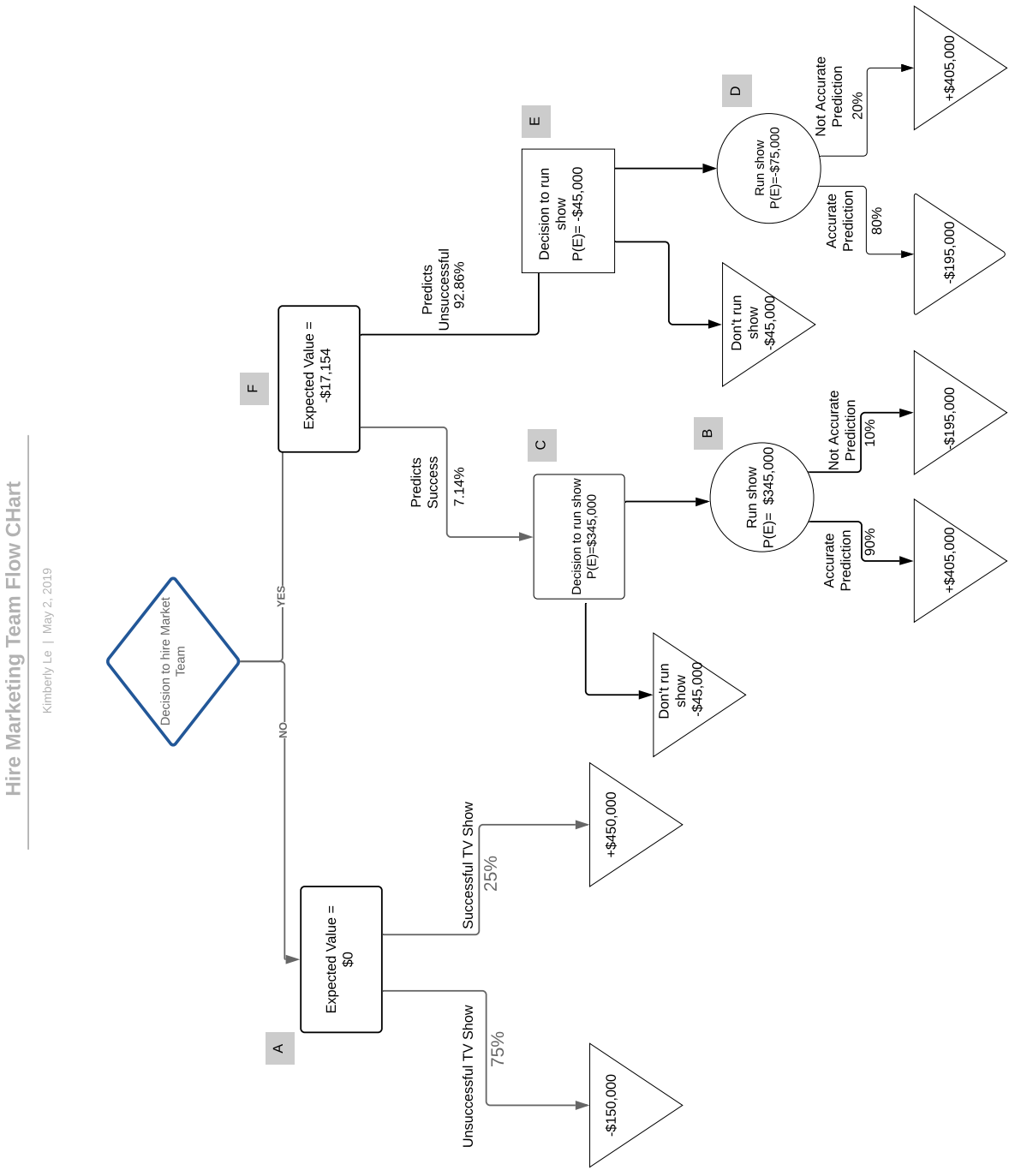
9.3.6

Problem: A local TV studio is deciding on a possible new TV show. A successful TV show earns the station about $450,000, but if it is not successful, the station loses about $150,000. Of the previous 100 shows reviewed by the local TV station, 25 turned out to be successful TV shows, and 75 turned out to be unsuccessful TV shows. For a cost of $45,000, the local station can hire Buddys Market Research team; this team will use a live audience in previewing the TV pilots to determine whether the viewed TV show will be successful. Past records show that market research predicts a successful TV show about 90% of the time that the TV show was actually successful and predicts an unsuccessful show 80% of the time that it turned out to be unsuccessful. How should the local TV studio maximize its profits?

What we know:

- Successful TV Show: +$450,000
- Unsuccessful TV Show: -$150,000
- Data: Out of 100 shows – 25 Success, 75 Unsuccessful
- Hire Market Research Team:
  - Cost: -$45,000
  - Predicts successful TV Show: 90%
  - Predicts unsuccessful TV Show: 80%

Analysis: I created a flow chart with the appropriate conditional probabilities. The chart considers the decision to hire the market research team, their prediction success/unsuccessful probabilities, and decision to run shows based on those probabilities.


Hire Marketing Team Flow CHart
Kimberly Le | May 2, 2019
Decision to hire Market Team
YES
NO
A
Expected Value = $0
Successful TV Show
25%
+$450,000
Unsuccessful TV Show
75%
-$150,000
F
Expected Value = -$17,154
Predicts Unsuccessful 92.86%
E
Decision to run show P(E)= -$45,000
Don't run show -$45,000
D
Run show P(E)=-$75,000
Not Accurate Prediction
20%
+$405,000
Accurate Prediction
80%
-$195,000
Predicts Success
7.14%
C
Decision to run show P(E)=$345,000
Don't run show -$45,000
B
Run show P(E)= $345,000
Not Accurate Prediction
10%
-$195,000
Accurate Prediction
90%
+$405,000

Project 5

A

In part A in the flow chart, we can compute the probability of the expected value when we decide not to hire the marketing research team. Using the data, we know that there is a 75% chance that the show will be unsuccessful and 25% chance will be successful. Given the amount that we could earn(+)/lose(-), we get $P(E) = (450000 * 0.25) + (-150000 * 0.75) = 0$.

Result: Thus, the expected value is 0 if we do not hire a market research team.

B

We need to work backwards from the flow chart in order to get the result of the expected value. Thus, in part B of the flow chart, we will earn \$405,000 if the marketing research team predicted the success of the TV show accurately. Note, we are subtracting \$45,000 from the earned \$450,000 of the success TV show because we need to consider the cost of hiring the market research team. Same idea applies to if we have an unsuccessful TV show, we get $-\$150,000 - \$45,000 = -\$195,000$. So, now we calculate if the market research team predicts accurately that the show will be successful $P(E) = (450000 * .9) + (-195000 * .1) = 345,000$.

Result: Thus, the expected value of running the show is \$345,000.

C

Part C of the flow chart resembles a decision node. If the market research team predicts the show to be successful, we need to decide whether or not we want to run the show. If we did not run the show, we would lose -\$45,000. If we did run the show, as seen in B, we get an $P(E) = \$345,000$.

Result: Thus, we choose the best value node and that is \$345,000.

D

Part D of the flow chart looks at if the market research team predicts accurately the show to be unsuccessful and we decide to still run the show. Given the probabilities, we get $P(E) = (-195,000 * 0.8) + (405,000 * 0.2) = -75,000$.

Result: Thus, the expected value of running the show is -\$75,000.

E

Part E of the flow chart resembles a decision node. If the market research team predicts the show to be unsuccessful, we need to decide whether or not we want to run the show. If we did not run the show, we would lose \$45,000. If we did run the show, as seen in D, we get $P(E) = -\$75,000$.

Result: Thus, we choose the best value node and that is -\$45,000.

F

In part F of the flow chart, we are looking at the results of the hired market research team. We calculate the successful/unsuccessful prediction probabilities if we did hire them. Combining the successful TV show probabilities, we get,

$$0.9n + (100 - n) * 0.2 = 250.7n = 5n = 7.1428\%$$

This means that the market research team will predict a successful TV show with 7.14% and a unsuccessful TV show with 92.86%. Now using those probabilities and the expected values, we get, $(345,000 * 0.0714) + (-45,000 * 0.9286) = -17,154$.

Result: Thus, the expected value is -\$17,154.

Conclusion

We conclude, based on the calculated expected values, that we should not hire the market research team as it would not maximize our profits.

9.4.6

Problem: ESPN is trying to decide which of three football games to televise in the upcoming season in the southern region of the United States: Alabama versus Auburn, Florida versus Florida State, or Texas A&M versus LSU. The estimated viewers (in millions of homes) of the games differ according to the national rankings of the teams as shown in the following table. Use the different criteria to determine what decisions could be made. Make and justify a recommendation to ESPN.

a. Laplace criterion

Laplace method: maximizing the expected value assuming that the probability of each state are equally likely.

Alternative	Conditions		
	1: Both teams have top 5 national rankings	2: One team has a top 5 national ranking	3: Neither team has a top 5 national ranking
Alabama vs. Auburn	10.2	7.3	5.4
Florida vs. Florida State	9.6	8.1	4.8
Texas A&M vs. LSU	12.5	6.5	3.2

Figure 1: Taken from text

Analysis: The probability of each state is $\frac{1}{3}$. The expected values of each state are:

E(Alabama vs. Auburn) $= 10.2(\frac{1}{3}) + 7.3(\frac{1}{3}) + 5.4(\frac{1}{3}) = 7.63$
E(Florida vs. Florida State) $= 9.6(\frac{1}{3}) + 8.1(\frac{1}{3}) + 4.8(\frac{1}{3}) = 7.5$
E(Texas A&M vs. LSU) $= 12.5(\frac{1}{3}) + 6.5(\frac{1}{3}) + 3.2(\frac{1}{3}) = 7.4$

Result: Since the Alabama vs. Auburn has the highest expected value, we will choose it to screen.

b. Maximin criterion

Maximin: Find the min for each state and then choose the max of those. In layman terms, we are looking at the best of the worst case scenarios. This is sometimes used in business situations where we are looking at the best least cost scenarios to budget money.

Analysis: Looking at the table, we find the min of each game:
Alabama vs. Auburn = 5.4 Florida vs. Florida State = 4.8 Texas A&M vs. LSU = 3.2

Result: We see that the max of the min is the Alabama vs. Auburn game. Thus, we will choose that game to screen.

c. Maximax criterion

Maximax: Find the max for each state and then choose the max of those. In layman terms, we are looking at the best best case scenarios. If you are feeling frisky with your money and

want the best of the best this criterion is the best decision!

Analysis: Looking at the table, we find the max of each game:
Alabama vs. Auburn = 10.2 Florida vs. Florida State = 9.6 Texas A&M vs. LSU = 12.5

Result: We see that the max of the max is the TExas A&M vs. LSU game. Thus, we will choose that game to screen.

Conclusion

Thus, based on the results we found above, it makes the most sense to screen the Auburn vs. Alabama game as it had the highest expected value for the Laplace criterion and the Maximin criterion. Some of the constraints we should consider are how much money ESPN is willing to pay and perhaps PR related problems with each team as it may affect the viewers opinions.