Module 4: Discussion

What are the practical use decision tree tools to help you make decisions under uncertain situations?

Daniel Talamantez

Daniel Talamantez

Sep 22, 2020 Sep 22 at 10:01pm

A practical use for a decision tree could be the selection process when buying a new vehicle. The issues that I always run into is cyphering through all the information on the different types of vehicles and trying to decide which to pick. The tree could incorporate the different dealers, incentives (dealer or manufacturer), car type, options, warranty, safety stars, professional reviews (1-10), future value, and cost. It would encompass decisions and payoffs for the best overall vehicle. There would not be much uncertainty except for the potential lemon factor that I would assume is unmeasurable. Putting all of this information into an engine like this could assist you in making a qualified decision. This is just one example for the many possible uses the tree can provide for daily tasks.

Edited by Daniel Talamantez on Sep 27 at 10:14pm

  (1 like)

Damian Dalcour

Damian Dalcour

Sep 27, 2020 Sep 27 at 8:10pm

Great illustration, Daniel. I never thought about using decision tree tools to help with buying a new vehicle. I look to purchase a car within the next few weeks. I will incorporate the different dealers, incentives, car type, warranty, safety stars, professional reviews, and cost in a tree. I think this will help me make a decision based on factual information and suppress impulsive behavior. After reading your post, confidence has now filled the place of fear. I hate I'm just now learning this concept/method. Decisions of the pass would have been made much easier with decision trees. Thanks for sharing, Daniel; this is life-changing.

  (1 like)

Logan Presnall

Logan Presnall

Oct 2, 2020 Oct 2 at 12:06pm

Daniel,

That is a great example of a practical use for a decision tree. I recently just purchased a truck and having to compare value, dealers and everything you mentioned on paper was more than overwhelming. So in the end I went with the dealer that I have always gone to because it was comfortable even though there might have been a better deal out there, and if I would have used a tool like this I might have just found it. Thank you for the example and for something to consider in the future.

-Logan

  (1 like)

Kacie Fischer

Kacie Fischer

Oct 3, 2020 Oct 3 at 8:25pm

Daniel,

This is a great use for the decision tree analytic solver tool! For any decision which has multiple different options (like the vendor or car dealership), it may be difficult to see the benefits of each. By using a decision tree, the different options are clearly displayed, which makes your decision a little more informed.

I am in the process of planning for a wedding and one process that would have helped to have a decision tree matrix was when comparing different venues. I could compare different features such as venue cost, catering per plate cost, open bar per adult cost, the distance of venue to the airport, etc. It would have really helped!

Kacie

  (1 like)

Tyler Gilbreath

Tyler Gilbreath

Oct 4, 2020 Oct 4 at 3:09pm

Daniel, this is a great example of how a decision tree could be effectively used. I could also see it being used when deciding to purchase a home. You could evaluate the options of purchasing a new home, custom-built to your specifications, or purchase an older home that may require work. The tree would allow you to weigh the benefits of reduced maintenance costs of a new home versus the potential increased costs of the upkeep of an older home.

My wife and I have definitely been the winners of purchasing an older home. We have spent more money than we originally anticipated maintaining the home and fixing things that were not declared before we purchased.

  (1 like)

Troy Philips

Troy Philips

Oct 11, 2020 Oct 11 at 5:48pm

Great example of using a decision tree in everyday life. I will very soon be trading in my car for a new vehicle and almost wrote about this say topic. I think it is a good way to narrow down when you already have an idea of what you need or want. If you are like me, its about getting the best deal and I think this could help.

Rosanna Popa Rangel

Rosanna Popa Rangel

Sep 23, 2020 Sep 23 at 7:56pm

What are the practical use decision tree tools to help you make decisions under uncertain situations?

The decision tree tool practical use comes from the user-friendly platform; it is an easy way to understand and calculate the expected value of a specific decision. From Prof. Yang lecture: "Expected value is useful for decision theory because many decision-makers are expected value maximizers who choose the action that yields the greatest expected value. "

When meeting with uncertainty, the chance node allows the user to add the probability and the possible result, based on this, the tool makes a decision based on the best outcome.

As with all Decision Making methods, decision tree analysis should be used in conjunction with intuitive methods.

Decision trees provide an effective method of Decision Making because they:

Clearly lay out the problem so that all options can be challenged.

Allow us to analyze fully the possible consequences of a decision.

Provide a framework to quantify the values of outcomes and the probabilities of achieving them.

Help us to make the best decisions on the basis of existing information and best guesses.

Source: https://www.mindtools.com/dectree.html

  (1 like)

Joe Williams

Joe Williams

Sep 27, 2020 Sep 27 at 3:56am

Rosanna this is a very well-thought-out discussion response from you. This platform is new to me and I'll agree with you that it is very user-friendly. Seeing it in front of me, instead of just attempting to visualize it all really did give me an easy way to understand as well as calculate the expected value of a specific decision as you said! Great words from you to really put this into context on what happened for me as well.

I'll have to say "learn something new every day" really applies to me here when playing with the chance node and learning how to add the probability, and just continue going down a

"rabbit hole". Do you think that this is one of those things you can get lost in, and by the time you look at a clock realize you've been playing with it for 2-3 hours?

For me, I think it's going to take a lot of prep work/research before I can sit down and input everything into it to be able to use it to its full capability. I found myself asking the question of "what makes you think that is the best outcome?" of the software. Did you find yourself asking that same question?

Edited by Joe Williams on Sep 27 at 3:56am

   (1 like)

Rosanna Popa Rangel

Rosanna Popa Rangel

Sep 27, 2020 Sep 27 at 9:21am

Joseph,

Thank you for your kind words!

I do think this is a tool where you can lose track of time since it has so many functions, many of which we haven't even used yet.

With the examples, and the assignments it was easy to see which was the best outcome, so it was more to confirm my initial thoughts based on the formulas we used, than to actually see which was the better option. I'm sure that if I use it in real life with different criteria, in unexpected situations, it'll be a different story where I'll be evaluating the best option by the tool, and also applying intuitive analysis.

Thanks,

Rosanna

Damian Dalcour

Damian Dalcour

Sep 27, 2020 Sep 27 at 8:11pm

Rosanna, thanks for expounding on decision trees. You added some fresh ways to look at decision making. Decision trees are a tool we can use when we are met with uncertainty. They help you layout options. With the use of decision trees, one is able to investigate the possible outcome of choosing certain options. Decision trees give you a balanced picture of risk and

rewards for each course of action. They are helpful in analyzing possible consequences or a decision. Using them can eliminate unwanted stress and health issues.

  (1 like)

Rosanna Popa Rangel

Rosanna Popa Rangel

Sep 27, 2020 Sep 27 at 8:16pm

Damian,

Thank you for you comment!

I agree with your insight in decision trees, it's definitely a balanced picture of risks and rewards, and it can help to make decision in an unbiased way by following real data.

Thanks,

Rosanna

Kacie Fischer

Kacie Fischer

Oct 3, 2020 Oct 3 at 8:38pm

Rosanna,

I really appreciate how well you summarized the aspects of a decision tree that makes it an effective method for decision-making. I think one of the most important statements you've made is "should be used in conjunction with intuitive methods." You can't always replace experience with hard data. Some decisions may result in unforeseen consequences or results that the data just didn't support. In this cases such as these, professional experience and judgement must bridge that gap.

Are there any personal experiences or decisions which you could have benefited from by using a decision tree?

Kacie

Rosanna Popa Rangel

Rosanna Popa Rangel

Oct 3, 2020 Oct 3 at 9:30pm

Kacie,

Thank you for your comment!

Yes, definitely. I'm originally from Venezuela, and when I first moved to Houston in 2014, it was my first time in Houston. I started planning my move doing some research about the area where I wanted and could afford to live. I also needed the location to be close to a main avenue so I could use public transportation because I didn't know how long it would take until I could afford a car. I reviewed the safest areas of the city. Since I'm an engineer I typed engineering firms, EPC, etc. on google maps which gave me a radius of where I needed to be close to, in case I found a job around that area.

Based on safety, cost, distance from a main street to use public transportation and relatively closeness to the Energy Corridor, where most of the EPC firms were located, I started evaluating apartment complexes, contacting the leasing offices and setting appointments for my arrival date.

Then I made my decision, based on research and on intuition.

If I had a tool like the decision tree, this selection process would have been easier, considering the criteria I mentioned above.
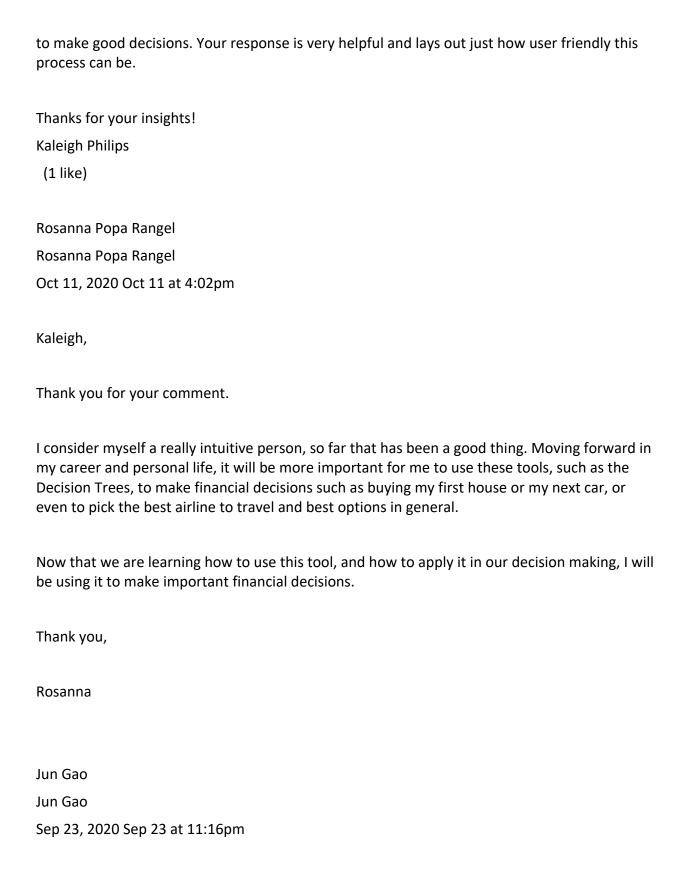
Thanks,

Rosanna

Kaleigh Philips

Kaleigh Philips

Oct 11, 2020 Oct 11 at 1:10pm

Howdy Rosanna!

I like that you mention the decision tree should be used in conjunction with intuitive methods. I don't think there is a one size fits all approach and a combination of methods is usually needed

to make good decisions. Your response is very helpful and lays out just how user friendly this process can be.

Thanks for your insights!

Kaleigh Philips

  (1 like)

Rosanna Popa Rangel

Rosanna Popa Rangel

Oct 11, 2020 Oct 11 at 4:02pm

Kaleigh,

Thank you for your comment.

I consider myself a really intuitive person, so far that has been a good thing. Moving forward in my career and personal life, it will be more important for me to use these tools, such as the Decision Trees, to make financial decisions such as buying my first house or my next car, or even to pick the best airline to travel and best options in general.

Now that we are learning how to use this tool, and how to apply it in our decision making, I will be using it to make important financial decisions.

Thank you,

Rosanna

Jun Gao

Jun Gao

Sep 23, 2020 Sep 23 at 11:16pm

In our laboratory, our project plan has been laid out for next fifteen years. Because of this, I have never had chance to think and use any analytical techniques needed to facilitate the project selection, cost comparison and product launching in an institutional level. The only time I have used the simple tree structure (flow chart) to facility the decision-making process was for operation management. However, in the simplified tree structure, none of the parametric factors were incorporated into the chart for evaluating different options. After learning this module, I can use this decision tree analysis to analyze complex decision problems with multiple consequences and variances. At the end, I can figure out the solution which provides the highest expected value, all possible solutions and consequences.

On the other hand, our lab has a very low risk tolerance, and our business model is risk-averse. This non-linear utility function in the decision tree analysis is more practical for me. When I need to make risk decisions, I can use this to achieve the maximum certainty-equivalent value to mitigate risks in the future.

One of the example is for our device testing project. Many variances could cause the project failure and schedule delay. I can add these variances and probability of failure into the decision tree analysis. After incorporating risk tolerance parameter into the analysis, I can figure out the best scenario option with the lowest risk.

Edited by Jun Gao on Sep 23 at 11:29pm

Rosanna Popa Rangel
Rosanna Popa Rangel
Sep 26, 2020 Sep 26 at 3:06pm

Jun,

I haven't used the analytical techniques either, I'm more of an intuitive person. I feel this could help me with risky situations as well, where I can evaluate different criteria for multiple options to make the best decision. I definitely will be using this approach for decision making with associated high risks to make sure I select the lowest risk option.

Thank you,

Rosanna

John Schaub

John Schaub

Sep 30, 2020 Sep 30 at 8:50pm

Jun,

Like several that have replied I have very very little experience in decision tree method and lean more on experience via "actuals" from like problems that have been capture in the past. As I mentioned in another post, associating the risk behind each decision can constitute an abundance of time. What give us that percentage of risk? How can we determine it would provide X amount of return higher? That is the deep analytics that puzzles me and interests me to find the answers. Thank you for the post.

Jacquelyn Lopez-Barlow

Jacquelyn Lopez-Barlow

Oct 3, 2020 Oct 3 at 1:07am

Jun,

I agree that LANL is risk-averse, especially because the work we do has the potential for significant consequences. I think using a decision tree could be an effective communication tool with our management while presenting execution strategies. How would you develop the probabilities of failure? My first thought is to use trends from representative data.

Kaleigh Philips

Kaleigh Philips

Oct 11, 2020 Oct 11 at 1:14pm

Howdy Jun,

It is interesting to hear about your project plans being laid out for the next 15 years. This is very different for the section of oil and gas that I am in. I can't imagine that kind of structure and direction, it would be nice to have such a laid out plan!

I have little experience using decision trees, but like that you are able to find ways to incorporate this into your labs risk averse business model.

Great information!

Kaleigh

Damian Dalcour

Damian Dalcour

Sep 25, 2020 Sep 25 at 11:44pm

612

What are the practical use decision tree tools to help you make decisions under uncertain situations?

When helping you choose between several courses of action, Decision Trees are excellent tools. Decision Trees provide a highly effective structure. Using these can layout options and investigate possible outcomes of choosing those options. The process provides an effective method of decision making and allows opportunities for all options to be challenged. The possible consequences of a decision are able to be analyzed fully. Decision Trees have helped form a balanced picture of the risks and rewards associated with a possible course of action. A Decision Tree is started with a decision you need to make. Two lines are drawn out from the box toward the right for each possible solution. The solution is wrote along the line. The lines should be kept apart as far as possible. This will allow you to expand your thoughts. A result is considered at the end of each line.

Bill Osburn

Bill Osburn

Oct 3, 2020 Oct 3 at 8:49am

Damian,

Decision Trees will be very helpful, for me, with future decisions. You are right about it being an excellent tool and highly effective. I like how it lays everything out there so it can be visualized.

How would you use a decision tree in making decisions in your personal life or professionally? I have found that it could be used in many ways and I am actually going to use it at home and at work.

Joe Williams

Joe Williams

Sep 26, 2020 Sep 26 at 4:30am

While learning about how to use the decision tree tools I thought about it applying to our family reunion planning process. Currently the process is a a weekend long endeavor that I can only relate it to as "herding a bunch of cats"! It's complete chaos, and somehow it's always a financial drain on everyone.

I have confidence in using this decision tree once I get everyone's data points. Maybe this can help on making some smarter decisions that they will feel good about. I'll be happy if it just cuts out the chaos alone! It will be neat to see how much each of their decisions costs them in the planning stages, instead of afterward like historically has happened.

I think once a majority of them can physically see their decisions on this "tree" they will make smarter choices instead of shooting from the hip, as they are used to. Showing them their decisions under uncertainty will really hit home with them. I will use a survey for everyone to answer questions to prior to starting the decision tree. This will give me good data points from the survey to show them the decisions we SHOULD be making.

Edited by Joe Williams on Sep 26 at 4:32am

Tom Cappucci

Tom Cappucci

Sep 28, 2020 Sep 28 at 2:39pm

Joseph, I like your analogy of "shooting from the hip" and how a decision tree can help eliminate this feeling in decision making. The EV numbers in the tree won't lie, and you can definitely use a tree to show the best decision for the family reunion activities!

  (1 like)

Mitchel Garrish

Mitchel Garrish

Oct 3, 2020 Oct 3 at 7:49pm

Joseph,

Sounds like quite the undertaking, I will be curious to know how it works out. I can see the value of presenting the decision tree to a group, guiding good decision-making, and streamlining decisions within a large group. How would you present the final product to the family?

Joe Williams

Joe Williams

Oct 4, 2020 Oct 4 at 6:41pm

Mitchel... easiest way to do that is put is screenshot the Decision Tree and put it on Facebook via our Family Group.

Jeremy Meehleib

Jeremy Meehleib

Sep 26, 2020 Sep 26 at 1:06pm

The practical uses of the decision tree tools to help make decisions under uncertain situations that jump out to me are potential uses in:

Bidding for work and tailoring bid packages to the customer and scope of work. Companies could use such a tool to ensure targeted high-profile customers receive bids with one set of financial strategies considered and smaller less strategic customers receive a different set of parameters captured in a bid. Or perhaps in consideration of multiple bids for multiple customers and determining what customers will be bid on and what customer will not be bid.

Analysis of variance between margin estimates of a bid and actual work performed.

Prioritizing work schedules based on needs of several customers and company objectives. Such tools could readily determine which customer is best to delay on a schedule if necessary based on resources, timing, product availability, etc.

An extension of C., such a tree could help evaluate priorities in operational focus with the use of sensitivity analysis and impact on business unit ability to reach monetary or work targets. i.e identify bottlenecks.

In all the above cases, instances are readily conceived where detailed analysis is sidestepped for expediency or lack of oversight or lack of insight or skill.

Interesting opportunities.

Jeremy Meehleib.

Edited by Jeremy Meehleib on Sep 26 at 1:15pm

Rosanna Popa Rangel

Rosanna Popa Rangel

Sep 26, 2020 Sep 26 at 3:10pm

Jeremy,

In the number one item, you mentioned the financial strategies for bidding. I personally could use this method to make decisions between bidders, in a lot of cases they provide the same type of options for my company to purchase, it'll be a good use of this tool to input the criteria, and the importance of each criteria to select between different bidders.

As Prof. Yang mentioned in one of his lectures, it's important to use this tool and also intuitive judgment when making a decision but it'll definitely help to rule options out based on technical requirements.

Thank you,

Rosanna

Jeremy Meehleib

Jeremy Meehleib

Sep 26, 2020 Sep 26 at 4:21pm

Yes Rosanna. From the Purchasing side of things, the added criteria that could be considered that doesn't show up in bid price is safety ratings of service providers if they are providing personnel for installation, delivery schedule alignment with project, geographic location relative to delivery location for maintenance products. The list could go on and on relative to the decision tree on your end.

The key advantage for the purchasing company is they know the preferred rankings of these items will not be obvious or even known to the bid company depending on the situation. These benefit the purchasing company in subsequent negotiations.

Regards,

Jeremy

(1 like)

Rosanna Popa Rangel

Rosanna Popa Rangel

Sep 27, 2020 Sep 27 at 9:24am

Jeremy,

Thank you for your response.

I agree, that safety rating is well discussed with my vendors since we understand this carries an unexpected cost, if not taken into consideration before the purchase happens. Another thing to note are drawings, these are hidden fees if not talked from the get-go. Some providers charge extra for providing official drawings that are needed for construction and for the data books.

Thank you,

Rosanna

Daniel Talamantez

Daniel Talamantez

Sep 27, 2020 Sep 27 at 10:08pm

Jeremy,

I would agree that your number 3 example could greatly influence time management. By creating additional time, you could therefore apply resources where you see a gap and increase speed of service. I think you have great relevant examples that would benefit many industries like the construction business especially. This could potentially prioritize schedules and create greater efficiency in their daily operations. I am curious if those types of companies already use this type of think tank to make decisions in the field.

 (1 like)

Jay Hembree

Jay Hembree

Oct 4, 2020 Oct 4 at 2:52pm

Howdy Jeremy,

I really enjoyed using this tool and think it is extremely valuable in determining the most profitable path while also allowing for a risk factor to be entered. You first point about bidding for work and tailoring work packages makes me wonder how many times this has been used but incorrect assumptions or data that is not quite correct to win the work package. I have heard the phrase "take a challenge" several times in my years in commercial manufacturing. With correct data and assumptions this tool will give you clear cut options on how to proceed or to not proceed.

-Jay

 (1 like)

Zachary Smith

Zachary Smith

Oct 8, 2020 Oct 8 at 11:14pm

Hi Jeremy,

In your first point, I like your idea on how different versions of decision trees could be used to prioritize resources when bidding on work. Using it to understand how to target strategic customers versus non-strategic customers would be a great way to make sure the upfront work, which is often non-billable, can be most effective. In the past, my company has targeted any and all types of work which has spread our resources thin rather than focusing on customers where our chance of success has historically been higher - I believe constructing a decision tree could be a great way to visualize how we can better pursue the right type of client.

Edited by Zachary Smith on Oct 8 at 11:15pm

Kacie Fischer

Kacie Fischer

Sep 26, 2020 Sep 26 at 3:15pm

What are the practical use decision tree tools to help you make decisions under uncertain situations?

As with any data set, in order to make informed decisions, the data must be displayed intrinsically and use the correct metrics. The Decision Theory article states, "When you make a decision, you are choosing among alternatives. Your objective is to choose the alternative that is best, where "best" depends on what your goals are." The process of making a decision must start with an evaluation of your goal and then developing the alternatives to achieve this goal. Decision trees help display this data in a meaningful, transparent way. They can be used to process information about a certain type of decisions that might not otherwise be realized.

There are two practical uses that we learned about in this module for decision trees. The first way a decision tree can be used is for those decisions that will be made over and over. In this case, an average of the potential risk and reward can be developed weighing each value to produce the expected payoff values (EV). The second case is used for one-time decision making, for which the averaged values may not equal actual product performance. This involves a concept called utility or the relative perceived value of a possible payoff. "The utility of a payoff represents the total worth, value, or desirability of the outcome of a decision alternative to the decision-maker" (Ragsdale, p.776). By setting a value for a reasonable amount of risk incurred, known as the risk tolerance parameter (R), the exponential utility function can then be used to determine a certain-equivalent value (CE). "Utility theory provides a way to incorporate the decision maker's attitudes and preferences toward risk and return in the decision-analysis process so that the most desirable decision alternative is identified" (Ragsdale, p.776). Each type of decision tree can be solved by excel to highlight the maximum payoffs, either the maximum expected value (EV) or the maximum expected utility.

Kacie

References

Hermalin, B.E. (1996). Decision Theory. University of California at Berkeley. [PDF]

Ragsdale, C.T. (2015). Spreadsheet Modeling & Decision Analysis: A practical introduction to business analytics (7th Edition). Cengage Learning.

Jun Gao

Sep 26, 2020 Sep 26 at 11:52pm

All,

After reading all of the posts so far, it appears to me that most people don't have decision tree analysis experience. I agree with everybody that it is an excellent tool to categorize problems and provide the algorithms for data mining. The unbiased visual tree diagram is very useful for many complex multi-stage decision problems, and can help identify a strategy with the highest likelihood of achieving the final solution. However, I'm also wondering if there are limitations of this method. As Dr. Yang described, the probabilities used for the evaluation are very subjective. This approach should be not the only thing that drives the final decision-making. Other factors, situations, etc. should be considered as well.

Daniel Talamantez

Daniel Talamantez

Sep 27, 2020 Sep 27 at 10:13pm

Jun,

I definitely agree that the decision tree is only a tool and that it should not be the sole method when making decisions. It should only act as an additional aid in your decision process. I do like how it can produce hard numbers based on user input to quantify, however like you said you still need to remain vigilant because it can bypass certain measures if you are not being subjective. I do believe it is a great presentation tool if you are trying to explain a situation to a group of people to show possible outcomes and why you ended up on one particular answer/area.

  (1 like)

Jeremy Meehleib

Jeremy Meehleib

Sep 30, 2020 Sep 30 at 3:06pm

Kacie, Jun and Daniel -

I think the observation that is missing with using the decision tree as a tool is that not only does it help work through a decision in a logical way and allow you to weigh different aspects of outcomes and probabilities of situations, it is also useful as a tool to explain to SOMEONE ELSE how you came to a particular decision.

You now have a way to visually account for the perspectives of others in the decision making process relatively easily. You can change preferences and likelihoods in real time and show how those changes will effect the decision. It can also capture items that are somehow missing in the decision matrix.

In most cases, coming a decision with multiple players is about telling a compelling story. The decision tree makes telling that story much easier.

Regards

Jeremy Meehleib

  (1 like)

Kacie Fischer

Kacie Fischer

Oct 3, 2020 Oct 3 at 9:04pm

Jeremy,

Thank you for your reply. I think that this is an important observation. I would think that in most cases, decision trees are being used in a professional platform. Being able to show how you came to a conclusion, and being able to support your position with facts displayed in a useful/easily understandable format is really what makes this such an effective tool.

Kacie

Jay Hembree

Jay Hembree

Oct 4, 2020 Oct 4 at 3:20pm

Howdy Kacie,

Thank you for bringing up the quote from the article about goals. While what we are working on is a pure profit/what seems best chart, the decision makers have to utilize this data, their amount of risk, and try and theorize some of the unknowns to make their best decision. EV and CEV are huge in making decisions to proceed or not but knowing the end goal helps you to interpret this data in the correct light. Have you seen this be an issue in your company? People having a goal but then when the data came in, they changed course even if it would have provided the necessary outcome. I have seen it once where a company got greedy and more risky instead of taking the safer option that would have fit the stated goal of the project.

Jacquelyn Lopez-Barlow

Jacquelyn Lopez-Barlow

Sep 27, 2020 Sep 27 at 2:27pm

Various tools can be used to make decisions, including a SWOT diagram, decision tree, decision matrix, or force field analysis. To analyze a strategy's alternatives, using a decision tree provides the flexibility to evaluate options, risks, and probabilities. Decision trees are not just for decisions, but also causal analysis to identify root causes and the contributing factors. When there are uncertain situations, analyzing data helps us stay objective and can remove some of the uncertainties by adding values to each option. Once the alternative flows and values are defined, a sensitivity analysis evaluates the impacts of other variables. By understanding how each variable influences the alternatives, more information is available to support the decision-making process, and there are multiple methods to review the data (e.g. tornado charts). I have used a decision tree professionally for causal analysis and trade studies. Personally, I also use it for something as simple as cleaning out my closet- what to keep, donate, throw away, and recycle.

Links for interesting articles on decision trees:

https://hbr.org/1964/07/decision-trees-for-decision-making (Links to an external site.)

https://www.pmi.org/learning/library/decision-tree-analysis-expected-utility-8214 (Links to an external site.)

(1 like)

Jeremy Meehleib
Jeremy Meehleib
Sep 30, 2020 Sep 30 at 3:42pm

Jacquelyn - I think the sensitivity analysis capability you highlight is most likely a function not many people consider when making decisions.

Most responses to situations require decisions based on anticipated options, causes or impacts. When those anticipated options are accounted for, should the decision tree be expanded to include items that are less likely? These less-likely items may cause great variability in outcomes and make coming to a decision almost impossible. This influence is likely the reason it didn't make it into the decision tree to begin with.

As a practical example, sink holes and real estate in Florida come to mind. Should that factor into the decision to purchase a home or not? What circumstance would be required for such an addition be needed in a decision tree on purchasing a home in Florida? On the flip side, how close would a sink hole have to be for you to include that information in a decision to relocate?

Regards,

Jeremy Meehleib

Jacquelyn Lopez-Barlow
Jacquelyn Lopez-Barlow
Oct 3, 2020 Oct 3 at 12:17am

Jeremy,

I would include options that may have a lower probability as long as it adds benefit to the analysis. The number of options evaluated should be within reason and focused on the project's objectives. The reason I include other options is that it can provide additional data, and it can address stakeholder questions. As an example, we are working on a new heat source design and during a recent trade study, we evaluated multiple isotope options for the fuel source. We knew that the current material was the best for the planned design already, but the goal of the study was to find out what the next two viable options were. In total, we evaluated six isotopes with two being uncommon in our industry, and we selected only one as a realistic alternative. The study was able to answer a sponsor's question, and it provided the team data to support the novel heat source design.

What types of options included in the decision tree, or other decision-making tools, should be driven by the project's objectives, requirements, and the organization's needs. You definitely need to include options that stakeholders wanted evaluating, but you also want to analyze anything that provides value to the expectation. There is a balance that needs to be established. Using your example of whether to include sinkholes as criteria for evaluating to buy a house or not depends on the buyer. What risk are they willing to take, or is it something they are worried about, or is there a concern about effects on the property value- these are all questions that only the buyer (decision-maker) can answer.

Jun Gao

Jun Gao

Oct 1, 2020 Oct 1 at 2:03pm

Jacquelyn,

Your post really opened my mind. In fact, there are many decision-making tools/applications which can facilitate us to make a right decision. I did a little bit deep diving on these applications and want to share the ten popular tools which can be used for decision-making under different circumstances.

SWOT (Strengths, Weaknesses, Opportunities, and Threats) Diagram: It is a powerful strategic-planning tool that assist for organizational planning and personal decision-making. Strengths and weaknesses are often viewed from an internal perspective, and opportunities and threats were considered as external factors.

Decision Making Tree: This is the application we learned from decision-making class. The visualized tree structure can map out the best decisions based on the outcomes, risks and uncertainties.

Decision Matrix: As its name indicated, this approach is evaluating and prioritizes a matrix of options with a list of weighted criteria. The decision will be made according to each option against those criteria.

Pareto Analysis: It's also known as the 80/20 rule. It is a statistical tool to evaluate the limited number of tasks to project the overall effect.

Cause and Effect (Ishikawa Diagram): This tool is for understanding the 'cause and effect' relationship for solving a problem. The causes and effects in a particular relationship can be picturized in a fishbone structure to understand the source of variation and final situation.

Force Field Analysis: It is a root cause analytical tool which can help us to understand the root cause and process of the organization in a better way. This tool evaluate the factors (forces) that could drive the movement toward a goal (helping forces) or blocking movement toward a goal (hindering forces).

Strategy Map: It is a visual diagram of company plans for achieving the business strategic goals, discovering strategic issues and mission implementation.

Break-even analysis: This tool can be used to determine what stage of sales will be profitable, and what number of products or services we need to cover the cost. It is a useful tool for investors to determine at what price they will break even on a trade or investment.

Pugh Matrix: it is a criteria-based decision matrix which helps us select the best viable and most feasible option from a list of given alternatives. It does not require a massive amount of quantitative data. This tool can then be used to choose specific aspects of the all the alternatives and then combine them to make the most feasible and better product.

Ratio Analysis: It is a quantitative method to analyze the financial information in the company's financial and profit statements to determine company's liquidity, operational efficiency, and profitability. It is a cornerstone to determine the company's financial health and to draw comparisons to other competing firms.

Edited by Jun Gao on Oct 1 at 2:04pm

   (2 likes)

Xiaomin Yang

Xiaomin Yang

Oct 2, 2020 Oct 2 at 8:02am

Jun, thank you for the summary of the tools which are different purposes. In the future modules, we will covers some of them, such as ratio analysis.

XY

Jordan Caddick

Jordan Caddick

Oct 2, 2020 Oct 2 at 10:14pm

Jun,

Great post. I'm familiar with the SWOT analysis, decision making tree and decision matrix. The other items are an eye opener for me. I think it's important to recognize that many of us are "stressed and pressed" at work, that is "stressed out and pressed for time", so having more tools such as the ones you mention above in our manager's toolbox for making good decisions is always a good thing.

Jacquelyn Lopez-Barlow

Jacquelyn Lopez-Barlow

Oct 3, 2020 Oct 3 at 12:18am

Jun,

Thank you for summarizing them. Many of those listed I have not used before, and I am glad we will be learning about some of them in future modules.

Christopher Huebel

Christopher Huebel

Oct 5, 2020 Oct 5 at 1:28pm

Hi Jacquelyn,

I haven't personally used the decision tree tools much outside of this classroom. While I plan to incorporate it into different aspects of my home and work life, one thing that I have used quite a bit is root cause analysis. Typically anytime we have an issue at the refinery, that's large enough to warrant a RCA, we perform an RCA to mitigate problems and find contributing factors like you stated. One thing I have not thought about was using the decision tree to see risks involved with root causes and contributing factors. This would be a great tool to use in the RCA studies that we do quite frequently. Thank you for pointing that out!

Best Regards,

Chris Huebel

Tom Cappucci

Tom Cappucci

Sep 28, 2020 Sep 28 at 12:52pm

When faced with an uncertain decision such as whether to launch a new disruptive product or enhance an existing product, you can use a decision tree to help you determine the expected value of each option and highlight the option with the best expected value based on the parameters in the analytical solver model. Each node in the tree represents a different alternative for a particular decision. The decision tree tool automatically calculates the profit value of each option to calculate the EMV, thus selecting the option with the best profit as having the largest EMV. By selecting either a "decision" or "event/chance" node, you can create your decision tree to evaluate the value of each possible decision and identify the maximum possible payoff at the terminal node. This form of data driven decision making allows you to be consistent with the strategic direction of the business organization, positively impact the performance of the company, solve problems that are important to the organization and clearly show how a decision will impact the company bottom line.

Brandi Greenberg

Brandi Greenberg

Oct 2, 2020 Oct 2 at 11:50am

Tom,

Have you ever used a decision tree tool before? I have not, but what you wrote hits home in many decisions that I make every day. Do you find that the tree's visualization and ability to "see" the best and worst decision can help present the data? Sharing this analytical data could help upper management get on board with your decision.

Ken Wagner

Ken Wagner

Oct 4, 2020 Oct 4 at 7:40pm

This is straight to the point. In these uncertain times, I am sure that many companies are re-calculating their decision trees to determine if a product will be launched. When Disney released Mulan on streaming, companies were standing by to determine if that risk was work taking. When it did not do as well as one would hope, you see many major movie companies push their schedule back instead of trying the same thing. Disney also moved back their schedule. However, the initial decision to release Mulan in an unconventional format was for done in some part by a decision tree.

Richard Pearson

Richard Pearson

Sep 29, 2020 Sep 29 at 8:03pm

Use of the decision tree tools allows for potentially complicated relationships to be displayed in an easier to digest layout. When evaluating a project with various decisions and consequences and/or probabilities from those decisions, the decision tree gives an easy to follow a visual representation of these decisions.

From my line of work, the decision tree tool could be useful in evaluating vendor and/or location options for overhaul work, determining the best part supplier based on costs, or determining if outsourcing costs for development or implementation projects would be worth the cost. Through our internal auditing procedures, we have a decent handle of the ability of our vendors to meet our needs, this data could be incorporated when evaluating work costs to

help determine the best course of action to choose. Additionally, the decision tree tool lays out the information in an easy to follow flow chart. Though they could be complicated with many decision nodes, most people should be able to logically follow the decision tree to see how the decisions made along the way affect the potential outcomes in the end.

Edited by Richard Pearson on Sep 29 at 8:13pm

Logan Presnall

Logan Presnall

Oct 2, 2020 Oct 2 at 12:15pm

Richard,

I haven't used decision trees in my line of work before but I agree that it would be a wonderful way to evaluate vendor options and come up with a non-biased data driven choice. As you said, with the easy to follow flow chart many people, including the ones with the check book, should be able to come up with the same decision in the end.

-Logan

Amy Hollabaugh

Amy Hollabaugh

Sep 30, 2020 Sep 30 at 4:16pm

I think one of the most practical uses of a decision tree is when you are weighing out the options of decision. For instance deciding to go back to school to get a Master's. You can determine how much it will cost you, how it could increase your salary after obtaining the degree and your future prospects. Then compare that to where you currently are and if it is worth the risk to go back to school. You can also add another branch to determine what kind of toll it will take on your family and your mental health and how much time you will have to commit to balance all of your responsibilities. The decision tree can help organize all the options of what will happen if you decide to get a master's and show the risk of not getting a masters and you can see how any of the options will cost you with real numbers not just what your gut is telling you. But most likely the decision tree will validate what you're instincts are telling you.

(1 like)

John Schaub

John Schaub

Sep 30, 2020 Sep 30 at 8:39pm

Amy,

Very practical use as you showcased. While I struggle to find its use in my current role, through your example I can see how this could be used in many other applications outside the financial aspect. What I struggle with or could is narrowing the chance or risk associated with the choices. Looking through the cases determining the true risk percentages takes time and abundance of research. Often time I am presented with issues from our SW engineering and configuration management team that present me with a need from the field and they seek from me how much effort, cost are behind preparing the directive to field. Looking back to my actuals I have captured helps determine or shape my response; however, I have seen many not have those actuals and can't provide the risk percentages associated with the choices.

Xiaomin Yang

Xiaomin Yang

Oct 2, 2020 Oct 2 at 8:05am

John, in the "forecast" module, we will discuss how to estimate the probability numbers. XY

Mitchel Garrish

Mitchel Garrish

Oct 3, 2020 Oct 3 at 7:34pm

Amy,

The decision tree would have come in handy when determining this program's value compared to other investments. For me, a decision tree for this program would need to include a utility function to account for the desire to achieve a goal of pursuing a graduate degree.

Travis Metz

Oct 4, 2020 Oct 4 at 9:32pm

Amy,

Brilliant and very pertinent use for a decision tree. I do notice towards the end of your response you begin to introduce subjective data (time away from family, mental health, instinctual decisions), how would you go about quantifying data as such for a decision tree model? I would tend to believe that the decision tree could be manipulated to provide the answer that you wanted in an instance such as this.

Jeremy Meehleib

Oct 5, 2020 Oct 5 at 9:56am

Travis - You highlighted what is a potential downside of the decision matrix.... the opportunity to manipulate. I think that is actually the point of the tree itself.

The decision tree is to assist you in putting in the values and assumptions to justify a decision. The act of manipulation in the tree requires you to document and change values/percentages/revenue. Those very changes should highlight your own preferences or risk tolerances and lead to better understanding of the straightforwardness of the decision. To SEE how much a value/percentage/revenue would have to change to justify your preference....you should be able to identify if that is indeed reasonable and if the decision tree is accurately capturing all the decision points.

If everything in the tree says A is the best option and B is still the company's preference, something is missing in the decision tree. The negotiation study we had in an earlier module about the contract that was stalled because of the manufacturers brother comes to mind.

Jeremy Meehleib

Christopher Huebel

Christopher Huebel

Oct 5, 2020 Oct 5 at 1:37pm

Hi Amy,

Great choice in picking something practical to use a decision tree for. It reminds me that not everything has be used in a workplace setting, but these tools can be used for almost any risk uncertainty. In my opinion, one the decision trees most valuable asset is being able to lay out all of the risks and uncertainty into an easy to read diagram. Having all of these options "on the table" allows for a person to make the best possible decision whether it be financial investing or go back and get your masters. I personally plan to use this more in big decisions that affect me outside of work that have just as big of an impact. Thank you again for the post!

Best Regards,

Chris Huebel

Troy Philips

Troy Philips

Oct 11, 2020 Oct 11 at 5:58pm

Amy,

Good example of a decision tree in practical use. I had never heard of a decision tree before this class, but I see where I could have used it in the decision about going back to school. I can see

where this would be really valuable for those who have been out of school for a longer time and if it is really worth it to put in all the time a effort.

John Schaub

John Schaub

Sep 30, 2020 Sep 30 at 8:15pm

What are the practical use decision tree tools to help you make decisions under uncertain situations?

Decision support tools like decision trees, allow a pictorial demonstration of choice we have coupled with (at time) cost and risks associated to enable one to make a decision based from data and not that of intuition.

In my current role as a technical data author under modification engineering, I do not use the decision tree modeling as most of my tasks or the result of work packages that finalize modification CDRLS; however, I could see these tree as a great benefit to financial decision making as we have found within the modules video, reading, and exercises throughout the week.

My only experience (outside the academic environment) utilizing decision trees was under an SIA event.

In this SIA we took deep dives into the SW delivery of aircraft data load (ADL) files to the fleeted aircraft along with the logistics behind doing such a task. In our model we annotated time of delivery under potential methods to boost readiness along with pros and cons of each. While it was structured slightly different from the mathematical algorithmic functions that Analytic Solver brings; none-the-less it was a useful tool that showcased the most successful path to take

If in a different position in which financials were the clear tangible, I could see this tool being heavily used.

Edited by John Schaub on Sep 30 at 8:30pm

Richard Pearson

Richard Pearson

Oct 2, 2020 Oct 2 at 9am

John,

I agree with the financial part you mentioned. I think the decision tool can be a good way of pairing engineering (or technical decision-makers) with the financials in a method that makes it easy to see both sides of the coin. Engineering can say here are your options and finance can say, here are your costs for the options and both can see the various paths available.

Additionally, it would be nice if this tool could be used in a non-financial sense, I guess you would just need to find a way to assign a value of sorts to a decision…

Jay Hembree

Jay Hembree

Sep 30, 2020 Sep 30 at 8:23pm

Some of the practical tools to use are in a decision tree are branch alternatives, expected value formula, decision nodes, decision maker/expected-value maximizer, surveys, certainty equivalent value formula, diversification, decision points, and decision-event chains. The use of the EV and CEV formulas gives real time data for each branch of the tree with a probability outcome that can then be analyzed, and risk can be factored in the decision. Once the decisions tree and branches have moved past all nodes you will have the expected payoffs for each branch.

This leads to asking several questions as laid out in the Harvard Business Review, "Decision Trees for Decision Making" by John F. Magee:

What is at risk? Is it profit or equity value, survival of the business, maintenance of a job, opportunity for a major career?

Who is bearing the risk? The stockholder is usually bearing risk in one form. Management, employees, the community—all may be bearing different risks.

What is the character of the risk that each person bears? Is it, in his terms, unique, once-in-a-lifetime, sequential, insurable? Does it affect the economy, the industry, the company, or a portion of the company?

Not all decision trees will answer these questions and you must make your own decisions. The decision tree gives data so upper management can make a more informed final decision on which branch to follow and how much risk to take.

Daniel Day

Daniel Day

Sep 30, 2020 Sep 30 at 10:39pm

I think it bears repeating, your point that the decision tree, while a valuable tool, cannot be the only factor involved in the decision. Just like you're saying, there are many other factors where the decision tree can supplement the decision making process, but cannot usurp it.

As was pointed out in the module, estimating risk tolerance is a fairly subjective process, and as every basic programmer knows, Garbage In, Garbage Out. If the data on which the decision tree is modeling the decision is flawed, so will be the recommendation.

Matthew Hudson

Matthew Hudson

Oct 4, 2020 Oct 4 at 6:23pm

You make a good point that it will not answer all the questions but it hopefully gives that manager an insight into the direction he/she would like to move. The fact that it lays out all the options and EVs will give the decision maker a better chance than simply a gut decision and as you mention, "you will have the expected payoffs for each branch"

Joseph Ramirez

Joseph Ramirez

Sep 30, 2020 Sep 30 at 8:42pm

I have used a decision tree many times in my current role without realizing it. These decisions have come when helping customers in deciding whether to repair an older machine or to invest in a new one. There is some cost analysis involved and typically we will compare the cost of replacing parts on the older machine versus the cost of purchasing a new machine. Since we don't know which parts we will need to be replaced in the future, these are decisions under uncertainty. We can look at the past history of the machine model to see what parts were replaced the most. Sometimes this is an educated guess based on my experience with the machine but we can come up with a good probability and cost from this. In the future, I will create an actual tree in these situations to help provide the customer with real data.

Daniel Day

Daniel Day

Sep 30, 2020 Sep 30 at 10:21pm

I also thought of this type of thing, Joseph. You're absolutely right that in many of our industries we may be going through a decision tree process mentally without recognizing there was a formal process for it. And I also agree that this tool might be an excellent one to have available to show a more concrete analysis when presenting recommendations to customers or to supervisors. Having the numbers and options mapped out and easily reviewable carries a lot more weight than just saying "Well, I think that...."

Marc Farias

Marc Farias

Sep 30, 2020 Sep 30 at 9:25pm

What are the practical use decision tree tools to help you make decisions under uncertain situations?

A good example for using the decision tree tool could be trying to determine the best software solution for a company. The decision tree can breakout whether to go with an in house

developed software application versus choosing a Commercial Off The Shelf (COTS) software application. This is often challenging for industries that require both common and unique business needs. Both have advantages and disadvantages that can be mapped out in different nodes. I have made an example decision tree below mapping out the possible routes and showing a notional expected value/cost.

decision tree discussion.png

Eric Worley

Eric Worley

Oct 2, 2020 Oct 2 at 12:31am

Mark,

Good evening, and thanks for your post. Your example is excellent, and I suspect could apply to nearly every company in some capacity. The example that comes to mind from my previous employer was regarding an acquisition that was originally private equity sponsored, and we were integrating it with the larger publicly traded organization. Part of the integration was identifying areas where we could 'harmonize' with the greater organization, and the Enterprise Resource Planning 'ERP' software platform was one of those. This system is the backbone of organizations and manages functions from HR, finance, account, sales, commercial, operations, etc. The easy part was deciding that, that approach was indeed a good idea. However, the difficult decision came down to what software to choose, and how to prioritize its implementation. Recalling the process, which was a tremendous challenge, it would have been very interesting to apply a decision tree methodology when we were vetting the various ERP softwares. Nonetheless, there are what seems to be endless software options for various business functions, and I think applying an objective decision tree approach would possibly make those much clearer.

Thanks Again,

Eric Worley

ewworley@tamu.edu

Mariano Paoli

Mariano Paoli

Oct 4, 2020 Oct 4 at 9:36am

Marc,

I believe that using a decision tree to choose the right software is a great tool. However, it can also be a daunting task as there are multiple non-monetary aspects of the different software packages that affect the final decision. I think this goes back to rule number one of the analytical approach, which is to define the business goal and ensure alignment with that goal. The most cost-efficient software may not have the right capabilities, and it could also encounter rejection from the end-users.

Matthew Hudson

Matthew Hudson

Oct 4, 2020 Oct 4 at 6:28pm

Using a decision tree for the software development is a great way to determine the best cost and possible course of action. I have hear many companies treat the internal development as low cost because you own the people but how much longer will it take and cost to reach that goal. What about the cost of maintenance. I think it is very practical to create a decision tree, with assumptions, uncertainty, and risk and plot the best and worst path. Maybe it takes 6 months longer but is half the cost to do it internally? Is this the best course of action, depending on the need of the software. While it might not be able to answer all the questions, it certainly help with many aspects.

Daniel Day

Daniel Day

Sep 30, 2020 Sep 30 at 10:16pm

A practical use of decision tree tools in uncertain situations is to find out where you might be able to decrease the amount of uncertainty in the decision.

For example, in data center engineering, facilities have various "Tier Ratings" based on the engineered reliability of the facility, and how much "uptime" the facility can provide. However, as the designed tier increases, so does the cost of building and maintaining the facility. Eventually, the cost of operations can exceed the profitability of reduced downtime, and the facility would be more profitable at a lower tier.

When deciding what level of facility to build, a decision tree can be helpful in displaying new information to look for. The uncertainty, in this case, is how often an equipment or service failure happens that can be mitigated via redundancy, vs the cost of engineering that redundancy into the facility. Using the uncertainty node in the decision tree can visually represent the various scenarios, and can take some of the guesswork out of the decision.

Using the utility function, a design engineer can factor in the risk tolerance of the company to get a better idea of which tier most suits the company's needs. It's simple to say that the more risk-averse the company is, the narrower the margin of construction and operation costs to revenue they will accept. In other words, they want to minimize likelihood that an outage causes loss of revenue, and therefore will probably build a higher tier facility, that's a bit more expensive. Conversly, a risk-seeking company might be wiling to minimize the construction/operation costs to maximize operating revenue, but be more exposed to revenue loss due to an unpredictable outage.

The decision tree can put numbers to this concept (given an accurate estimation of the company's risk tolerance) and decipher exactly how willing the company should be engineer more redundancy, and which data center designs would most suit the company's needs.

Eric Worley

Eric Worley

Oct 2, 2020 Oct 2 at 12:21am

Daniel,

Thanks for your post. I particularly appreciate your example of applying a decision tree to equipment redundancy in a facility build scenario. While I don't personally work in this space, I

do work for an energy services company that regularly deploys equipment and personnel to the field in unforgiving environments. A topic of discussion and sometimes contention, is equipment redundancy. Which projects should get redundant equipment? Which projects should not? Should it be based on revenue, size, customer, etc? Equipment redundancy always seems to be a heated debate, and taking a decision tree approach will be very interesting as it will quickly and objectively identify where the most expected value is.

Thanks Again,

Eric Worley

ewworley@tamu.edu

Zachary Smith

Zachary Smith

Sep 30, 2020 Sep 30 at 10:59pm

Elements implemented in a decision tree to help make decisions can include using a chance node in lieu of a decision node, making sequential decisions and, determining a risk profile or tolerance based on the consequences of the decisions. All of these elements can enable our decisions to be transparent and organized, quantifiably understood to justify decisions, provide more certainty when used in conjunction with each other, and allow multiple parties to follow a particular train of thought behind decisions. Also, when applying a company's objective to decisions, it can influence a particular risk profile (averse, loving, neutral) which can be implemented in the decision tree to guide the decision maker to align with the company's initiatives.

Bill Osburn

Bill Osburn

Oct 3, 2020 Oct 3 at 8:58am

Zach,

I agree with you about the ability to have a transparent view of the decision before the decision is made. The certainty that is provided with the decision tree can give us peace of mind when making decisions knowing we have made the best choice. Being able to present it to other party's involved so that they can see why the decision was made is a great advantage of a decision tree as well. The last part of our lessons about risk tolerance will be beneficial to add to the tree as well. Do you think risk tolerance is the same for each situation or does it change depending on the decision to be made?

Ronnie Hurst

Ronnie Hurst

Oct 1, 2020 Oct 1 at 7:18pm

Decision tree tools allow decision-makers to quantify and evaluate uncertainty. For some, it is practical to have a visual aid to understand and clearly view the problem and all options. The provided framework within the tool allows for all possible values and outcomes to be evaluated and compared against each other. Since most people and organizations are risk-averse, a decision tree can also quantify this risk, which is very difficult to do in most decision-making practices.

This module allowed me to reflect on my own organization's decision making processes. We use a very simple method for our agreements where certain metric thresholds need to be met. However, we fail to take into account our relative performance and track record into account. If 20% of our agreements are underperforming and 30% overperform, we can assume that any new agreement would likely follow this same pattern (or at least on average). Additionally, we have agreements that often require us to spend large amounts of up-front costs in the form of hiring people, purchasing inventory, purchasing equipment/software, etc. A decision tree and expected value evaluations could greatly help us understand how to prioritize these agreements and make better business decisions.

Tom Cappucci

Tom Cappucci

Oct 1, 2020 Oct 1 at 7:53pm

Ronnie, as you said, it sounds like your company could benefit greatly from using decision trees. With large upfront costs associated with your agreements, a decision tree would be a great tool

to find your "walk away point" where an agreement is not profitable for your company, or possibly an agreement you thought would not be profitable/favorable, actually turns out to be the best option when mapped out in the tool.

Ronnie Hurst

Ronnie Hurst

Oct 3, 2020 Oct 3 at 7:10pm

Tom - I think even better than finding our "walk away point" or BATNA, I believe a process like this will allow us to step back and look at the possible outcomes. From there we would be able to identify risk and perhaps decide to change some of the variables of the agreements.

Sarah Terrill

Sarah Terrill

Oct 5, 2020 Oct 5 at 8:30pm

Ron - I never thought about looking back at the performance record of our company and applying that to the possible future projects. Agree about the up-front costs being large so it would be interesting to build a decision tree using past performance for the chance nodes and building in the up-front costs for each of the possible scenarios. This makes me want to start building one...

(1 like)

Eric Worley

Eric Worley

Oct 2, 2020 Oct 2 at 12:13am

TAM-PrimaryMarkB-14.jpg Eric Worley

TCMT 612 - Technical Management Decision Making

Module 4: Discussion

The practical uses of decision tree tools are to help individuals navigate and approach multiple decision scenarios in an objective, unbiased way. We all encounter numerous decisions every day that we have to make in life, both professionally and personally. Some are simple where we can rely on heuristics, while others require more heavy-analytics to evaluate the appropriate decision before moving forward. 5 categories of decision making were covered in Module 4:

· Decisions with certainty

· Decisions with uncertainty

· Analyzing sequential decisions under uncertainty

· Risk utility function – exponential

· Calculate the value of risk mitigation technologies

Regarding the tools associated with making decisions under uncertain situations, we used Analytical Solver as the software interface. By composing decision tress comprised of decision nodes, chance/event nodes, assigning probabilities, and identifying our expected value amongst various scenarios, we were able to identify a completely objective path to maximize expected value. Considering this newly learned approach and tool, I will be practicing applying it to significant decisions I encounter at work, such as technologies and contracts. I am already working on evaluating a new technology to determine if it's meaningful enough for the company to pursue by way of a partnership, acquisition, or organic development.

Eric Worley

ewworley@tamu.edu

  (4 likes)

Xiaomin Yang

Xiaomin Yang

Oct 2, 2020 Oct 2 at 8:11am

Eric,

very good summary. I may just use it for the summary of the module.

XY

Jordan Caddick

Jordan Caddick

Oct 2, 2020 Oct 2 at 10:23pm

Eric,

The overview of 5 categories of decision making we used in Module 4 is helpful. I feel like the one I use the most is making decisions with uncertainty. As a project manager in the construction industry, I am making decisions every day that deal with a high degree of uncertainty. I'm sure your career also requires you to make decisions under uncertain conditions. As a further topic of discussion, I'm curious to understand when one is faced with decisions with uncertainty, do they react differently while under a time constraint? As for myself, I will likely spend some time making a mental decision tree before I act now that I have taken this course!

Marc Farias

Marc Farias

Oct 4, 2020 Oct 4 at 11:31am

Howdy Eric!

I just want to say that I like the way you break things down in the topic of discussion, not only in this post but in all your posts! Seeing that you have learned a great amount from this class, I'd really like to know how your evaluation of the new technology in your department pans out for you. Exercising the decision tree is great in theory. I feel the most challenging part of it is determining the probabilities if you don't have any historical data to go off of. Also, Jordan made a good point of acting differently under time constraints. Sometimes all of us are faced

with the pressure of making a quick decision. I hope there will be additional future lessons on how to deal with "on the spot" decision making.

Jonathan Weiss

Jonathan Weiss

Oct 2, 2020 Oct 2 at 7:37am

During uncertain situations, when utilizing decision tree tools, a chance node should be applied. By using a chance node, an individual has the opportunity to compare pros and cons with a calculated percentage. The chance node enables someone to apply multiple options, with assorted values and percentages and then compare to one another to determine the best expected value.

Not only does a chance node allow weighted percentage options to be compared to one another, they can also be compared to other options as well, such as deciding to do nothing or comparing to another proposal that has a definite outcome, and is not left up to chance or uncertainty. By using these chance nodes, individuals are able to accurately assess risk and determine which option best outweighs the others.

In a real world scenario, using the decision tree tools for uncertainty could be applied when selecting a piece of machinery. Normally when one is choosing a piece of machinery, they want to ensure it lasts a long time, has affordable parts and overhaul service, and that it's not too expensive to purchase. A decision tree could help layout which piece of machinery has the best longevity, what it will cost to maintain the longevity, and which incurs the most cos at the most at the beginning. The uncertainty comes into play, because the lifespan of a piece of machinery is never guaranteed. The cost vs. the percentage risk of failure, which coincides with expensive maintenance and possible replacement must be considered.

Edited by Jonathan Weiss on Oct 2 at 7:57am

Richard Pearson

Richard Pearson

Oct 2, 2020 Oct 2 at 9:05am

Jonathan,

I was thinking about this during the lectures and such, the examples are one-time costs and don't necessarily take into account the recurring costs associated with a decision. I would imagine you could roll those costs up into the costs of the decision or the chance of a decision working, but I wonder if there is additional analysis or modeling that we can do to take into account recurring costs with a decision.

Tim Parker

Tim Parker

Oct 4, 2020 Oct 4 at 3:10pm

At this level of trying to make decision, rolling up costs would be your best scenario. As you try to tack on complexity, it becomes harder to make an effective decision. The enumerated details would be separate from your actual choice.

Let's say we have an Option where it's 20% to lose $X and 80% to gain $Y. The values of X and Y would actually have a large amount of work to go into them. So any value that we place on our profit $Y needs to include the recurring costs over a time period that we are looking for. Some projects need to be evaluated on a single year, some over several years, and some immediately based on use.

The decision tree is just a tool, but it's simplicity is one of it's major boons.

Logan Presnall

Logan Presnall

Oct 2, 2020 Oct 2 at 11:30am

While most of the things I work with on a daily basis are very structured and they rarely change, a practical use of the decision tree tool in my organization would be bringing in a new vendor into the lab environment. It can help answer many questions such as will the new vendor equipment help improve efficiency compared to the products already in the lab or is the cost of bringing in this equipment worth the return. This software can really help my organization take the bias out of making these types of decisions. Since we are normally tied very closely with a few vendors, when a new one comes along it is normally already at a disadvantage and using a

program like this can show the advantages of taking on a product and take the human element out of it.

Brandi Greenberg

Brandi Greenberg

Oct 2, 2020 Oct 2 at 12pm

Logan,

That is a good point on taking the bias out of the decision. The visualization of the data is what piques my interest. It will help in presenting the data in an unbiased way. Do you feel like the decision's uncertainty can introduce probability and bias into the decision if you are not careful? I thought that a person could sway the outcome by assigning different probability values to chance nodes.

Jonathan Weiss

Jonathan Weiss

Oct 4, 2020 Oct 4 at 10:42am

Logan,

I like how you said "take the human element out of it." I think that's so important. Everyone has opinions and biases, which can often weigh heavy on making decisions. When making a decision that is not based on raw, factual data, the chances for failure often increase. In a business setting, emotions and feelings need to be set aside. Decisions need to be objective and should be in the best interest of the company. Using the decision tree tool is a perfect way to remove the imperfect human element and allows us all to make better, more informed decisions.

Megan Wallace

Megan Wallace

Oct 4, 2020 Oct 4 at 4:48pm

Logan -

I definitely agree that it's a great way to organize all the available data. Sometimes it seems like it's easy to get bogged down in detail instead of focusing on what's important. While I don't necessarily feel it takes the human element out of it, as there are often other factors involved that may not be able to be included in calculations, it's an excellent tool to educate and guide a decision!

Brandi Greenberg

Brandi Greenberg

Oct 2, 2020 Oct 2 at 11:33am

Decision-making often involves multiple criteria, and those criterions can have high levels of uncertainty and risk. Using a decision tree can facilitate visualization of decision alternatives that may not have been clear before. The decision-maker must define the goal and identify the options and consequences[1]. With this information, a decision tree is a logical method that can help decision-makers think analytically through the problem to reach the best outcome, identify substitutes, and recognize missing information or environments. A decision tree is a support tool that uses a tree-like graph of decisions and possible consequences, including chance, event outcomes, resource cost, and risk-utility.[2] A chance/event node indicates uncertainty in a decision tree; the node branches represent possible outcomes that can include probability and the anticipated value. In uncertain situations, a decision tree tool can be used in a practical way to support the decision of the decision-maker. I could have employed the decision tree recently when deciding which satellite receiver dish and a lightning suppression system to install at the customer locations.

[1] TCMT 612 Module 4 Topic 64 Analytical approach to Support Decision Making – Dr. Yang

[2] TCMT 612 Module 4 Topic 65 Introduction to Decision Trees – Dr. Yang

 (1 like)

Timothy Koontz

Timothy Koontz

Oct 4, 2020 Oct 4 at 11:44am

Good day Brandi.

I enjoyed your post especially your description of a decision tree. The part that I never considered is the identification of missing information. We utilize the Why Trees and Root Cause Analysis in the safety profession. The Root Cause Analysis and Why Trees do not work very well with missing information. The missing information becomes obvious when making the Why Tree which will prompt the investigator to conduct more research. The missing information can be pertinent and can alter the outcome of the investigation or the decision.

Brandi Greenberg

Brandi Greenberg

Oct 4, 2020 Oct 4 at 3:17pm

Howdy Timothy,

I am familiar with the Root Cause Analysis, but I had to think about the "Why Trees" I guess you keep asking why until you get to the cause? Or the issue? I would think that those will show the missing information on what the cause or issue is but do they show missing information for a comparison between multiple options?

Tyler Gilbreath

Tyler Gilbreath

Oct 2, 2020 Oct 2 at 9:04pm

The analytical solver is extremely useful when comparing multiple potential solutions to a problem. The event/chance node assists us in comparing the potential gains and losses of a proposed solution. The event/chance node also allows us to incorporate the level of risk tolerance we find acceptable based on the potential decisions. Lastly, the highlight function of

the decision tree analytical solver assists in evaluating all potential decisions and identifying the decision with the greatest value of return based on the parameters of each decision.

The analytical solver is a versatile tool because it allows us to modify and adjust the decision tree if there are new factors introduced into the problem. An example of this is similar to the assignment we completed where we reviewed the success of the oil well drilling control device with and without the comprehensive market study that could be included in the project decision.

Joe Williams

Joe Williams

Oct 3, 2020 Oct 3 at 1:49am

Tyler have you found a use for the analytical solver yet in your everyday life? Maybe even in something that takes place weekly?

For myself I've thought about attempting to use the event/chance nodes to assist me in comparing the potential gains and losses of a proposed solution that is based on time not really a financial aspect. I haven't got it figured out yet, but I'm sure the more I play around with it, I can figure something out. I'd like to use it for showing a physical chart to be able to say "look here folks, look how much time we waste doing THIS, whereas if we do THAT it will only cost us this much time".

Since the event/chance node also allows us to incorporate the level of risk tolerance I want to place with that as well for daily/future operations. If you find yourself tinkering with it and can pass on some tips, please do!! This solver is all new to me so I'm very open to listening to others and becoming more efficient with it.

Tyler Gilbreath

Tyler Gilbreath

Oct 4, 2020 Oct 4 at 2:54pm

Joseph, I appreciate your comment. I think I may have taken the initial prompt a bit too literal when responding the first time. I think the analytical solver is a tool that would be useful when making decisions regarding which home project I would like to start next. My wife and I have struggled with deciding which room we should renovate but I think there is enough information regarding what home buyers look for I could create a decision tree comparing the benefits of updating the master bathroom, the kitchen, or the exterior of the house first. It would help me analyze the cost of each project along with the potential gain in home value the completion of the project. This isn't necessarily an everyday use but it is something I can see myself utilizing in the very near future.

Jordan Caddick

Jordan Caddick

Oct 2, 2020 Oct 2 at 10:09pm

Optimization, calculation of expected value (EV), the enabling of evaluation of information, and tools to evaluate chance, event outcomes, resource cost, and risk utility are some of the decision tree tools that can help one make decisions under uncertain situations. Specifically, under uncertain situations, chance nodes can be used to maximize the probability of a desirable decision. Another tool is the tornado chart, which takes an input from candidate cells to calculate the effect of each change on the output cell's value. Also, a strategy table, which is a sensitivity analysis tool that allows the user to analyze how the optimal decision strategy changes in response to two simultaneous changes in probability estimates, is another good practical tool to help make decisions under uncertain situations. A strategy chart can also be used to display the same information, but graphically. These are a few of the practical tools that one can use while utilizing the decision tree model to make decisions under uncertain situations.

Amy Hollabaugh

Amy Hollabaugh

Oct 4, 2020 Oct 4 at 4:19pm

Jordan,

As this is my first experience using a decision tool I didn't realize there were so many other options. The strategy table seems like a helpful tool to use when decisions are dependent on other uncertain decisions and would help give you a perspective of the best vs. worst scenario. When making decisions like theses do you prefer one over the other?

Bill Osburn

Bill Osburn

Oct 3, 2020 Oct 3 at 8:42am

TCMT-612

Module 4 Discussion

Bill Osburn

What are the practical use decision tree tools to help you make decisions under uncertain situations?

Decision Trees, as I have learned in this class, can be used in many ways. Personally, in day-to-day life, it could be used to determine which car to buy by placing weight on price, features, mileage, and looks. It could also be used when purchasing a home using parameters such as neighborhood, size, style, and other things. Another great use would be in determining whether a job offer should be taken or not. Location, wage, benefits, and chance of promotion could all be used to determine the best choice.

The decision tree will be very useful at work now that I am taking on system engineer duties and responsibilities. With much of our equipment becoming obsolete, we are tasked with finding suitable replacements for these items and at times there may several options which could include requiring additional equipment or modification to existing equipment to

meet requirements. Having a tool to enter parameters that will go into the decision and seeing it on the screen will make our lives easier and better decisions can be made in the future.

(1 like)

Timothy Koontz

Timothy Koontz

Oct 4, 2020 Oct 4 at 11:37am

Good day Bill.

The decision tree is an excellent tool to use in decision making because it lays out the information logically and without bias. The user can easily see the different comparisons to help with their decision making but ultimately, it is only a tool. After the decision tree is made, the user will at least understand the origin of their decision; either fact based or from a bias. There are many decisions that have been made that cannot be linked to facts but to merely personal preference. Preferences can stem from a gut feeling, past history that cannot be captured on a decision tree, or the current social environment. There were many factors that I overlooked when I bought my last vehicle. I prioritized one aspect that I did not have much consideration for prior to entering the decision making process. Ultimately, I was satisfied with my purchase but I may not have been a few years ago. The decision tree has to be viewed for what it is; merely a tool.

Marc Farias

Marc Farias

Oct 4, 2020 Oct 4 at 11:54am

Hey Bill, thanks for sharing your personal examples of using a decision tree in your day-to-day life. I particularly like the determining whether a job offer should be take or not. I haven't had to look for a job or decided on a job in quite a while so a decision tree would definitely come in handy when that prospect arises. I would also think using a decision tree when choosing the correct candidate to hire out of multiple applicants would be very helpful. Would you agree?

Taylor Anderson

Taylor Anderson

Oct 4, 2020 Oct 4 at 10:04pm

Bill,

I like that application with obsolete equipment, I could use that in my work as well. I agree using a tool like this would help us make better decisions in the future and being able to see all the data and outcomes displayed in the decision tree would be beneficial to everyone.

Kaleigh Philips

Kaleigh Philips

Oct 3, 2020 Oct 3 at 1:08pm

I think a practical use where a decision tree would help me make a decision in an uncertain situation would be when implementing a new system whether or not to purchase marketing material for the new system from the vendor. Do posters and banners really help with the implementation, or could targeted communications and word of mouth be enough? In my current position, we have done both, but using a decision tree and seeing the potential financial impact would have been useful in making the argument to go with or without the materials from the vendor. If it is determined we need the materials, there is also another alternative we could add into the decision tree of making our own materials rather than purchasing from the vendor. Either way, having a decision tree with multiple nodes and decision points would help in the process of deciding which route is most financial responsible.

Harshvardhan Tirpude

Harshvardhan Tirpude

Oct 4, 2020 Oct 4 at 12:42pm

Thanks Kaleigh, I agree with you on what you said related to the decision tree tool. Do you think are there any possible limitations while decision making when under pure uncertainty? Or do have you any such experience in the past which you can share?

Thanks,

Harshvardhan

Mitchel Garrish

Mitchel Garrish

Oct 3, 2020 Oct 3 at 7:05pm

Decision tree tools could be useful in many uncertain situations. The decision tree tools could help decide between low or high-risk product marketing decisions at work or for uncertain choices in your personal life. For instance, the decision tree could be a valuable tool if unsure about attending graduate school. The decision could be presented as an investment of tuition for a return in expected salary and could then be compared to other financial investments with expected payoffs. The decision tree could lay everything out in black and white to assist with the final decision.

Edited by Mitchel Garrish on Oct 3 at 7:14pm

  (1 like)

Mariano Paoli

Mariano Paoli

Oct 4, 2020 Oct 4 at 9:15am

Mitchel,

I find it interesting that you used the decision to go to graduate school as an example. I can certainly say that I relied on my intuitive decision-making skills when deciding to attend this program. I think it would be an excellent exercise to use what we learned in this module and weigh out all the options. I had looked at getting either an MBA, a PMP, or the METM. A decision tree would have helped me make my decision a whole lot easier.

Tyler Gilbreath

Tyler Gilbreath

Oct 4, 2020 Oct 4 at 3:01pm

Mitchel, I definitely considered many of the same variables when deciding to pursue a graduate program. I think this tool could be particularly helpful for high school students who have not quite committed to attending college yet. I don't think there is enough information supporting the choice to forgo a college education in order to pursue a trade school or other type of program. I think this would be a helpful tool that would allow future students to make educated decisions on what other potential outcomes there are in life if one does not pursue a college degree.

I have been in school with people who just did not enjoy the college experience, but felt it was the only option. They invested their parents money or money they took out in loans in something that they weren't 100% bought into.

Tanner Welch

Tanner Welch

Oct 4, 2020 Oct 4 at 7:53pm

Mitchel,

Great point.

While not educated on decision trees at the time, I performed a crude decision analysis of the pros and cons of attending graduate school. At the end of the analysis, the pros definitely overshadowed the cons!

Troy Philips

Troy Philips

Oct 3, 2020 Oct 3 at 9:05pm

One of the biggest events of the year for the NFL is the draft. While teams can sometimes tell that a player is going to preform at an NFL level, more professional bound players a less certain. I think a good use for a decision tree would be to help determine what player has the most upside for the professional stage. Since teams invest millions a dollars in plays, it is very important that they pick the correct players that will bring high value and offer the best ROI.

Harshvardhan Tirpude

Harshvardhan Tirpude

Oct 4, 2020 Oct 4 at 1:18pm

Hi Troy,

I liked the example that you suggested using the decision tree tool while selecting players for the NFL. However, studies show that modeling approaches help to find the most predictive of NFL draft order but it also not necessarily the most predictive measures of NFL player success. What are your thoughts on this?
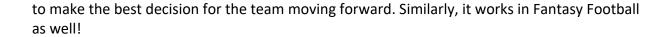
Thanks,

Harshvardhan

Megan Wallace

Megan Wallace

Oct 4, 2020 Oct 4 at 4:45pm

Troy -

Great comparison! I can imagine that teams would have a weighted needs list, which could then be used to search available players, then rank them out in a priority-based order in order

to make the best decision for the team moving forward. Similarly, it works in Fantasy Football as well!

Tanner Welch

Tanner Welch

Oct 4, 2020 Oct 4 at 7:51pm

Troy,

I currently have Sunday Night Football on in the background, so I feel that it is only fitting that I comment on your post.

Not only could teams utilize the Decision Tree to project the ROI on a particular player, they could also utilize it to determine if it is beneficial to draft a quarterback in the first round, or a defensive lineman.

John Mullins

John Mullins

Oct 4, 2020 Oct 4 at 9:20pm

Troy,

Great use of the decision tree, it mirrors what Billy Bean did with the Oakland A's implementing analytics. I liked how analytics removed the emotional aspect from selecting players. One of the downside to straight analytics is it does not account for player personalities or off the field issues. With the decision tree model you can account for many different aspects, which can lead to selecting a highly talented player on the field and one that will stay out of trouble off.

Taylor Anderson

Taylor Anderson

Oct 4, 2020 Oct 4 at 9:46pm

Troy,

Such a good real-life example outside of work. I find it easy to relate these items to work, but at times find it hard to relate to personal life outside of work. I wonder if they use something like a decision tree to determine which players will have the biggest payoff, they should if they don't.

Mariano Paoli

Mariano Paoli

Oct 4, 2020 Oct 4 at 9am

Decision trees are great tools to help make decisions under uncertain situations. Its graphical representation of all possible outcomes allows for an easy way to present data using simple math. Making a decision tree will enable you to use a systematic approach to brainstorming the alternative paths decisions might take you; thus, allowing us to see the bigger picture rather than focus on a few options. Additionally, the tool allows for easy integration of other decision trees, which opens up the door for collaborative efforts between different groups. Decision trees can also be used to measure the value of perfect information, which is particularly useful when trying to decide how much resources to allocate for market research prior to making a decision.

As leaders, we need to make the right decisions and convince other people of such decisions. Showing the outcomes of our choices and uncertain events into one diagram helps to lead us in the correct direction. For instance, when a company is trying to decide how to spend a limited amount of funds for improvements in its infrastructure, a decision tree could help guide the organization in the right direction. Additionally, the risk-utility function can be used to help model a solution that includes the risk tolerance of the company.

Jonathan Weiss

Jonathan Weiss

Oct 4, 2020 Oct 4 at 10:48am

Mariano,

Well said. Seeing the bigger picture is so important. It's easy to get sucked in, putting the blinders on and not seeing all of the other potentially great options. As you pointed out, working with other groups allows us all to make better and more informed decisions for an organization as a whole.

I agree with your comment about the risk-utility function as well. Not all companies operate under the same philosophy. Some organizations are open to risk, while others are not. By using this risk function, companies can accurately assess their risk level and make the best decision based on their calculated comfort level.

Sarah Terrill

Sarah Terrill

Oct 5, 2020 Oct 5 at 8:36pm

Mariano - I, too, pointed out the advantage of collaboration between groups. The ability for the individual groups to build their branch of the decision tree, and then for all of them to feed into a larger tree that is evaluated at a higher level seems like a great way for a company to gather all the necessary input from those that have the best knowledge of their area. It also ensures that all factors are included in the larger decisions before management makes a determination.

Timothy Koontz

Timothy Koontz

Oct 4, 2020 Oct 4 at 10:20am

Good day Fellow Leaders.

A decision tree is a visual map of the steps considered and ultimately used in making a decision. As with any map, the information must be correct, in the correct location, and formal processes must be adhered to. In business, the decision tree can be used to help determine the cost/benefit of pursuing a new product line or if continuing with the current product would be

a more lucrative business move. The decision tree can also be used to determine if it would be beneficial for the company to enter a new market in a foreign company. The decision tree can be enhanced by including the company's risk tolerance and specific market analysis to help the user see a clearer picture of the question being asked. With the correct information, the decision tree can be used as clear and concise evidence of why a company chose a specific action. The decision tree takes the user bias out of the decision process and utilizes facts. A decision tree that is used correctly with all the needed information should be infallible against outside scrutiny.

The decision tree is an underutilized tool that has many far-reaching benefits outside of the business industry. The decision tree can be used in the personal decision-making process. The user has to be mindful of not inserting enough information or the incorrect information to skew the results in their favor. The decision tree can be used before a major purchase such as a house, appliance, or a vehicle. Sometimes people have an unwarranted bias in the decision making process which can lead to the wrong choice being made. I like Apple phones so I will continue to use Apple. If you layout the specifications, the pricing, applications, dependability and the applications, you may see proof that the other product is better suited for your needs. When presented with that information, you may still buy the Apple phone but at least you understand why you bought the phone along with its benefits and disadvantages.

In the safety profession, we utilize root cause analysis and the Five Whys to determine the root cause of an incident. Just like the decision tree, the root cause analysis is a visual map of how the author determined their final conclusion. The root cause analysis must follow a set procedure and be populated with the correct information.

Edited by Timothy Koontz on Oct 4 at 10:30am

Tim Parker

Tim Parker

Oct 4, 2020 Oct 4 at 3:15pm

Timothy,

Be very careful when stating a decision tree takes user bias out of the process.

Almost every single item going into the tree is likely to have some bias. The percentages of outcomes, the costs of the decision, the estimated profit, etc. The decision tree is a useful tool for analyzing the information given, as it is given. But the underlying information is likely to have an inherent bias pending on who populated the information and under what conditions.

Harshvardhan Tirpude

Harshvardhan Tirpude

Oct 4, 2020 Oct 4 at 12:23pm

What are the practical use decision tree tools to help you make decisions under uncertain situations?

Decision tree tools help not only to get outcome value but also with the amount of risk each decision carries

Helps to define the problem and all feasible alternatives to get possible outcomes. For example, it helps to decide whether a product should be a launch or not considering all the strategies keeping into consideration.

Expected value analysis is a special way of determining the severity of risks. Decision tree tools help to get the expected value of several risks and summarized by their expected values into best-case, worst-case, and expected-value scenarios.

Grant Shirley

Grant Shirley

Oct 4, 2020 Oct 4 at 3:17pm

Hey Harshvardhan,

I like and agree with all three of your practical use examples. I'm a big fan of these tools and they definitely address a lot of the needs for most of our decisions like risk assessment, clearly outlining feasible alternatives, and helping with expected value. As I told Tim, I'm really looking forward to using more of this tool, both personally and professionally, in the future.

Tim Parker

Tim Parker

Oct 4, 2020 Oct 4 at 2:26pm

The practical use of decision trees is that it utilizes a systematic approach and does not hide any information, nor does it lock away the information used to make a decision behind the scenes. The decision tree shows all items right away:

What decisions are needing to be made?

What will the final outcomes look like?

What are the probabilities of events likely to happen?

What are the expected values each step of the way?

What path needs to be taken for the best option?

Getting all the information out in front of decision makers allows for more effective decisions to be made. Since all information is readily available, visible and relatively easy to calculate, the information given by the decision tree can easily be digested then used by the managers as well is influencing other decisions that may need to be made.

Grant Shirley

Grant Shirley

Oct 4, 2020 Oct 4 at 3:13pm

Hey Tim,

I like your assertion that decision tree models do not hide any information, locking it away to make decisions behind the scenes. This tool is extremely valuable and takes much of the human emotion out of the decision making process. I see this as a hurdle in my own organization. I

also agree that the tree can be easily digested. I'm looking forward to using this functional tool in my uncertain decision making.

Grant Shirley

Grant Shirley

Oct 4, 2020 Oct 4 at 3:09pm

My company has two facilities located ~50 miles from one another in central Texas. Both locations have redundant capabilities and technologies, manufacturing both polymers and metals. These two locations exist in proximity because of a merger and acquisition in 2014; continuing to operate as two separate P&L centers leading to inefficiencies as an organization. The COVID-19 economy has certainly brought waste and inefficiencies to center stage. This has begged the question of reevaluating the roles and needs of the two facilities.

There are quite a few options leadership can evaluate using decision tree tools for these uncertain situations: Both facilities could consolidate into a new or existing location, the facilities could consolidate technologies into existing locations (i.e. metals in Austin and polymers in Belton), the company could choose to close one of the locations permanently, or the status quo is maintained, and no significant changes are made. The use of decision tree tools would be necessary in making this vital determination.

Amy Hollabaugh

Amy Hollabaugh

Oct 4, 2020 Oct 4 at 4:10pm

Grant,

I think this is a great example of how a decision tree can be utilized to assess uncertain situations. I feel like decision trees mute certain biases that management uses to make decisions and shows graphically and analytically which decision is the most advantageous to the company not just management's opinion. I feel like a lot of companies at this moment in time should reassess their processes and what should be modified for the future.

Joseph Ramirez

Joseph Ramirez

Oct 4, 2020 Oct 4 at 6:47pm

 Grant,

I think it is really worth noting that there is a need for reevaluating roles and needs of companies in this economy right now and heading into the future. This tool will be very valuable for us to use at our companies. The decision tree may not offer final answers but in uncertain times like now, it can illustrate future financial investments and opportunities.

John Mullins

John Mullins

Oct 4, 2020 Oct 4 at 9:14pm

Good example of how your company could use the decision tree tool. I was trying to think of a way how my company could use a decision tree when explaining this tool to my boss and your example cleared it up. We have 2 corporate office buildings in Irving and just aquired a 3rd with an option to lease 3 additional floors. It is easy for me to just say lease the additional 3 floors and let one of the other office buildings go, but now I can plug the data into the decision tree and allow the computer to show the best possible outcome. Thanks.

Megan Wallace

Megan Wallace

Oct 4, 2020 Oct 4 at 4:44pm

Personally, I use something that resembles a categorical variable decision tree when planning out how I'll troubleshoot a particular issue a user may be having. I do my best to have several approaches ready so I can solve the problem most efficiently, so mapping out progressively more specific steps is helpful. Basically, I start by looking at a big-picture issue, then ruling out options/branches of the tree as I go, until I've narrowed down the exact issue and apply the appropriate fix. Definitely a different approach than most, but with limited experience, this is the best comparison I can make on a professional level.

I can see how the decision tree tool can be used on a much more in-depth level, though, as it serves as a method to take out the "noise" from an issue, allowing you to look at all available facts at once. While it obviously just shows a mathematical solution which may not always be -best-, I would include it in the process to at least guide my reasoning on any given problem.

Joseph Ramirez

Joseph Ramirez

Oct 4, 2020 Oct 4 at 6:14pm

Megan,

I have thought about this exact situation in my field, where I use this decision tree for troubleshooting. I haven't found a way to use an event/chance node in these situations but many decision nodes could be used and using this to branch out into events/results. Definitely a great way to go about troubleshooting.

Ken Wagner

Ken Wagner

Oct 4, 2020 Oct 4 at 7:30pm

This is a great point, while it may not be in a typical decision tree format, many trouble shooting guides work on the same idea. "If this issue turn to page ..." or "if you see this then it might be a, b, or c" When developing a work order/plan you would use these steps to determine if repair is the best outcome or replacing would be the best outcome as well.

While for the assignment I was doing everything based on a company picture, decision trees are used for almost every area for life. Especially working as a data scientist, I constantly program decision trees for features that will help computers automate.

Carolyn Perez

Carolyn Perez

Oct 4, 2020 Oct 4 at 8:42pm

Megan,

This is a great example of using a decision tree in the workplace. The specifics of my position do not particularly lend itself to allow me to make decisions like this on my own, but I can see how it would be useful in your position and how you logically follow the steps of a decision tree by starting with the "big picture issue". As someone who also has limited experience with decision tress, I can see how you made the comparison and how this would be a very useful tool.

Travis Metz

Travis Metz

Oct 4, 2020 Oct 4 at 9:47pm

Megan,

I'm very intrigued by your example of using a decision tree when troubleshooting. Troubleshooting is broad and varied between different industries, but I had never really considered the thought process as mirroring this. It would certainly make it easier to keep track of the plethora of "if/then" statements you might go through to resolve an issue by allowing the typical trial-and-error method with less backtracking. Thank you for bringing up this point.

Matthew Hudson

Matthew Hudson

Oct 4, 2020 Oct 4 at 6:12pm

Decision trees helps a manager make financial decision when there are multiple paths of uncertainty. If a manager needs to determine if the environment is right to launch a produce to a split decision about whether to make a change before or after product launch, the decision tree will give you the expected value of that decision. This removes much of the guess work and provides a simple method for determining the answer. This assumes the information is based on accurate or best guess probability of the action. For this we use the chance node with

the uncertainty or probability of the event to compete the decision. Adding the Utility function allows for a more accurate risk outcome of the decision. This can lead to business strategy gains and market shares. As the project progresses the decision tree can be updated with actual data, assisting in the determination of strategies, positive/negative market reception and projected profits. In hindsight, if something fails you can also review your decision tree to understand where your assumptions or projections were wrong. Maybe you didn't expect COVID-19, did you make the proper adjustments to compensate, does your decision tree show this action?

Carolyn Perez

Carolyn Perez

Oct 4, 2020 Oct 4 at 8:49pm

Matthew,

Although, I have never had the opportunity to make or use a decision tree in the workplace I resonate on a personal level of using the decision tree to make financial decisions. I think using this tool when making major purchases really allows someone to see the consideration of all possible outcomes of the decision along with a very helpful visual representation.

Jacquelyn Lopez-Barlow

Jacquelyn Lopez-Barlow

Oct 4, 2020 Oct 4 at 8:52pm

Matthew,

Decision trees are useful management tools to evaluate objectively alternative paths. Reading other posts, some people have used them to troubleshoot or select vendors. How would you or could you verify that the information you are relying on is accurate or representative? Also, you mention using the tool to reevaluate decisions because of an unexpected event, and this makes me think of ways to use the tree as a monitoring tool as well. Decision trees do show how information is combined, is interactive, and can show how uncertainties propagate. When do you think is the right time to reevaluate the decision tree with stakeholders?

Ken Wagner

Ken Wagner

Oct 4, 2020 Oct 4 at 7:24pm

When companies are trying to make decisions under uncertain situations, there are many tools and methods that can be used to make the decision. As seen through the past two weeks, one tool that can be used is the Analyzer software. This allows someone to input all the possible outcomes and reach a determination. The first tool that is used within the trees is to continue to use an old product by upgrading or developing a completely new product. To help create this decision, you would need to conduct a market survey to understand how the market could potentially reach to this. This research will allow a company to decide what the risks are. This can then feed into having multiple possible outcomes of a product. When you have these possible outcomes then you can use the tool to calculate the expected value. While it is subjected, if can be used to help align your decision. The tool will also help you decide what is the best path to follow if you have developed numerous potential outcomes.

Jeremy Smith

Jeremy Smith

Oct 4, 2020 Oct 4 at 11:15pm

Ken,

I find it interesting that you mention alignment in decision making. In my experience, I spend a lot of my time in my project meetings, or setting up other meetings, to get alignment on a path forward from lots of different stakeholders. This type of tool has the potential to really save time in communicating, as you point out, by showing all of the numerous potential outcomes and the path being suggested in a succinct manner, which allows for faster, more accurate, and aligned decisions from stakeholders.

Tanner Welch

Tanner Welch

Oct 4, 2020 Oct 4 at 7:37pm

The transparent nature of the decision tree method provides the decision maker with a well lined out tool that identifies the events, choices, and consequences so that all alternatives can be challenged.

Within my organization, a decision tree may be used to outline the various events and choices needed to be analyzed prior to reactivating a drilling rig/vessel. Through the use of a Chance Node, the uncertain nature of the demand for drilling rigs may be analyzed. Prior to the commitment of the needed capital, a rational , detailed approach that outlines all potential outcomes would provide management a better understanding of not only the macro environment, but the micro as well.

Edited by Tanner Welch on Oct 4 at 7:48pm

Ronnie Hurst

Ronnie Hurst

Oct 11, 2020 Oct 11 at 10:23pm

Tanner -

Your example of the application of a decision tree was similar to the one I gave for my organization. Rather than uncertain market conditions, our scenarios would be mostly rooted in historical data.

When it comes to something like market conditions, how would you go about understanding and assigning those factors? Is this something that is done at an organizational level? It's something that I have always been curious about from a business and market intelligence standpoint.

Carolyn Perez

Carolyn Perez

Oct 4, 2020 Oct 4 at 8:36pm

The thing I like about decision trees the most is that they force someone to look at every possible outcome of a decision and allows someone to see their decision come to a complete

conclusion. I think a practical use for a decision tree would be in project planning and business decision making. I think I would personally use it for making big financial decisions as well since I am able to see the outcome of my decisions. I think one advantage is that since it is a visual representation, it is great for non-technical people to follow and it allows us to see the data relationship.

Zachary Smith

Zachary Smith

Oct 8, 2020 Oct 8 at 10:58pm

Carolyn,

I like that you point out decision trees give us a visual representation for decisions. I believe decision trees are a great mechanism for organizing our thoughts and putting basis behind the "what ifs" when we're mulling over our options. I, like many others, am a visual learner for the most part so having an image that represents my thoughts helps. Sometimes our intuition can guide us down the wrong path, but if we take a little bit of time to write out and better understand our options it can help us understand the best decision to meet the objective.

John Mullins

John Mullins

Oct 4, 2020 Oct 4 at 9:05pm

What are the practical use decision tree tools to help you make decisions under uncertain situations?

  Instead of just guessing to make a decision, by laying out the problem with all options and the probabilities of each, better informed decisions can be made. This is accomplished by using squares to represent a decision and circles to represent chances and these are connected by branches which are alternative decisions. The expected value formula can be used to calculate gains or losses at each terminal node or the final possible outcome, which tells you the best possible outcome. As a visual person that likes to lay all of the options out on paper this tool helps justify decisions.

Edited by John Mullins on Oct 4 at 9:07pm

Travis Metz

Travis Metz

Oct 4, 2020 Oct 4 at 9:10pm

After playing with the analytics software and doing the assignments, I believe that the ability to create a visual support to quantify a decision or best outcome with probability is the most immediately practical. Tables and charts of numbers can appear equally impressive and muddled. By removing all the unnecessary data and keeping only what is relevant to the situation at hand, the decision tree can present an effective, streamlined model. When comparing a decision tree model to that of expected value, subjective variables can be minimized or eliminated outright, thereby providing a more true representation of data. Additionally, a decision tree is more effective in today's modern, collaborative environments.

Jeremy Smith

Jeremy Smith

Oct 4, 2020 Oct 4 at 10:58pm

Travis, I really like what you mentioned about the visual nature of a decision tree. I think you are right in that it can be extremely useful in conveying your thought process to others on how you arrived at your decision. I have tried to do this many times in the past and have struggled since the required input information needed to make the decision was very complex. This method definitely has the power to remove the extraneous information to produce in your words: "an effective, streamlined model."

Taylor Anderson

Taylor Anderson

Oct 4, 2020 Oct 4 at 9:41pm

Decision trees will help give the expected value for each situation when the outcome is uncertain. I have used expected value before, but have never used decision trees in the past, especially in software like solver that assists in all the calculations. This tool is extremely beneficial in assisting a user to determine which path to take in an uncertain situation and what

the expected outcome is. For example, this tool would be handy when determining which process improvement to make when manufacturing a product. At times we know how much time we will save the probability of each improvement happening. While the decision tree will show the maximum expected outcome, it is up to the user to determine how risky they want to be and which path they are willing to take for the payoff. Some payoffs are very large but the uncertainty of them happening is extremely low and would be very risky to take, the decision tree helps lay all of this information out so that a user can take all of the info and make the best decision for themselves.

Edited by Taylor Anderson on Oct 4 at 9:52pm

Robert Carrano

Robert Carrano

Oct 4, 2020 Oct 4 at 11:58pm

Taylor,

I really like how it allows the user to have options on the amount of risk they want to take. I often mess around with what my financial situation would look like if I wanted to retire by a certain age. Choosing the level of risk and adding in some other factors allows for a good visual representation of what I could expect and the best choice for me at that time. The fact that I can add multiple trees to that scenario and build on it makes it even more exciting, as I am sure when I do this in a few years I can review what I had projected from today's outcome and see the difference.

Respectfully,

Rob

Edited by Robert Carrano on Oct 5 at 12:02am

Jeremy Smith

Jeremy Smith

Oct 4, 2020 Oct 4 at 10:52pm

I have seen that most of the examples so far have been in references to economic finance decisions. I can also see a very practical use of decision trees in a more technical environment as well. For example, in the true essence of a set-based design methodology, you could use a decision tree analysis to understand the tradeoffs between different design decisions in product development. The trick would be in figuring out how to translate some of the variables into numerical terms to facilitate the analysis. I have seen this done in terms of hours of expected effort, number of resources, etc. It really is dependent on what criteria you want to optimize your cost function on. Then, extending this idea further, you could have a much more complex decision tree if multiple trees were used to decide on the best course of action based on more than one (or many) prescribed optimization criteria, i.e. instead of single-input-single output trees, you could utilize multiple-input-multiple-output trees. A great example of this was in our 4th assignment problem which combined expected value and risk tolerance as simultaneous inputs, actually changing the outcome.

Ronnie Hurst

Ronnie Hurst

Oct 11, 2020 Oct 11 at 10:12pm

Jeremy -

While I agree that a lot of the examples have focused on economic factors and decisions, I think that is because that it is a very relatable to most people. I assume its a big reason why a lot of the books and academic papers on utility and decision theory use money as the crux of their survey questions and thesis,

When you think about it, a lot of the examples you laid out can be translated to money in some way. Which provides a great equalizer and control when evaluating how or why people may make decisions.

Christopher Huebel

Christopher Huebel

Oct 4, 2020 Oct 4 at 11:28pm

Often one of our biggest issues when making decisions is not being able to physically see the different options laid out before us. The decision tree tools offer a systematic way of thinking and require a thorough analysis of all options. These tools can lead to the bigger picture and laid out in a chart that is easy to read and follow. These tools can be used in most everyday scenarios like whether to purchase a new vehicle or used vehicle. They can also be used in determining the best treatment plans for patients. With these tools we can clearly see all the results from our decisions and can justify our actions accordingly based on our tree. Even when using decision trees in uncertain situations like financial investment decisions, the use of chance tools in the decision tree can help steer us in the right direction based on the data presented.

Edited by Christopher Huebel on Oct 4 at 11:41pm

Robert Carrano

Robert Carrano

Oct 4, 2020 Oct 4 at 11:57pm

Christopher,

I believe the visual aspect behind making decisions is very crucial. As you mentioned, the decision tree lays out an excellent visual aid to analyze your options and show you what the best outcome is. It allows for projected change so you can play with different scenarios to remain flexible for future situations. I very much agree with you that this tool will help point you in the right direction and make the best decision.

Respectfully

Rob

Robert Carrano

Robert Carrano

Oct 4, 2020 Oct 4 at 11:51pm

The decision tree enables you to display and present problems in a schematic way. This has a tree like structure laying out your potential decisions or possible consequences. These can be broken down into chance, event outcomes, resource cost, and risk utility.

An example of a reason you may want to use this would be if you were planning to launch a new product. You most likely already have an idea of the expected return after the launch, but you want to project how much more profit you would make if you were to market prior to the launch. This tree would show you the options and highlight the best decision determined by the costs and outcomes.

Sarah Terrill

Sarah Terrill

Oct 5, 2020 Oct 5 at 8:24pm

Using the chance node, decision tree tools help us evaluate decision nodes with multiple chance nodes. A decision with two outcomes becomes simple enough to evaluate in your mind. A chance node with a couple of outcomes added to one of those branches becomes more complicated but easy to do on paper. As soon as there are multiple decisions with multiple chance nodes all with varying levels of probability and multiple layers of possibilities, the decision tree tools help to evaluate for us using the highlight tool. Being able to add layers and branches to the decision trees through the copy and paste function allows for different organizations to combine their decisions trees together for one large evaluation by the upper management.