



IIT Madras

ONLINE DEGREE

Computational Thinking
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Concept of connected graph to represent the relationship between different nouns in a paragraph

Professor Madhav Mukund: So, we are done this dictionary classification of these words in particular we had marked out all the pronouns and the nouns by putting them under these headings. But one of the things normally when you write a sentence is that you have a kind of action happening between one noun and other, So...

Professor G. Venkatesh: Verb.

Professor Madhav Mukund: Like Swaminathan goes to school.

Professor G. Venkatesh: Goes is the verb.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: Swaminathan and school. So, Swaminathan is the subject.

Professor Madhav Mukund: Subject.

Professor G. Venkatesh: And goes is a verb, which is action. And school is the object.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: Going to.

Professor Madhav Mukund: Yeah, going to the school or...

Professor G. Venkatesh: Or whatever. Something, some relationship between Swaminathan school, expressed by goes.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: The relationship is expressed by goes.

Professor Madhav Mukund: So, these two nouns are somehow connected.

Professor G. Venkatesh: Connected, so there is a verb, it seems to connect nouns.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: And these nouns are all part of the same sentences.

Professor Madhav Mukund: Same sentence, but they should be connected by a verb you cannot just have supposing it was say, Swaminathan and his brother go to school, then brother is also a noun, Swaminathan is also a noun, but they are connected by and.

Professor G. Venkatesh: Okay.

Professor Madhav Mukund: On the same side as the verb.

Professor G. Venkatesh: Okay.

Professor Madhav Mukund: So, we really want to look at this connection across the verb, I think not just in the same sentence.

Professor G. Venkatesh: Okay.

Professor Madhav Mukund: There should not be any other type of connection between them, like conjunction, and is a conjunction, or.

Professor G. Venkatesh: So, should we look for nouns, which are separated by verbs, twos, nouns, which have a verb?

Professor Madhav Mukund: So, this is a relation.

Professor G. Venkatesh: Which have a verb in between.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: It may not be absolutely accurate.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: The verb sitting in between the two nouns.

Professor Madhav Mukund: And we can say that these two nouns are then connected to each other.

Professor G. Venkatesh: And also, they should not be, they should be in the same sentence. Now they should be the same part of the, sometime sentences are very long. And they are.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: Contain.

Professor Madhav Mukund: Lot of these clauses.

Professor G. Venkatesh: Clauses and all that, so then they should be within a clause.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: You look at, find out of whether the clause.

Professor Madhav Mukund: We can find out. Just do it informally. At least we can find out.

Professor G. Venkatesh: So, should we say that it should be to two nouns separated by a verb and do not have, between the nouns, there is nothing there is no full stop, there is no comma. There is everything for identify, no full stop, comma, semi colon, colon.

Professor Madhav Mukund: So, that is.

Professor G. Venkatesh: Or conjunctions like and, or.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: Any of these conjunction words.

Professor Madhav Mukund: Correct.

Professor G. Venkatesh: If they are not there, but things like that. Then we can say that these two nouns are...

Professor Madhav Mukund: Connected.

Professor G. Venkatesh: Connected or related to each other.

Professor Madhav Mukund: Yes.

Professor G. Venkatesh: They are connected to each other. Should we find?

Professor Madhav Mukund: Yeah.

Professor Madhav Mukund: Let us try and find out.

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PRONOUN - 0, 9, 11, 27, 40, 55, 61

NOUN - 2, 3, 4, 10, 18, 22, 24, 26, 34, 35, 37, 39, 45, 47, 51, 54, 56, 57, 59, 64

0 - 2
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 4 - 10
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 11 - 13
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Professor G. Venkatesh: We will take both the result.

Professor Madhav Mukund: So, we can say for instance, we can say that the 0 pronoun.

Professor G. Venkatesh: 0 pronoun.

Professor Madhav Mukund: Is connected.

Professor G. Venkatesh: Is connected by was.

Professor Madhav Mukund: Is connected by was.

Professor G. Venkatesh: The verb was. To Monday and to morning.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: So, it is connected to Monday and is connected to morning.

Professor Madhav Mukund: So, 0 is connected to 2 and 0 is connected to 3.

Professor G. Venkatesh: Okay.

Professor Madhav Mukund: So, I am just drawing this.

Professor G. Venkatesh: Now, since these letters ended. Nothing can, nothing from this sentence can connect to another sentence.

Professor Madhav Mukund: Correct.

Professor G. Venkatesh: There is a boundary, is there, sentence boundary. So, we leave this now. Over, this part is over.

Professor Madhav Mukund: Correct.

Professor G. Venkatesh: Now, Swaminathan other now.

Professor Madhav Mukund: Yes.

Professor G. Venkatesh: Okay? So, 4 is connected by the verb was, to so far no, eyes.

Professor Madhav Mukund: Eyes, so 4 is connected to 10 and then again, we reach a sentence bond.

Professor G. Venkatesh: And then sentence bond, it is over, 4 is connected.

Professor Madhav Mukund: So, he is 11.

Professor G. Venkatesh: 4 is what, 4 is Swaminathan.

Professor Madhav Mukund: By the way, so this 9 was a pronoun which we skipped over so maybe we should also say it is connected to 9 and 10.

Professor G. Venkatesh: 9 as a pronoun.

Professor Madhav Mukund: His eyes.

Professor G. Venkatesh: His.

Professor Madhav Mukund: Actually is 1 unit, a little bit unclear, but let us just keep it this way, so.

Professor G. Venkatesh: Yeah.

Professor Madhav Mukund: His.

Professor G. Venkatesh: Yeah.

Professor Madhav Mukund: So, let us put a 9 here, this line. See what happens.

Professor G. Venkatesh: Yeah.

Professor Madhav Mukund: So, now we are saying 11 is a new sentence which starts with he. And, what is he connected to?

Professor G. Venkatesh: Another he is actually as same as Swaminathan.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: So, we should have resolved it.

Professor Madhav Mukund: Yes.

Professor G. Venkatesh: Should we do that, 11 is the same as 4.

Professor Madhav Mukund: So.

Professor G. Venkatesh: So, just put a dotted line or something to be resolved it.

Professor Madhav Mukund: Or I will just write it in a different color above it.

Professor G. Venkatesh: Sure.

Professor Madhav Mukund: Okay.

Professor G. Venkatesh: 11.

Professor Madhav Mukund: So, even this 10 is 4 but that is it, I mean 9...

Professor G. Venkatesh: Connected, considered is a verb we are looking at how this.

Professor Madhav Mukund: So, Monday is now connected. Right? So, Swaminathan is connected to Monday is 13.

Professor G. Venkatesh: Is it the same as it was Monday morning? The same word.

Professor Madhav Mukund: Same word, but it is a different occurrence of the word.

Professor G. Venkatesh: Does not matter, but they want to see that they are related.

Professor Madhav Mukund: So then, should we put this is the same as 3.

Professor G. Venkatesh: 2.

Professor Madhav Mukund: 2 or 3?

Professor G. Venkatesh: 2.

Professor Madhav Mukund: Okay.

Professor G. Venkatesh: So, 13 and 2 are the same.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: Okay.

Professor Madhav Mukund: So, we will maybe later on we will.

Professor G. Venkatesh: We will resolve it. So, Monday.

Professor Madhav Mukund: Especially unpleasant in the calendar.

Professor G. Venkatesh: Calendar, which is 18.

Professor Madhav Mukund: So, that is connected to.

Professor G. Venkatesh: Then this sentence boundary came, so they are gone. There is every sentence will look very different.

Professor Madhav Mukund: Yeah, correct.

Professor G. Venkatesh: They are just linked, there is a same word actually. After the delicious, freedom.

Professor Madhav Mukund: Freedom, it is 22.

Professor G. Venkatesh: Of Saturday.

Professor Madhav Mukund: So, 22 and.

Professor G. Venkatesh: 24.

Professor Madhav Mukund: But there is no connection yet.

Professor G. Venkatesh: Not yet connection. And Sunday.

Professor Madhav Mukund: So, that is 26.

Professor G. Venkatesh: 26.

Professor Madhav Mukund: So, these are all disconnected right now.

Professor G. Venkatesh: Right now, connected. It was, was is the connecting word.

Professor Madhav Mukund: So, 27 also because I mean, it is not a great word, but we will just keep it difficult.

Professor G. Venkatesh: Difficult to get into the, this is the same Monday.

Professor Madhav Mukund: Same Monday.

Professor G. Venkatesh: Monday morning, Monday is connecting everything.

Professor Madhav Mukund: So, what is that 34?

Professor G. Venkatesh: That is 34.

Professor Madhav Mukund: 34 is all of these are connected to 34, which is the same as 2.

Professor G. Venkatesh: 2.

Professor Madhav Mukund: And all of these are also connected to mood.

Professor G. Venkatesh: Mood.

Professor Madhav Mukund: So, I will draw another collection of edges here, right 35, the same is to a 37.

Professor G. Venkatesh: 37.

Professor Madhav Mukund: Okay, we have a bunch of arrows all of these are connected. So, these all these 4 are connected to all these 3 via at one verb.

Professor G. Venkatesh: Okay.

Professor Madhav Mukund: And discipline also.

Professor G. Venkatesh: And discipline also.

Professor Madhav Mukund: Okay

Professor G. Venkatesh: And then they ended up finally. Fortunately, this sentence ended.

Professor Madhav Mukund: Now, we have 40 which is again, Swaminathan.

Professor G. Venkatesh: 40 is he, which we result as Swaminathan.

Professor Madhav Mukund: Yeah, so that is again now 4.

Professor G. Venkatesh: So, we can see something, right. This is introducing Monday, this is introducing Swaminathan.

Professor Madhav Mukund: Then Swaminathan appears again here and here.

Professor G. Venkatesh: Swaminathan is connected to Monday.

Professor Madhav Mukund: And then this is again connecting to Monday.

Professor G. Venkatesh: Monday and then few things are being said about Monday.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: You are not said about Swaminathan so far.

Professor Madhav Mukund: Yes.

Professor G. Venkatesh: And then Swaminathan said about Monday, you have said about Swaminathan, you have said about Swaminathan and Monday, you have said something about Monday more, a lot of things about Monday.

Professor Madhav Mukund: And know something about Swaminathan.

Professor G. Venkatesh: Now, you are trying, hopefully you are saying more things about Swaminathan, let us see.

Professor Madhav Mukund: It is a good way of thinking about the way the paragraph is flowing.

Professor G. Venkatesh: Paragraph is flowing.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: He is now Swaminathan, right?

Professor Madhav Mukund: Yes.

Professor G. Venkatesh: So, 40 verb shuddered, so this is the connecting at the very thought.

Professor Madhav Mukund: So, this is now connected.

Professor G. Venkatesh: 4 is connected to 45, 45 start, of, school. Okay, so 4 is also connected to school, now.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: Swaminathan is going to school. The dismal yellow building, connected to building, losing the sequence, alright.

Professor Madhav Mukund: Okay.

Professor G. Venkatesh: Building the fire-eyed Vedanayagam, 54.

Professor Madhav Mukund: 54.

Professor G. Venkatesh: His, his pronoun.

Professor Madhav Mukund: So that is.

Professor G. Venkatesh: This is supposed to be Swaminathan again, 4, so it is 55 put 4 on the top of here, class.

Professor Madhav Mukund: Okay. I am running out of space below so I am putting up 56, teacher.

Professor G. Venkatesh: 57.

Professor Madhav Mukund: And Headmaster 59, with.

Professor G. Venkatesh: Yes.

Professor Madhav Mukund: His, so this is 61 and this is a different, this is actually the headmaster. So, this is.

Professor G. Venkatesh: It is Vedanayagam.

Professor Madhav Mukund: Yeah, Vedanayagam which is 51, I think. Have a look, 51, I think go back.

Professor G. Venkatesh: 54.

Professor Madhav Mukund: 54, 54.

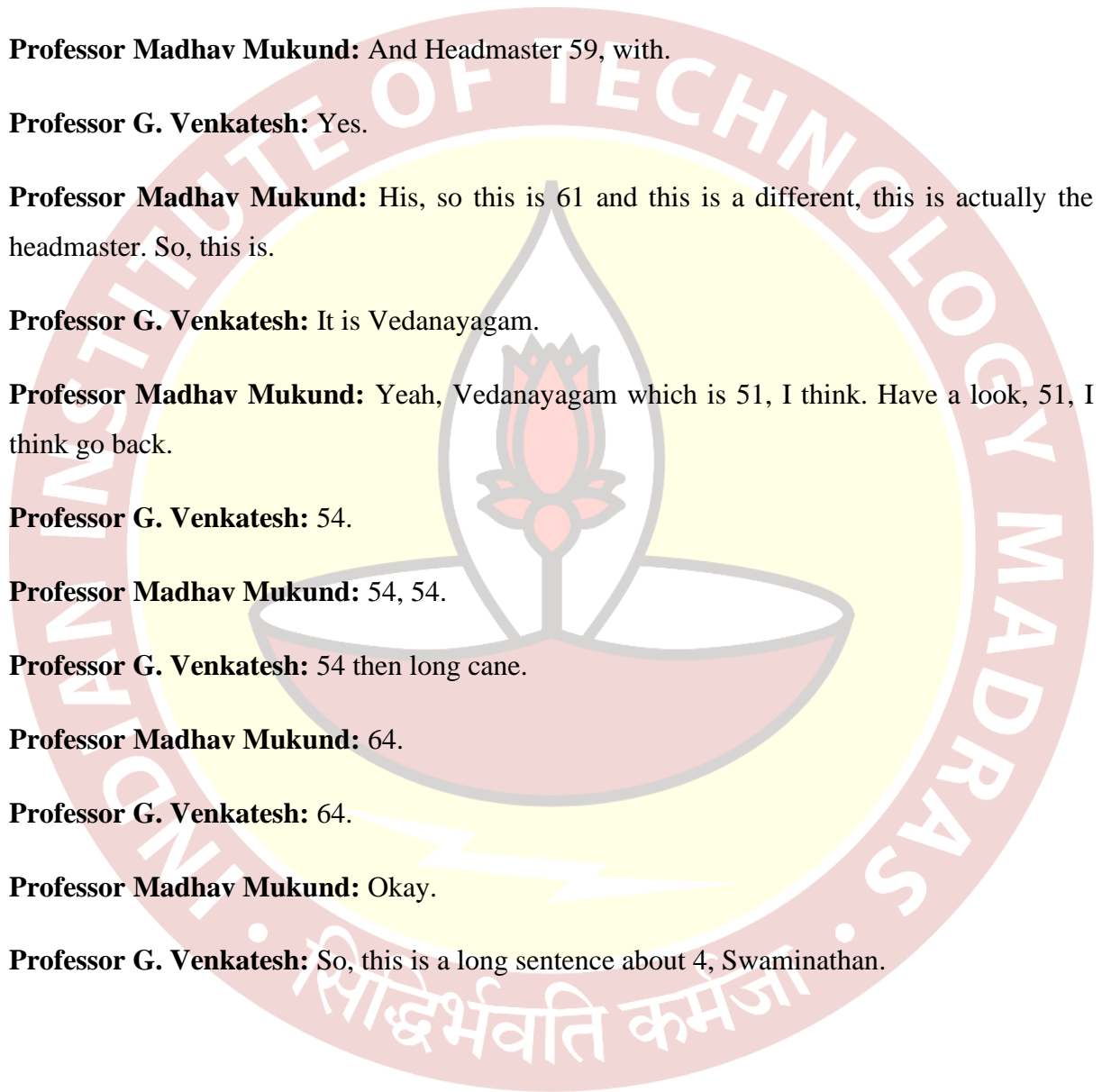
Professor G. Venkatesh: 54 then long cane.

Professor Madhav Mukund: 64.

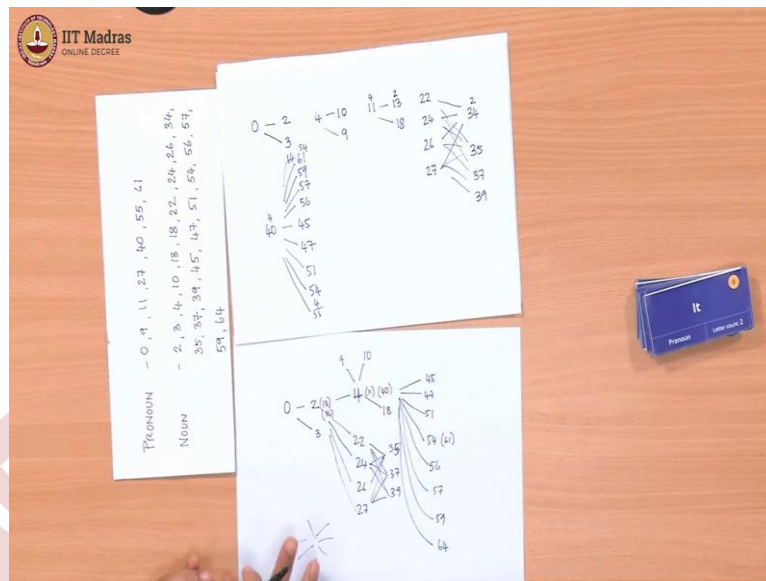
Professor G. Venkatesh: 64.

Professor Madhav Mukund: Okay.

Professor G. Venkatesh: So, this is a long sentence about 4, Swaminathan.



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Professor Madhav Mukund: So now what we are trying to say is that if we try to do this connection across these things, you are saying that we have 0 is connected to 2, is connected to 3. But this 2 is actually this thing.

Professor G. Venkatesh: This 13.

Professor Madhav Mukund: So then, from that sentence, this 2 as 13. So, maybe I will just put the other way around.

Professor G. Venkatesh: 2 comma 13, it is fine.

Professor Madhav Mukund: 2 13 is connected to 11, which is connected back to 18. And now, we have the same 2 is connected through this to everything.

Professor G. Venkatesh: Yeah.

Professor Madhav Mukund: So, this is connected here to 22, 24, 26, 27, here we have 34. Sorry, 34 is already done, 35. So again, I will put maybe here just to emphasize that this is the 34 connection. Coming here, 35, 37, 39, but here, now I have this complete what we said earlier, clique, this is like a click. Except it is from left to right. So, it is not everything connected. Everything on the left is connected to right. So, this is a connection. And then would we.

Professor G. Venkatesh: 3 is just hanging.

Professor Madhav Mukund: So, now we have to somehow.

Professor G. Venkatesh: 4 4 4, where is 4? We will have.

Professor Madhav Mukund: 4 is here.

Professor G. Venkatesh: 4, 11.

Professor Madhav Mukund: This level 4 is actually same as 11. So, we will.

Professor G. Venkatesh: We will write 4 and put 11 in the bucket.

Professor Madhav Mukund: 4 is the main thing. So, I mean, this is 11. This is through 11, it is connected, but 4 is connected to 10 and 9 in the first line.

Professor G. Venkatesh: 4 is connected to 10 and 9 and then 4 is connected to a lot of here.

Professor Madhav Mukund: And, then 4 as 40 gives us a connection to everything. On the end, right?

Professor G. Venkatesh: Yeah.

Professor Madhav Mukund: So, we have this whole.

Professor G. Venkatesh: So, you know, when it looks to be that everything is connected everything here, actually.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: And it ought to be no, in a paragraph.

Professor Madhav Mukund: So, all the nouns get connected, eventually.

Professor G. Venkatesh: The nouns do not get connected to each other in a paragraph.

Professor Madhav Mukund: Then there is something there are two.

Professor G. Venkatesh: Parallel things.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: Two stories.

Professor Madhav Mukund: Two thoughts, which are going through the paragraph connecting one group of nouns and another group of nouns and they are not meeting? They are not meeting.

Professor G. Venkatesh: We should not write in one paragraph.

Professor Madhav Mukund: So therefore, the paragraph.

Professor G. Venkatesh: Paragraph only in a paragraph.

Professor Madhav Mukund: Paragraph is supposed to be a kind of.

Professor G. Venkatesh: Coherent.

Professor Madhav Mukund: Coherent or a combined. Something which talks about.

Professor G. Venkatesh: One topic.

Professor Madhav Mukund: One topic.

Professor G. Venkatesh: In this case, you are talking about Monday and Swaminathan.

Professor Madhav Mukund: But they are.

Professor G. Venkatesh: But they are connected.

Professor Madhav Mukund: They are definitely connected. So.

Professor G. Venkatesh: So, the nouns should be when you make a graph here.

Professor Madhav Mukund: I am making a graph.

Professor G. Venkatesh: And, you are able to reach everything from one node to another node, there is a way to go.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: So, the graph looks connected there. Is it because it is connected?

Professor Madhav Mukund: So, I would call this a connected graph, because you can go from everywhere to everywhere, within this graph.

Professor G. Venkatesh: So, this is not broken off into two little, like this. This piece and this piece and this piece are disjointed.

Professor Madhav Mukund: Yeah.

Professor G. Venkatesh: Actually, they are not disjointed because the same element.

Professor Madhav Mukund: So, we are coming there and then coming back, so you go there, and then so you, 2 takes me there, and then this 11 is connected to this 4. So, that is what we saw 2 takes me there.

Professor G. Venkatesh: So, this is a connected graph.

Professor Madhav Mukund: So, this is a connected graph. So, from anywhere in this graph, I start with 39 for instance, I can go to 56, because I can follow this path and go around and then come back.

Professor G. Venkatesh: So, it is a connected graph. So, graph, so in a paragraph the nouns if you draw the relationship between the nouns and edge between the nouns as.

Professor Madhav Mukund: And now, unlike that earlier thing, when we were doing the binning, we are saying that this Monday, which comes in different places, is actually the same Monday. So, we are actually because that is how otherwise it does not make any sense, if every time I see a new word in a new sentence, it is a different Swaminathan or it is a different school, it would make no sense obviously when I say school in a paragraph all the schools should be the same.

So, by that connection, we are able to connect across, otherwise could not connect. As you pointed out, each sentence would give me a separation, but the only way I can connect across sentences by saying that this Swaminathan is this Swaminathan or that Monday is that Monday and so on. So, that is an interesting thought. So, now if I actually do this, and I find that there are two that I find a different, some that part and then I find a different part here, which is not connected to that.

Professor G. Venkatesh: That means that this is.

Professor Madhav Mukund: That this is a different sentence, which is kind of a group of sentences crept into this paragraph. And, it is not making sense.

Professor G. Venkatesh: So, there is a way, beautiful tool, I can not see I mean it gives any tool like this.

Professor Madhav Mukund: So maybe, so maybe we can use this, for people who are.

Professor G. Venkatesh: To find out whether a paragraph.

Professor Madhav Mukund: Usually, we can tell our English instructors that they can use graphs.

Professor G. Venkatesh: They can use graphs.

Professor Madhav Mukund: To mark the students who write.

Professor G. Venkatesh: Pass, can give pass or fail or give the marks based on whether the paragraph is coherent, here is a way to find out.

Professor Madhav Mukund: And in fact know when people say your thinking is not, is, they say is disjointed

Professor G. Venkatesh: Disjointed.

Professor Madhav Mukund: So, disjointed is exactly this, right? It is not connected; it is not connected. So, it is disjointed your make not making sense, what you are saying is not holding together. So, this is literally holding together the nouns and if the nouns do not hold together, your thoughts are not holding together. So, this is a very interesting thing and it is very good, alright.