The Application of Decision Tree to Form the Best Big Assignment Group

Aqil Abdul Aziz Syafiq/13518002
Program Studi Teknik Informatika
Sekolah Teknik Elektro dan Informatika
Institut Teknologi Bandung, Jl. Ganesha 10 Bandung 40132, Indonesia
Aqilabdaziz1123@std.stei.ac.id

Abstract—**Big Assignments are some of the hardest part of studying Informatics Engineering in ITB, to some, the problem is not theirself, but their team. This paper will help to make sure readers know how to not fall into bad groups.**

Keywords—**Assignment, Big, Group, Tree, Decision**

I. INTRODUCTION

Big Assignments are one of the hardest part of being an Informatics Engineering student at Bandung Institute of Technology. For some people, it seems that the problem with Big Assignments is that their team just can't seem to get it together to finish the assignments. While for some people are good enough to finish it on their own, some other are left with the inability to finish the assignment, and end up stressed and failing in the assignment.

Big Assignments, also known as *Tugas Besar* is a form of student evaluation in Informatics Engineering of Bandung Institute of Technology, they usually make students apply what was learned in class to make something that is either hard to make, or takes a lot of work, which is why people will work on it as a group. This is where the problem starts, while some may randomize the group, some subjects make students make their own group, which for some is a blessing, but for some can be chaotic and bad. Especially the ones with below average skill and/or have little to no friend.

This may be caused by many things, for instance, someone may just simply have no friends, causing themself to be left out and having to work on it by himself, or on some other occasions, they are forced to work with people they don't really know and can't really work with. This is also bad for people with below average skills, because most of the time, people with above average skill group up with other of their kind.

This is one of the main source and cause of stress that are happening in this study program.

Author have made this paper in hope that all current and coming students of ITB's Informatics Engineering can have at least an average group that can work together and finish their assignments. Author warns that reading this does not guarantee success on assignments.

II. BIG ASSIGNMENTS

A. Assignments

Assignments are a form of evaluation, usually given by teacher to students, to test the student's ability to apply or remember what was taught to them by the teacher.

Assignments can come in many forms, it can be online, offline, practical, theoretic, or it can be in any way available as long as it gives the desired result by the one who gives the assignment.

Assignments can also come in many size, it can be small, it can be something that takes a long time, it can be something that doesn't even need effort, or it can also be something that needs coordination and teamwork. Again, it depends on the purpose of the assignment and what type of assignment it is.

Assignments are one of the many reason people are stressed in their studies, it can be because how hard an assignment is, or how long it takes to finish them, or simply because how much of them are given upon a single individual.

B. Big Assignments

In ITB's Informatics Engineering, there are many assignments, but the hardest and biggest form of them are the Big Assignments, they are usually given to students mid-semester, and most of the time, multiple of them from different courses overlap and can cause serious problem to students who can't or are not willing to manage their time wisely.

Most of the time, because of how complex, hard and time consuming they can be, Big Assignments will be done in groups. The groups may be randomized by the educators, or it may be left to the students to form their own group.

When it is left to the students, the problem of unproportional groups will rise. This happens due to the fact that not everyone wants to work with each other and look for their own group.

C. Making a group

When it comes the time of Big Assignments launches, people will all go around asking their friend to form a group. Some may have it all figured out and always get good groupmates, but some not. We will break down the problems and look for the solutions to this problem.

When making a group, of course readers can't just randomly ask people to form a group with them, there are many things to take in consideration when making a group. This is to make sure the big assignments will be at least finished on time and fully functional.

These are the main criteria that readers should almost always take in consideration when looking for people to group up with:

1. Programming Ability

   Of course, when readers want to make a group to work on programs, they will need members that are able to make programs, even better if they are above average. This can be seen by how well someone performs in class and normal assignments.

2. Teamwork and Communication Capability

   In group works, ability is not enough, everyone will agree that an average programmer with great teamwork and communication will always be better groupmates than skillful people who can only work by themselves. This can be judged by how well someone communicates, and their track record.

3. Well Acquainted

   When working with people, it will always be better when readers are working with people they already know, it can be awkward when trying to work with people you barely know. This, readers can conclude by themselves.

4. Business and Commitment

   When you work together in a group, you will naturally expect all of you to do their part, and to all realize the importance of the assignment, you don't want someone who is too focused on other things and doesn't prioritize the assignment in your group. This can be seen by how someone worked in past assignments.

Those are what the author thinks are the main criteria when trying to find people to work with.

III. TREE

A. Tree

A Tree is an undirected graph that is fully connected and have no circuits. If G is a tree with N nodes, then G is a tree if and only if these conditions are met[2] :

1. G is connected and have n-1 edges.
2. G has no circuit, and an addition of an edge will make a circuit in G.
3. All of the edges in G are bridges.
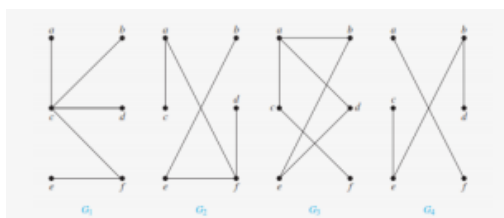
Figure 1. Examples of tree(G1 and G2), and examples of non-trees(G3 and G4) graphs
(Source : Discrete Mathematics and its applications, Kenneth H. Rosen : 746)

There are also some terms that have to be explained in this subject, some are :

1. Root

   The top node of a tree.

2. Child

   A node connected directly to another node moving further from the root.

3. Parent

   The reverse of a child.

4. Siblings

   A group of nodes with a single parent.

5. Descendant

   A node is a descendant of all parent nodes reachable with child to parent relation.

6. Ancestor

   A node is a descendant to its ancestors

7. Leaf

   Node without child.

8. Degree

   Number of a node's children is its degree.

9. Edge

   The connection between nodes.

10. Path

    Continuous connection of a node with its descendant, or vice versa.

11. Level

    Number of edges between the node and the root increased by 1.

12. Depth

   Level minus one.

13. Height

    A tree's height is the max distance of the root to a leaf.

14. n-ary trees

    A tree is called n-ary if all of its nodes have n or less children. For example, a tree, where every single node in it have 3 or less children, with no exception, can be called a 3-ary tree, and a tree that every single node without exception in it only have 2 or less children, is binary.

15. Rooted tree

    A rooted tree is a tree, in which a single special node is labeled, this single special node is often labeled 'root'. The root is the top of the tree and every other node is it's descendant, and the root is an ancestor to every node in the tree. The root also acts as the start point in the tree's usage.
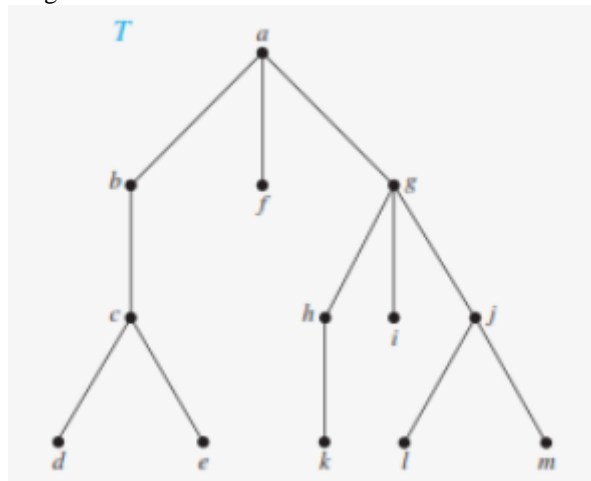
Figure 2. Example of a rooted tree
(Source : Discrete Mathematics and its applications, Kenneth H. Rosen : 746)

B. Decision Tree

Trees have many application and usage, whether it is used to solve or help with complex and hard things, or even to do and finish simple everyday tasks. Trees are a very basic approach to many things.

A decision tree is one of the many application and usage of trees. It is also a rooted tree. A decision tree is, like its name, is a tree used to make decision, all child nodes are according to an argument added to its parent. The leaves of a decision tree can be said to be the solution of the problem the decision tree is based upon.

Now while this may look pretty complicated, you can imagine it as a tool to decide something based on several consideration and what is the topic.
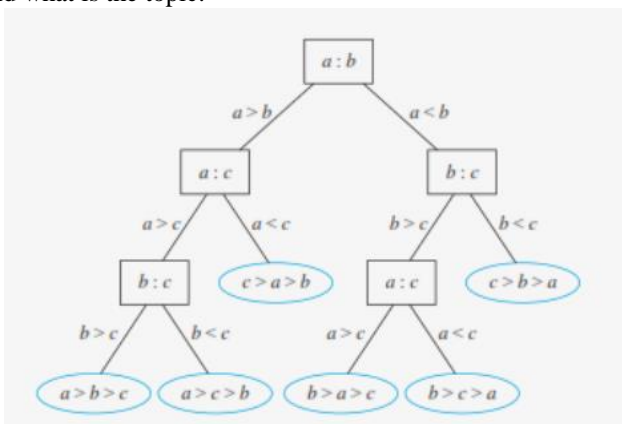
Figure 3. Example of a decision tree to sort 3 integers
(Source : Discrete Mathematics and its applications,

IV. THE APPLICATION OF DECISION TREES

Using the decision tree to find the best people for your assignment group is simple but not easy, all you have to do is list your candidates. After that you can basically run each of the candidates through the decision tree and see the conclusion of the decision tree, is the said candidate good enough and ideal to group up with. The process may be tiring depending on how many candidate you have on your list of candidate, but if you think about the consequences of not having a good group for your assignment, you will find that all the effort and risk is worth the problem you are facing.

A decision tree need to be based on a topic, and seeing that there are 4 criteria for choosing, we will create 4 trees of each criteria and we will then go through the 4 trees, and use the solution of each of the 4 trees in another tree.

This another tree is a tree that will combine all the solutions to finally determine a candidate's worth as a groupmate for your assignment, there will be many solutions based on this, as all combination of each of the criteria will come back as different solution in the final tree.

The first tree will be one of the tree that grades a candidate based on one of the criteria, the candidate's skill. Now what skill means here is the candidate's ability in programming in the particular subject of the assignment, while someone may have great skill in a subject does not necessarily means he excels at other subjects too, and also remember that skill is not the only criteria here, don't put off someone from the candidate list just because they are not very skilled at programming. Below will be the diagram used just for that, and others will follow.
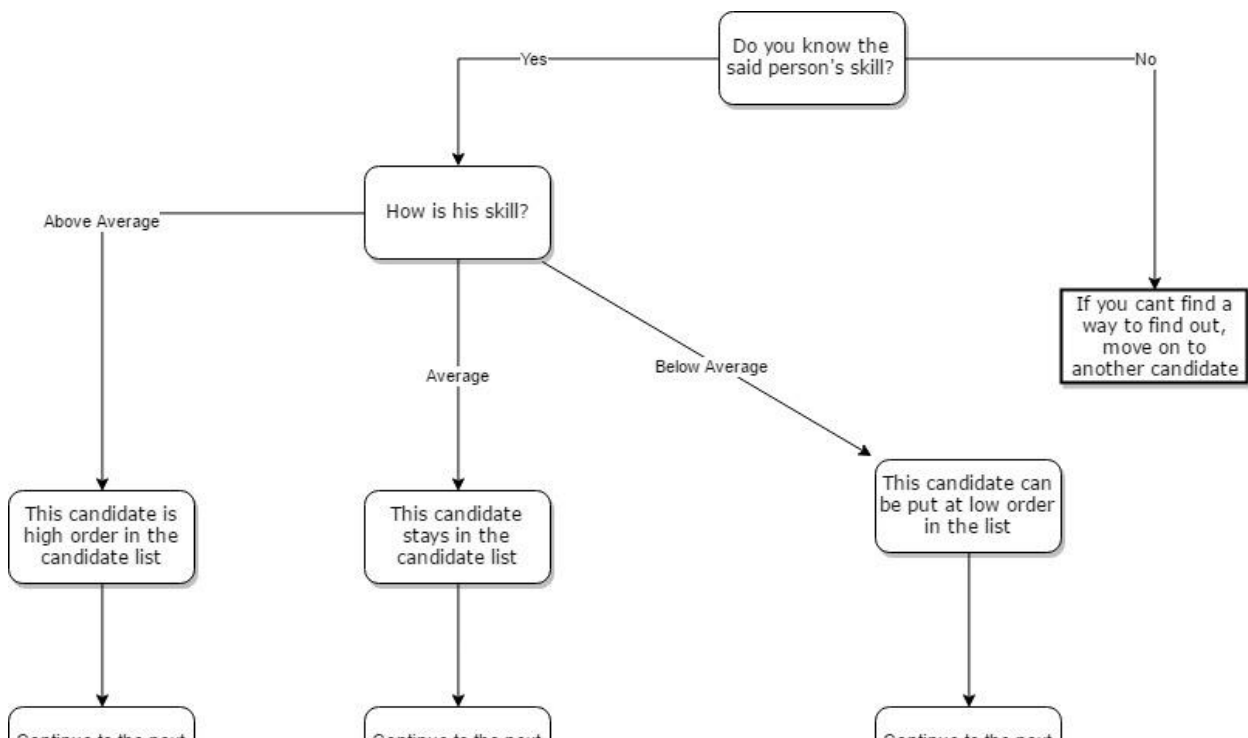
Figure 4. First part of Decision Tree, to determine a candidate's priority based on their skill
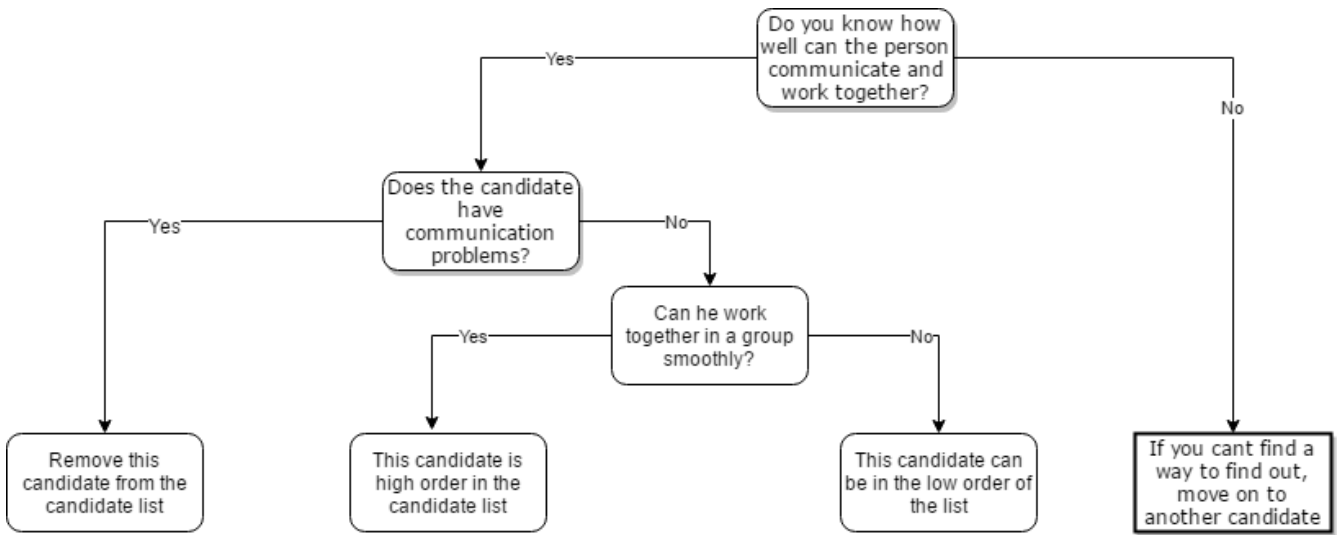
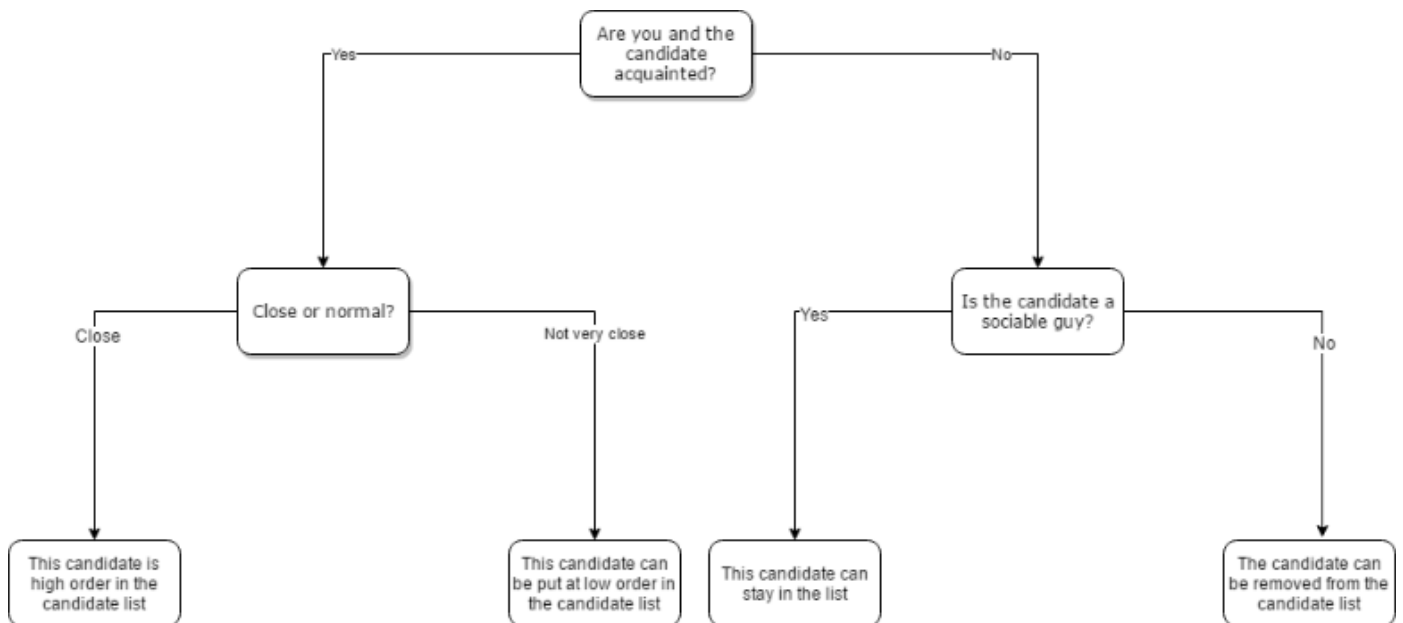**Figure 5. Second part of the decision tree, the communication skills criteria**

The second part of the diagram, is to divide the tier of each candidate on the list, based on one of the four criteria, the candidate's communication skill, and their ability to work together successfully in a group. While skills are important, the big assignment is a group project, meaning that it is to be done by the students in group of more than 1 people, someone that is smart, but lack the capability to work together as a team, will just be a hindrance to everyone else on the team. That is why the author have decided that communication skills and the ability to work together is one of the criteria.

You may be asking, if they are so important, why do they have to be unified together? Why can't communication skills be a criteria and the ability to work together be another criteria? The author thinks that the 2 criteria, communication skills and the capability to work together, is complimentary, and strongly correlated, because people who cannot communicate properly will definitely not be able to work together successfully in a group, and so goes the other way. Hence why the author made the two critical criteria united as one criteria.

Now, after making sure of the candidate's skill and their ability to communicate and work together in a group, the next criteria is how well you and the candidate are acquainted, now you might be asking, why is this a criteria? Now imagine working with people you don't know, surely the first few parts before knowing each other well will be hard and awkward. Big assignments have deadlines, you cannot afford to have a slow start, that is why knowing your groupmates well will make your work go more smoothly because of how less awkward and how easy it is to be forward about a problem.

And that was the third decision tree, the part to judge a candidate based on how well acquainted you are to them.

Figure 6. Third part of the decision tree, to judge based on how well you know the candidate

The fourth part of the decision tree is the same as the fourth criteria that have been mentioned earlier, that is the commitment of the person. Now to know this the best, you would have to had worked with him before, but since that is not always true, you can always ask people that have worked with him before.

Below is the fourth and the fifth part of the decision tree.

This final tree will conclude the last and final action taken on each candidates using the answer gotten from previous trees. It will combine the 4 criteria, and rank their importance and help you know which candidate is better than the other to group up with for your group assignment.
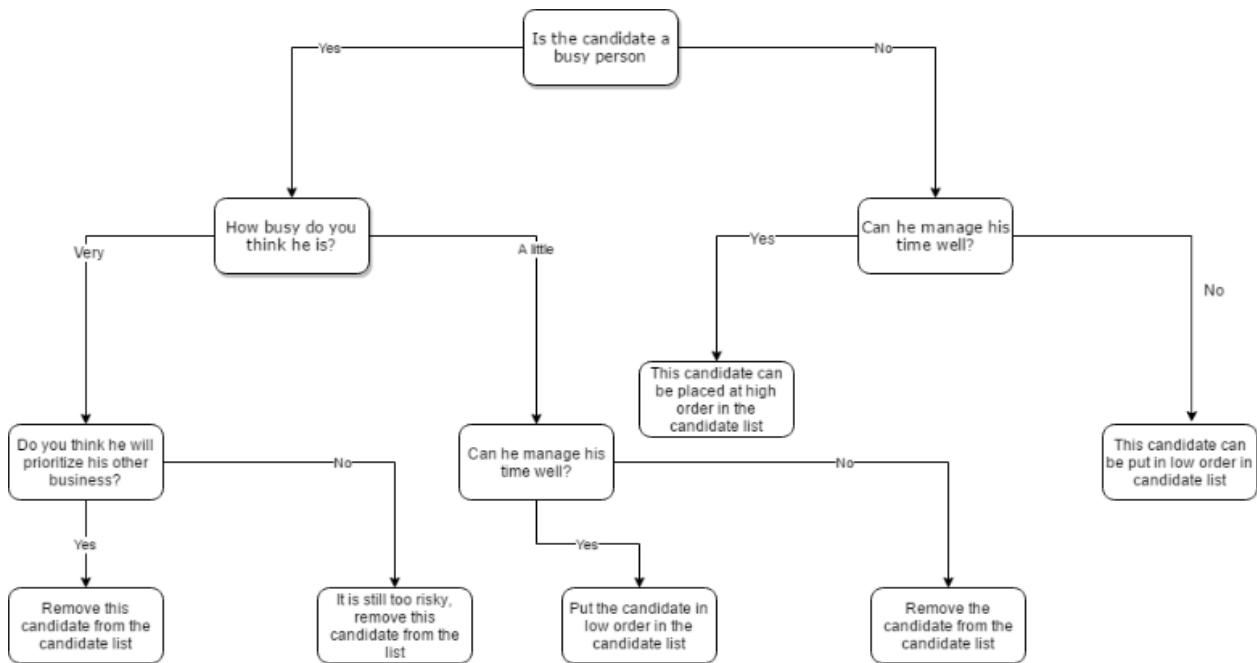

Figure 7. Fourth part of the decision tree, to determine a candidate's commitment and business
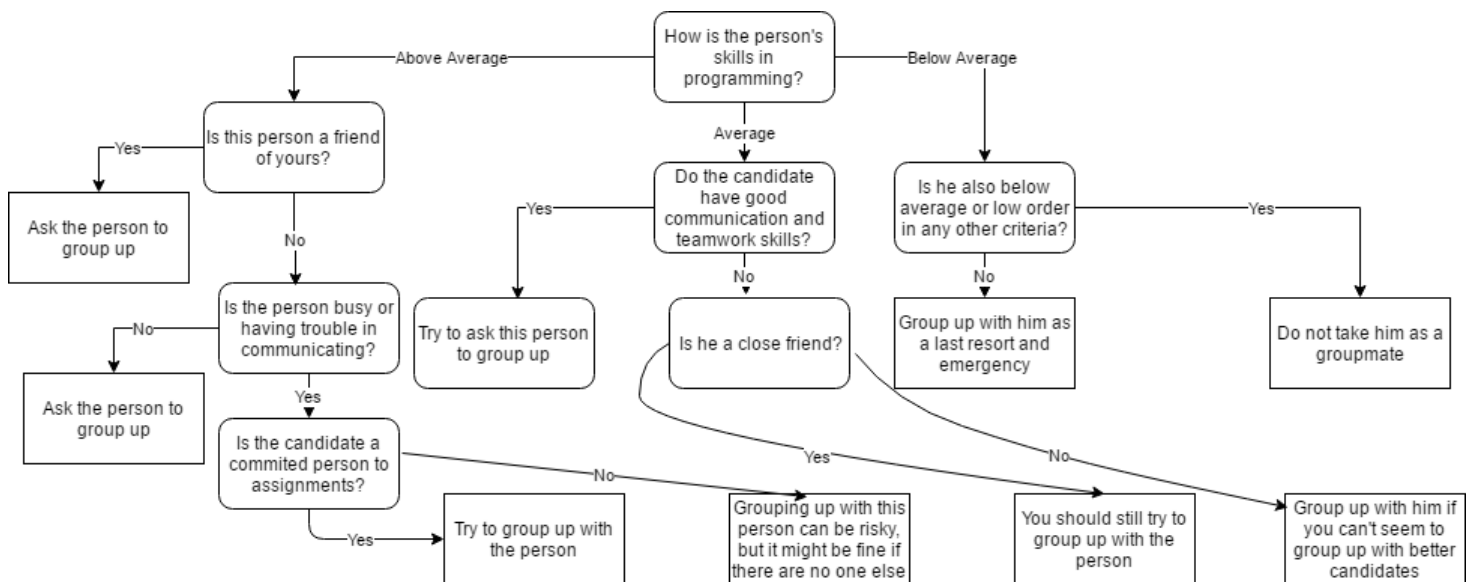

Figure 8. Final part of the decision tree, using information from previous 4 trees to determine the final action.

V. Conclusion

In the discrete mathematics course taught in class, not only are they useful for technical problems, they actually can help us with a lot of things, one of the useful things from discrete mathematics is tree.[3]

Using various criteria in determining someone's worth as a groupmate is always the best way to go, imagine if you had group up with someone good, and without saying anything, they just finish up the assignment, this will be bad for you because you can't learn and you have small share in the assignment, or worse, they are too busy at something else and the assignment become deserted. Vice versa, imagine if you grouped up with someone that is fully committed to the work, have great communication and is willing to work together, but is so under-skilled that he ends up being useless in the project. With this method we can minimize the chance of such thing happening.

Despite the effort put in applying this method, it still cannot fully guarantee the qualities of reader's assignments. This method is nothing but a tool, to determine which person and which classmates you should group up with. So that you can have better groups in the future. Though, things like being turned down by people you ask to be groupmates with will not be too uncommon.

Here we can conclude that, despite having a great tool such as a decision tree to help us with our problems. It is still up to readers and god, how the problem will be solved or not.

VI. ACKNOWLEDGMENT

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PERNYATAAN

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Aqil Abdul Aziz Syafiq/13518002