

Transcript of the expert interview

The interview was conducted on 29.08.2023 from 7 to 8 pm. The participants are a supervisor (B1), two experts (E1, E2) and the interview leader (IL), who is writing the Bachelor's thesis.

This document is a transcript of the recorded interview. The conditions agreed to on a signed consent form are adhered to and all personal details, names and locations are anonymized. This bachelor thesis is based on a prototype of previous work. The authors are mentioned by name several times in the interview and anonymized as [Student 1] and [Student 2].

B1: Oh, maybe a quick word from me at the beginning. Right, so it's nice that it worked out today. This is the [interview leader]. He's writing his bachelor's thesis with us. Also as part of this whole dance topic, like [student 1], we had him before. And he's just going to ask a few questions today to get a little bit into the subject. At first, three months or so, I think. In the thesis or two?

IL: Two I believe.

B1: Two to three. Yes. Exactly, and I've already come up with a few concepts. I don't know what you're going to show?

IL: Yes

B1: Exactly, where you can show yourself a bit more and just ask a few things to get into the subject and hear your opinion on it.

IL: Yes, then you've already said hello. Exactly, I just wanted to talk briefly about what I have in mind for a project. It's about developing a visual comparison of dancer trajectories, especially for Latin formation choreographies with defined formations, to help dancers and coaches in training to recognize formation errors and improve the quality of the danced steps. And right here is an formation from [Student 1]'s program that you are probably already familiar with.

E1;E2: (agree)

IL: Exactly, and you can see that the quality has somehow become quite poor, but you can see here that the diamond that was formed here is not exactly a diamond, but that the distances are a little different. And yes, that's what it's all about, using a tool to recognize it during training to see where these errors occur. Exactly. And that brings me to my first question at the moment, when a training session like this is being carried out. What methods are you currently using to improve the choreography?

E1: I'll have to think about the best way to describe it. We use both analog and digital tools. I say, for example, there are video analyses. We record the passages, for example, or even entire runs, then play them back again and again, practically pausing them when formation errors occur or when, for example, you have an incorrect formation transition, i.e. when there are somehow rotating formations and you notice a pair is rotating too slowly or something similar. And then, of course, we also use really old-fashioned aids, such as cones. We used to do it with ropes with little sponges stuck to them, colored ones for example. That you then simply reach the meter, the defined point, and pause and do it until this meter is reached with the steps.

IL: In practical terms, that means oriented to these checks on the floor.

B1: We don't have this floor every time. It's actually only available at tournaments or very rarely at some clubs, for example at training camps. We mostly train in halls and then we simply use the

handball and volleyball frames. There are always line circles, for example, and you know that's 1.80 meters, that's 4.50 meters or something like that on the side. Then we use that as a guide.

IL: And do you currently use any programs for this that can do the work for you?

E2: Not really yet, no.

E1: So for the development of the formations, you mean? Do you mean the choreography?

IL: No, just to analyze the danced choreography.

E1: Yes, not yet, no. I don't think it exists at all in that sense, so I've never heard of such a thing existing in the entire formation sector.

IL: Yes, that was also in my topic description, so it's definitely an interesting field. Exactly, now a bit more about my project, how I plan to do it in practice. I would draw a box around the individual dancers. Especially oriented to the feet. Then I would start at these two feet and average them to get the middle position. It's a certain amount of work to annotate this manually at the moment. But if you have this data, you can display it on a coordinate system like this. And then with this pattern so that you have two points, one is the target position and the other is the actual position and you can then compare them. Exactly and to develop such a tool, I would be interested to know if you have any ideas on what would be nice to see in such a tool.

E2: It's not quite clear to me yet how, well, I can use it, so to speak, when the formation has danced and I can look at it afterwards, so to speak... That I can then look it up somehow on the tablet it's probably or something, who's standing wrong, who's out of line or... I have to start a bit from the beginning, because I already know what the other two did. And it was also very different (reference to previous projects). And I think I need it to be a bit more vivid.

IL: Yes. So... To perhaps explain it a little more precisely... There are certain formations during the choreography, there are certain formations that are danced. And what I'm trying to do with my project is to look at the path between the formations, practically the trajectory from one formation to the next, and then to determine this trajectory on the basis of the defined formations, and then to compare it with what was actually danced. So then practically display in a web tool that you superimpose these two pieces of data that you have. So that you can then see where there are major deviations and which formations are harder and which formations are easier.

E2: Okay, then I have, so to speak, the one they danced in black and the other one, which would be correct, in white over it to see. Ah, it's half a meter there now, completely wrong. For example. Now I've had it too. And not?

E1: Yes, I missed that the first time. Of course, just like you wrote, with the boxes and the right and left foot, that's a huge amount of work. But I'm very excited because I think it's actually a really nice thing, because the way it's presented now, for example, you actually only ever have the middle body position. We often have positions, for example, where you have your right foot on the position and your left foot on the position and the distance between the two feet has to be, for example, one meter or half a meter. That can be represented very well with your project. It's nicer, of course.

IL: That means that you also have to make sure that you build in the space between the feet.

E2: And also a few, sometimes it's also the middle, so to speak, that we hold hands and stand next to each other. That's also sometimes the point. It's not just about the individual dancer, but also about the couple, so to speak.

IL: Yes, I also saw that in the choreo maker from [Student 1], that sometimes the pairs were grouped together as one point and then separated into red and blue, as it is here. Exactly. And yes, I'm now also collecting information on what data would be important for you. Now, you just mentioned the distance between the feet. I was thinking that maybe you could also, well, there should be a video built into the tool. I think that makes sense...

E1: Yes!

IL: ... that you can run them side by side. And perhaps you could also calculate a certain degree of correspondence for each formation or something. That you perhaps calculate a percentage with some criterion such as the distance, that you say 0% would be if you are 30 cm next to the point where you should be. And 100% would be if you were standing right on it. So that you can then perhaps rank the individual formations a bit, what went well, what went badly.

E2: If you let the music play along, you should have a certain beat. Because sometimes they are only in the formation for a short time and then immediately run out of the formation into the next one. It's built in so that the stopper is right there at that moment.

E1: I think you can actually do that with the planning tool, with the program I'm going to say, I think you can already do that now, can't you? Because you have a timeline down here that runs along with it. You could, for example, let me say, leave this first formation for 30 seconds, then another one comes for two seconds. So you could probably compare them a bit or superimpose them. I don't know where you end up doing that. Maybe you could do that.

IL: Yes. One difficulty that I noticed is that the music doesn't always have the same beat or the same speed. And that's especially the case in the planning program by [Student 1], that you're always in time, always the same unit on the timeline, although in reality it's different. That's why it makes it a bit more difficult. So if you want to do that, you would have to explicitly analyze the music and see how fast it is from A to B and from B to C and then write out the bars. I have an idea here of what it might look like later (shows sketch). In other words, you have this video above. And then you can display the boxes for the individual dancers by selecting them. And then you have a certain selection of diagrams and data that are visualized. The difference to the program from [Student 1] is that it is now continuous. This means that there are no pauses, you really have the whole video and can view data at any point. And the points here are now illustrated as the formations that have been defined. And you can then jump from frame to frame or simply let it run and you can then, for example, draw a graph here at the bottom to show how the deviation was from the individual formations, from the formations that were made, from the defined formations. Of course, you could also take further measurements for individual dance pairs, individual dancers, so that you can look at this again separately.

E2: That you can give an award to the one who was the worst and the one who missed the most.

IL: Yes.

E1: Is it planned in such a way that you can practically... So, if I look at the video now and see, for example, the two and the two that are in the wrong position, would that then only be displayed here in red with the correct position or would it then be displayed, for example, pair 7 is now one meter further to the right at four meters.

IL: Yes, at the moment I'm still thinking about the best way to display it. There would be the option of displaying a dotted circle with the position where you should be standing or a smaller dot with an arrow pointing to the larger dot. That you can display where you should be standing and where you will end up.

E1: Yes, I think that would be really nice, for example.

E2: I actually think, especially if I'm talking about our team, that it would sometimes make a lot of sense to say, hey seven, you're standing a meter off, that's what the program says, move over. Because they don't always believe it. I wouldn't think that would be bad either.

E1: Yes. Isn't it even marked there?

E2: That was the seven!

IL: Could be a nice coincidence.

E1: That was the seven.

E2: That's the seven!

E1: Okay, yes, that would mean that you would have to document everything with a video in order to collect the data, wouldn't it? So you would film it from time to time and then read in the data.

IL: Yes, exactly. That would practically go beyond the scope of my work, then I would have to look for an automated approach. I've experimented a bit, but it's very time-consuming. We would probably have had to correct so much that it would have been quicker to do it manually. But that would definitely be a further idea, to get the data faster directly from the video, so to speak. Yes, exactly. And music would probably be important if it runs along, wouldn't it?

E2: Yes, I would say so.

IL: Because yes, then it would be good if I perhaps still had access to the song that was in that performance in [place]. If I could, if it still exists or something.

E1: We need to talk to the Executive Board about this very briefly.

E2: We always rented it during the period. And now we're no longer allowed to dance it at the tournament. The performance isn't that dramatic, but let's just clarify it briefly.

IL: Now for this rough view in practical terms. You said earlier that you've used the program from time to time. The idea was to import not only the choreography, but also the position data and perhaps also the audio. Exactly, and then another idea would have been to import several files so that you could perhaps also see the development. You then have two videos and two bars here and can then see directly on top of each other what has improved and where there are still problems. But yes, exactly, there were any major problems when using the program or somehow with the display of the coordinate system or with the navigation.

E1: I'll have to think about that for a moment, I think we've talked about it a bit before. There were actually no problems with the coordinate system and the whole layout, it turned out really nicely. I think the only thing that bothered me at the time was that you couldn't delete individual formations. So if you practically took a formation and then another formation and then another, then you practically had to reload the files and couldn't delete the second formation, for example.

B1: He has fixed that in the meantime, but not yet in the version you have.

E1: Yes, ok, all right. I think that was the only thing that bothered me at the time.

IL: Yes, good. That wouldn't be here, probably that part of it, that would be something separate again. Okay, so I can build on that. Practically on the prototype.

E1: Yes, definitely.

IL: Exactly, I have one more question, namely with these different formations, are there trajectories between the formations, how are they structured, are they mainly straight paths or are there also curves or certain paths in between that you can't simply represent with a straight line?

E2: Well, there are times when I want to adjust to curves. Especially the curve won't be curvy. But in other curves, maybe it's not just about one curve at that moment, but maybe it should somehow be feasible for everyone. And there are definitely curves that you have to dance.

IL: And also rotations then for the couple.

E1: Exactly.

E2: Yes.

IL: I saw that once too.

E1: For example, we now also have one here. It's in front of the Roundabout Samba. The men rotate around the woman in a semi-circle. First after the promenade run and then they practically rotate around it. We also dance a little curve there.

E2: And from a purely critical point of view, you also want it to be possible for the woman to change her partner.

E1: But I'd say that for us now it's mainly linear, isn't it? Yes, yes, you could say that.

E2: Yes, it's more like that.

E1: Straight, diagonal, that's all we really have.

IL: Yes, if it's a curve, then you would have to pay attention to whether it's run evenly, or faster or slower, because you can't see that in the pictures.

E2: So in our new choreography, if we had used the formations and not changed them, then there would actually be a circle where the whole thing dissolves towards the front. But it's not in there anymore?

E1: It's not in there anymore, exactly. So we really only have straight transitions.

E2: No, not diagonally.

IL: So now, especially during the training, something else came to mind, something measurable, which would perhaps be nice to have. We've now talked about the deviations from the formations directly and then also presenting this as a big whole, then also ranking the individual formations separately in the list, so to speak. What other measurable things might be beneficial?

E2: About the path that was actually always [Student 1], wasn't it?

E1: They cross and overlap and one has to go through faster than the other. That was more part of the other student's project.

E2: Although of course you can also see that here in the action when they intersect.

B1: [Student 1]'s project was about the fact that you could discover this beforehand, i.e. when you create the formations. Here it's more or less about when they've already been danced.

E1: I actually think that a lot has already been presented. So we have the distances, just as it is here now. We also have the utilization in the area, so to speak. So who dances where and how often, whether each quadrant is always used. And I think the error analysis is very, very good, to be honest.

But it makes it really transparent that you can say, for example, that 10% of the formations are not hit at all and then show it in a bit more detail. Okay, pair 7, for example, always misses the first formation. The fact that the error rate is 100%, for example, is actually quite nice. That makes it really transparent. And personally, I can't think of anything else off the top of my head that could be shown.

E2: The fact that you can also look at the individual pairs to see who is standing somewhere wrong and how often is actually really important.

IL: So practically, you can choose individual pairs.

E2: Yes, I don't think that's bad.

IL: This workload, this kind of heat map or something, that was included in the program. If you were to use it now for the recording, I think, but you probably wouldn't be able to take anything out of it if you then implemented it again with the analyzed data. Often the deviations are only small anyway, I think you probably wouldn't see any difference on such a large heat map.

E1: I can well imagine, yes.

E2: Well, I don't think you should go too extreme, because it's just important at the moment to see who's wrong, that you can perhaps take out the individual pairs, but that's actually the main thing about the topic. And I think if you also have that from [student 1], so to speak, then you're covered to such an extent that you have to be careful not to get too... Otherwise you can let the computer dance, so to speak. That's definitely always true. I think otherwise it's just too much.

E1: Well, the way you described it, I actually thought it was quite good that you say you can have the general error rate calculated practically and you can have it calculated practically for the pair. I think that's quite sufficient, as it's a huge amount of work. If you then say, I don't know, pair 7 is there and it's wrong every time or half a meter wrong every time or something, then that's really helpful.

E2: If everything works perfectly in theory, is it something that I have with me in the training session? Or is it something that I then work out after the training and then have, so to speak, in the next training session?

IL: It all depends on the data you get from this choreo. At the end of my work, there will most likely be no automatic approach to getting the position from the dancers. That would be part of future work.

E2: That was what we talked about at the beginning, that you do it manually, so to speak. Yes, of course.

E1: I don't know if that affects you, but theoretically, if I always have the same angle in the recording, for example, if I practically always have the same angle and the same coordinate system in the hall, for example, then I could use our program, for example, if I now know, ok, there is image 1, 2, 3, 4, 5 and so on and so forth, I could practically always have it stop on my video and then I don't know if you can do that, but then practically put the target, i.e. the target mask over the actual mask. So I don't know if that still affects you, if that's the future work, but that would be... Oh well, no, that would probably have to be added from above.

IL: I'll take care of that.

E1: Ah, okay.

IL: So in a program that I've now finished developing, I take this surface, regardless of the angle from which it was filmed, select four corner points and then draw the formation in such a way that you can see it semi from above. That's why it makes more sense to take the leg position, because the body is then stretched out. But the position from which it was filmed doesn't have to be the same. You just need to know how big the field is. And then you draw the boxes into the video as it is. Then you have the data. You then calculate where the data is in such a square. So you don't have to pay attention to how the camera is positioned.

E2: So that's a step up from [Student 2]?

B1: Yes, a bit like that. [Student 2] did the whole thing with augmented reality, so that the definition in the hall is superimposed on the real transfer surface, so to speak. That would be similar to what you suggested, what you did in this video.

IL: I should also quickly find a picture where you can see what it looks like. Exactly, the program looks like this. You put red dots on the surface and then say where the dot is in this square. And then you can transform it to look like this. That's the test image for me. Of course, this would not be the final version. But what you can say in any case, if you mark the legs in the video, is here. And if you put these coordinates in there, the legs are still marked. This shows that you can make a square out of any angle.

E1: That would mean for us that we would have to set our coordinate system exactly every time you come to read it out, wouldn't it? That it practically has a frame?

IL: You would just need some points.

B1: From which you know how far apart they are.

IL: Yes, exactly. You can then say in the program, I now have 10 meters to the right, which means I set 10 points to the right and I have 5 meters upwards, which means I set 5 points upwards and then I can put that in there and then I know that every small square that has been defined is exactly one meter by one meter. That would solve the problem. Just the annotation in the video. That doesn't quite work yet. From my side, I don't have many more questions. I don't know, are there any more from you?

E2: I think we'll just let ourselves be surprised by what comes out. And then when you try it out, that's what it looks like. I always have to see it then.

IL: Yes, that's roughly what it should look like in the end. It's a prototype now, it hasn't been implemented.

E2: I think that if it works, then it will be a great help.

E1: Definitely. You save yourself a lot of work.

E2: Yes, if you have that from [Student 1] for planning and then this for assessing, then the only problem is the dancers. I don't think you can make it any more technical than that. It's then perfectly planned and assessed.

E1: I think so too.

E2: Yes, except for the chip in the feet, which puts the dancers exactly where their point is. Pulled over like that.

B1: That would be really convenient for tracking, if you could somehow put something on the feet, in motion capturing you often have a reflective ball that people get stuck on. If you could put that on the feet to see where each foot is, then you wouldn't have to annotate it as much as [IL] needed to.

E2: Or chips like that? Isn't there something there?

IL: Certainly, with an induction field in the base.

B1: That would also be an idea, of course.

IL: That the feet would be metallic and that would be recognized on the floor. Or that each dancer wears a different color.

B1: We've actually thought about that before, that everyone puts on a shoe in a different color.

IL: Then you can use video editing to hide all the colors except the shoes. Then we can use the color to find out the position.

B1: Well, tracking is still an open challenge that we might solve later. We'll let [IL] do his work first, because it's a bit easier, and see if it provides any added value at all. If it does, then we'll think about how we can easily achieve this. This annotation here is very time-consuming. How much do you have? Have you already annotated a third of the choreography?

IL: Yes, a third in 15 hours.

B1: So that's not something you can realistically use. That's first of all to see whether it makes sense, whether it helps in any way. And if it does, you can see how you can get there more easily.

IL: The problem with these automatic trackers that are available is that there are object tracking algorithms where you just say track the point. In the examples, it always works quite well, but when a dancer turns, the point you're tracking is obscured. And especially if the resolution is not good, at some point the program no longer recognizes the point you have selected. I tried this with a few. I then estimated 100 points per dancer and after 10 seconds there were only 5 or 10 points left. But maybe you could somehow set the points semi-automatically, let it run for a bit and see if it still fits. But that would be a lot of work. It's not fully automatic either.

B1: Do you have the video, or what it looks like with the annotations when you run the program?

IL: No, I don't have it yet, but I can run the program again. I still have the algorithm on my PC.

B1: Oh, do you have it with you? I just meant to show it now, if it's easy to understand.

IL: No, unfortunately that's not possible. My laptop can't do that. It will take an hour for it to display something. Then I'll need the PC at home. Then I'm done with my questions and thank you for your time.

E1;E2: Gladly!

IL: If I have any more questions, it would be good if I could contact you again.

E2: Of course, you can come to training at any time. Sometimes I think it's quite good to get a better understanding. The others were also there once.

B1: Yes, I think it helped [student 1] a lot.

E1: You'll see your supervisor then.

E2: The one standing in the wrong position! The seven here.

B1: He has to watch the video frame by frame. He can really see everything exactly. Every mistake exactly.

IL: Yes, it's interesting. I'm starting to know the choreography by heart.

E2: Good, you can dance along. Although it's the old choreo.

E1: Yes, exactly, I should ask you that right now. It's practically the old choreography. So is your work based on the data from last season?

B1: Yes.

E1: The new one would have been even more time-consuming because we don't have any formations or anything like that in the program for you yet.

B1: Yes, you would have to create them first with the program from [Student 1]. Then we would have the formation definition and then we would need a video, so to speak. Okay. So for this part now. You could do that with the new one, but then someone who has an incredible amount of time would have to annotate that. I can hire a student researcher to do it, if that's the case. Do you feel like doing it after your Bachelor's thesis? No, we won't do that to you. Okay, good. Very nice!