IIT Madras

ONLINE DEGREE

Computational Thinking
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Operations on the data collected in three prizes problem using lists

Professor Madhavan Mukund: So, we has found when we were doing this three prize problem, one of the things we have said was that the student who qualifies for the price must be in the top 3 in at least one subject.

Professor G. Venkatesh: At least one subject, yes.

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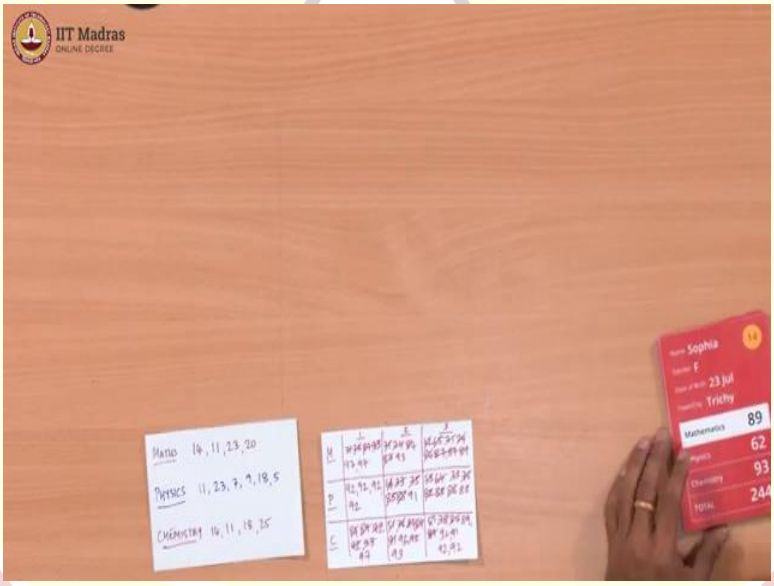

Professor Madhavan Mukund: So, we had calculated for each subject the top 3 marks in that subject. So, in mathematics for instance there were two 97 to the top mark, one with 93, one with 89, so 97, 93 and 89 were the top 3 marks. Similarly, in physic is 92, 91, 88; chemistry it was 97, 93, 92. But what we have not recorded in this is who got these marks? So, we only know that somebody got 92, somebody got 88.

Professor G. Venkatesh: In fact we notice that somebody who did well in chemistry, topper in chemistry has not got very good marks in maths and physics. Topper in maths and physics had not necessarily done, he is not the topper in chemistry, remember.

Professor Madhavan Mukund: So now one question to ask is in this collection of people who have got top 3 marks in of the subjects is there somebody who has actually managed to get not the top mark but at least within the top 3 in all 3 subjects.

Professor G. Venkatesh: All 3 subjects which means that what does it mean; mean that student must be, so student must be in this…

Professor Madhavan Mukund: Yes, so there is a maths set so to speak.

Professor G. Venkatesh: There is a maths set the students who got either 97, 93 or 89 that is the maths set.

Professor Madhavan Mukund: Then we have a physics set. So people who got in physics 92, 91 or 88 and then we have a chemistry set.

Professor G. Venkatesh: This is 97, 93 or 92 in chemistry.

Professor Madhavan Mukund: And now we want to check whether this intersection of these 3 sets is empty or not, whether there is some student…

Professor G. Venkatesh: Will be there, I suspect that at least one student will be there, may be 2.

Professor Madhavan Mukund: So what will need to do is now find out…

Professor G. Venkatesh: What is your guess? I think there will be 2, 3.

Professor Madhavan Mukund: Maximum 1 I think, maximum 1.

Professor G. Venkatesh: Okay, will see, will find out. I think that there will be 2, let us see. So, how do we do this? So we go through this, we know anyway these marks. So like we have to do is filter this…

Professor Madhavan Mukund: And like last time we will record the list, we will not physically put in the index markers but will imagine that they are there. So without disturbing the thing we will just not down in a separate thing the list of those cards. So anybody who has got now we are doing the maths list, so maths list…

Professor G. Venkatesh: So what you want we to check? 97, 93 or 89?

Professor Madhavan Mukund: Yes, anybody who has got 89, so the card number is 14.

Professor G. Venkatesh: You may keep maths in one and physics in we want to keep everything 1.

Professor Madhavan Mukund: Yes it is because there are only a few which are in the top.

Professor G. Venkatesh: So 14?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 87?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 62?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 97?

Professor Madhavan Mukund: Okay that is 11.

Professor G. Venkatesh: 97.

Professor Madhavan Mukund: 23.

Professor G. Venkatesh: 84?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 68?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 87?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 78?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 81?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 65?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 57?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 72?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 63?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 74?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 72?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 93?

Professor Madhavan Mukund: Yes, 93 is there, 20?

Professor G. Venkatesh: So, 64?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 81?

Professor Madhavan Mukund: No, so I think maybe that is a misprinted card, maybe we should pull it out.

Professor G. Venkatesh: 71?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 87?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 62?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 74?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 44?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 62?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 52?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 56?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 42?

Professor Madhavan Mukund: No.

Professor G. Venkatesh: 76?

Professor Madhavan Mukund: So, now we have come up with these 4…

Professor G. Venkatesh: And I did not disturb it.

Professor Madhavan Mukund: Yes, without disturbing because the same order we just, and actually we can validated we got it right because here according to our calculation there were 97, 97, 93, 89, should have been 4 and we have 4.

Professor G. Venkatesh: So, we have to do same process, we could have done it in one iteration without having to do it…

Professor Madhavan Mukund: But it is just, supposing we have done it at different times and kept track of it, it is just to illustrate that.

Professor G. Venkatesh: So physics like that we can do physics also.

Professor Madhavan Mukund: So we want 88 and above.

Professor G. Venkatesh: 92?

Professor Madhavan Mukund: So 11.

Professor G. Venkatesh: 83.

Professor Madhavan Mukund: Okay.

Professor G. Venkatesh: 7.

Professor Madhavan Mukund: Okay.

Professor G. Venkatesh: 88 and above, physics 88 and above, yes 88, 88 and above.

Professor Madhavan Mukund: 9.

Professor G. Venkatesh: 88 and above.

Professor Madhavan Mukund: 18, 5?

Professor G. Venkatesh: Okay.

Professor Madhavan Mukund: What is the last one?

Professor G. Venkatesh: 58.

Professor Madhavan Mukund: 58, okay 90 is chemistry, okay fine. And finally we have chemistry. So chemistry we want…

Professor G. Venkatesh: get the numbers 4 plus 2; 6.

Professor Madhavan Mukund: 6, correct.

Professor G. Venkatesh: Chemistry we need 92 and above.

Professor Madhavan Mukund: Yes, so 14.

Professor G. Venkatesh: Yes.

Professor Madhavan Mukund: 11?

Professor G. Venkatesh: 92 and above, so 97.

Professor Madhavan Mukund: 18.

Professor G. Venkatesh: This is 91, 92.

Professor Madhavan Mukund: 25.

Professor G. Venkatesh: 91 again, nice scores in chemistry, okay 62, 78, 90.

Professor Madhavan Mukund: There should be 1, 2, 3, 4.

Professor G. Venkatesh: Not bad, alright, good. So now what do we do? What is the question, this is a set of all the people who scored…

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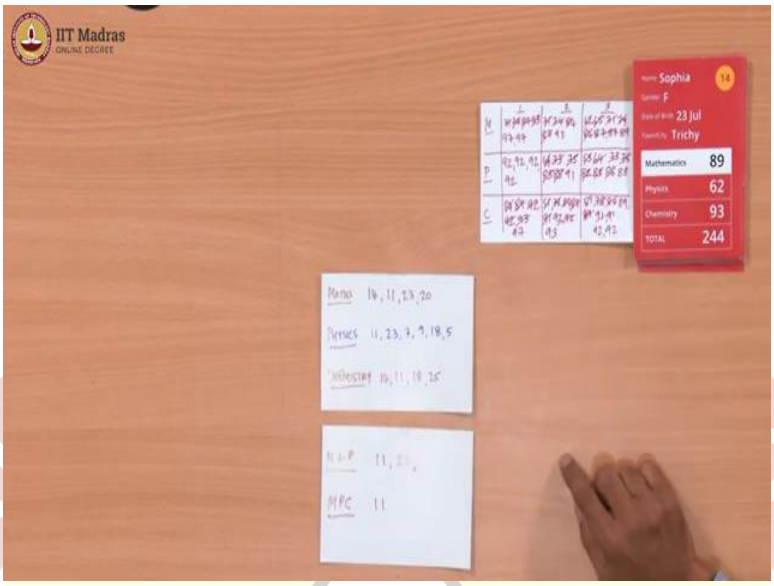

Professor Madhavan Mukund: The top 3, top 3 marks in maths, top 3 marks in physics, top 3 marks in chemistry.

Professor G. Venkatesh: So, we do not need the cards now, we do not need this also, this is all we need. So, from these 3 sets we want to find out these 3, intersection of these 3 sets is null or has something? So, what do we do it? We have to iterate, we go through this and for each of these go through this, so it is a 3, iteration, it is a iteration my god, so one pair at a time we can do no?

Professor Madhavan Mukund: I think so, I think we will find out those have in both maths and physics only those need to be checked.

Professor G. Venkatesh: Make another card and do it.

Professor Madhavan Mukund: So, let us do that because there is no point in looking for somebody in all 3 if they are in 2, so first we will do maths plus physics.

Professor G. Venkatesh: So maths is intersection with physics, so it means that you go through all the maths, so 14.

Professor Madhavan Mukund: Is it there? It is not there.

Professor G. Venkatesh: 11?

Professor Madhavan Mukund: Yes, so 11 is in there, so that is okay.

Professor G. Venkatesh: 23?

Professor Madhavan Mukund: 23 is there, 20 not know, so we have go two people who are in maths plus physics.

Professor G. Venkatesh: So now you intersect that with chemistry.

Professor Madhavan Mukund: So, we can…

Professor G. Venkatesh: Go through the smaller list 11, so 11 is there.

Professor Madhavan Mukund: So I will write M P C, so 11 is there and 23 is not here.

Professor G. Venkatesh: That is it, 23 is not there.

Professor Madhavan Mukund: Say I got 1.

Professor G. Venkatesh: You got 1?

Professor Madhavan Mukund: I said at most 1, so 1 okay.

Professor G. Venkatesh: Alright, so here again this is an example of where we, if you want to find 11 presumably can the bookmarks?

Professor Madhavan Mukund: Yes, then we just have to look for the bookmark for 11 and we would get that card.

Professor G. Venkatesh: So we have again we wanted to find whether or not there is any common student among these 3 sets? So we first found the first set, made a list out of it, list of bookmarks, this two index right, indices. Physics we found the set, chemistry we found the set and then we found the intersection through algorithm.

Professor Madhavan Mukund: Without disturbing…

Professor G. Venkatesh: Without disturbing, we did not disturb the cards that is the key thing. And then we identified that there is indeed one person we can pull that person out.

Professor Madhavan Mukund: Yes.

Professor G. Venkatesh: Wonderful, interesting.