

Transcript

00:00:00 Interviewer

Yeah, so I'm recording this session after getting the permission from you, so I'm going to share my screen with you for the questionnaire that we have.

00:00:04 Interviewee

Yes, not.

00:00:12

Right.

00:00:14 Interviewee

So just give me a second that I send you here.

00:00:20 Interviewee

Our paper, so otherwise we.

00:00:24 Interviewee

I forget to do that.

00:00:27 Interviewee

Uh, just a SEC here. The paper? Yes.

00:00:31 Interviewer

Maybe you want you have this?

00:00:32 Interviewee

Let me.

00:00:37 Interviewee

Because we are currently expanding this paper charts.

00:00:43 Interviewee

Uh file. I'm trying to see how to.

00:00:48 Interviewee

No. Shall I simply drop the message? Let me see. Drop the file. Probably.

00:00:55 Interviewee

In the chart.

00:00:57 Interviewee

I'm trying just to see.

00:00:59 Interviewee

No. Maybe I will send you by e-mail.

00:01:03 Interviewer

OK.

00:01:04 Interviewee

Yes, I'll send you by e-mail. So let's start with the questionnaire with the with the questions, yes.

00:01:07 Interviewer

OK, OK. So you can see the question here on your screen. OK. So first of all, can you please introduce yourself and describe your job role or maybe you could give me a role in the company?

00:01:24 Interviewee

OK, so let's say.

00:01:27 Interviewee

Let me understand this it it's about a company or it's about research because I'm mainly, you know, a professor at university.

00:01:36 Interviewee

And I have some industrial experience, but more limited indeed with my spin-off company. So is this the target? More like companies.

00:01:47 Interviewer

As I have mentioned that it it it this practitioner comparison validations can be from academia can be from industrial experience.

00:01:59 Interviewer

So the The thing is like the questions is like job role, it can be academia for being a professor.

00:02:07 Interviewer

For being an industrial guy, working experience can be redeeming your.

00:02:13 Interviewee

OK. OK. So let's, let's go home. So I'm a professor in software engineering. Yeah, but I'm also the CEO of a " ", so both of them but my, let's say, much longer experience is in academia.

00:02:28 Interviewer

OK.

00:02:31 Interviewer

OK, so how many years you are working in this company?

00:02:35 Interviewee

So it's 23 years I'm at the university and the three years with the company.

00:02:45 Interviewer

OK, so have you published any thesis in machine learning domain?

00:02:50 Interviewee

We've been publishing articles on machine learning yes, and software architecture.

00:02:55 Interviewer

OK, OK. So can you please share your experience in the current position?

00:03:01 Interviewee

OK, so this is a very generic question. Are you looking specifically for some specific experience?

00:03:10 Interviewer

Yeah, exactly for the machine and.

00:03:13 Interviewer

I'm supposed to like you are sharing the machine learning experience with me.

00:03:17 Interviewee

So we have been using machine learning in a a real project with the big museum in Italy for example and we are using machine learning and software architecture in our current research.

00:03:32 Interviewee

With a couple of collaborators, essentially.

00:03:37 Interviewee

And we are working in this area since I would say four years at this point.

00:03:43 Interviewer

Four years. Yeah. OK. Yeah, I think so. I have read something. Machine learning thesis in the museum.

00:03:50 Interviewee

Yes, yes, from a postdoc of mine.

00:03:56 Interviewer

Yeah, yeah, that was a famous thesis of research paper. I have seen that.

00:04:01 Interviewee

OK.

00:04:01 Interviewer

Yeah, I have read it. Yeah. Yeah, that was also helpful for me. So do you have any experience in the previous company which is developing machine learning system? If so, then what was your old experience?

00:04:03 Interviewee

OK.

00:04:05 Interviewee

OK.

00:04:16 Interviewee

OK, So what we have been doing mostly is using machine learning for software architecture. OK is not mostly developing machine learning system but the the real project I was telling you we were using machine learning.

00:04:36 Interviewee

As in the system itself.

00:04:40 Interviewee

So in this predictive project for queue management.

00:04:47 Interviewer

So is your company service based?

00:04:49 Interviewer

Or product based service based OK.

00:04:50 Interviewee

Service based.

00:04:54 Interviewer

So what software development model do you practise in your company? In general, like Agile or Waterfall?

00:05:01 Interviewee

Uh. In between a gaol and rap?

00:05:05 Interviewee

Wrap rational unified process.

00:05:07 Interviewer

OK.

00:05:08 Interviewer

OK. Yeah.

00:05:11 Interviewer

So could you please share your experience with the interesting projects in machine learning that you have worked on recently?

00:05:18 Interviewee

Yeah. So this is the the project with the museum. As I told you. So you, we had to collect data for almost one year.

00:05:27 Interviewee

Understanding how long people were visiting the museum for when they were arriving in the museum, how many people were.

00:05:39 Interviewee

Arriving all together in the museum to make a prediction on, you know, let's say.

00:05:47 Interviewee

How how long the next visitors would have spent in the museum at a certain time in a certain day?

00:05:57 Interviewee

This has been a concrete project with the tested in 30 real days with hundreds of thousands of visitors.

00:06:11 Interviewer

OK.

00:06:12 Interviewer

Yeah. So is your working experience. How many software texture design techniques of machine learning you've worked with?

00:06:20 Interviewee

OK. Uh.

00:06:23 Interviewee

So which common software and techniques of machine learning you from being used in most? So it's #10, right?

00:06:31 Interviewer

No nine, yeah.

00:06:32 Interviewee

No #9. OK, how many software architecture design techniques for machine when you work with? So essentially what we did since we started some years ago, we had a little bit to invent how to interweave the software architecture part and the machine learning so we had.

00:06:37 Interviewer

Yeah, yeah.

00:06:49 Interviewee

A team that was composed of part of software architects, part of Let's say, machine learning experts. And then let's say that we we had to indeed we we document the design decisions and we had the different viewpoints that we were using.

00:07:09 Interviewee

And we had to, let's say, invent our own process to interact between, let's say, the data scientist on one side and the software architects on the other side.

00:07:20 Interviewer

So you were discarding your own process design process with a lot we can say.

00:07:30 Interviewee

Uh, we were using microservices. Yes, yes.

00:07:33 Interviewer

Yeah. So we we can say microservices. Yeah, as it's like, OK.

00:07:36 Interviewee

OK, OK.

00:07:40 Interviewer

So which common software architecture, design techniques of machine learning you found being used in most company through your experience?

00:07:47 Interviewee

Mm-hmm. OK.

00:07:54 Interviewee

Did you have some examples to refer to so?

00:07:58 Interviewer

Yeah, microservices, client server or?

00:08:03 Interviewee

So we're still talking about, let's say, technologies rather than methodologies.

00:08:09 Interviewer

We can also discuss the methodology.

00:08:11 Interviewee

So so we have been using very much publish subscribe in terms of architectural style with microservices.

00:08:22 Interviewee

We are investigating our serverless functions.

00:08:26 Interviewer

OK. So do you think so like after?

00:08:28 Interviewer

Reading some literature.

00:08:29 Interviewer

Or maybe have a look around like people usually use the microservices or maybe which architecture design technique they use.

00:08:36 Interviewee

Now we didn't do any study for that.

00:08:38 Interviewer

OK, OK. So according to your experience, what are the best software architecture design techniques for machine learning? And what are benefits?

00:08:48 Interviewer

Of using them.

00:08:52

OK.

00:08:55 Interviewee

What we have to do, indeed, it's a very incremental interweave between software architecture decisions and machine learning decisions.

00:09:05 Interviewee

So the the idea is that I would say that in our experience, we had to work like the chicken and the egg.

00:09:14 Interviewee

So trying to understand the when it was fundamental to get the data from the data engineers for the machine learning model and when it was instead.

00:09:26 Interviewee

Important to get the feedback from the software architect.

00:09:29 Interviewee

So it was, I would say, a very intermixed between getting the data from the the architects and producing the architecture and trying to understand how to put in sequence these two phases in a continuous approach where continuously.

00:09:48 Interviewee

We got more data, we got an architecture. We went back to the data scientist. We asked them some more information and they, let's say, adapted their model and we adapted our architecture and then we we have been going back and forth in, in this direct.

00:10:08

Right.

00:10:09 Interviewer

OK. Yeah.

00:10:11 Interviewer

So do you have?

00:10:12 Interviewer

Any recommendations for software architecture design techniques for machine learning?

00:10:18 Interviewee

Yes, uh, I would say, uh, first of all, it's very important to analyse the technical debt that can be imposed by.

00:10:30 Interviewee

Applying architecting of machine learning application, another thing I believe is the quality of the data.

00:10:40 Interviewee

Because if we input the data in our software architecture coming from the machine learning model from the data model, if the data that we inject is wrong or is imprecise, the risk is that our architecture is not optimised, for example.

00:10:58 Interviewee

And and another thing I think is really understanding the process on how to interleave properly machine learning the the creation and adaptation of the machine learning model and creation and adaptation of software architecture. As we know adaptation and self adaptation.

00:11:19 Interviewee

Are big keywords in this domain.

00:11:22 Interviewer

Yeah, yeah.

00:11:25 Interviewer

So towards the 13 question, maybe I can highlight this better. What would be the best practise that could be helpful or useful in applying software architecture, designing of machine learning systems?

00:11:38 Interviewee

OK, applying soft architecture best practise.

00:11:44 Interviewee

Uh, let me think about that.

00:11:50 Interviewee

Uh, one of the thing that I believe is very important is to have a data model.

00:11:56 Interviewee

A data view. So when we do software architecture, typically we don't have an explicit data view. We have a software, hardware we may have, you know other views, deployment views. We typically don't have an explicit data view. So the data view needs to be the bridge.

00:12:17 Interviewee

Between the the data scientists working on the machine learning model and the software architect implementing the architecture of the system so that that's I think is one of the best practise that I will recommend to have.

00:12:32 Interviewee

So an explicit data model.

00:12:32 Interviewer

OK, OK.

00:12:35 Interviewer

OK. Yeah.

00:12:38 Interviewer

So what would?

00:12:40 Interviewer

What are the most common software architecture design challenges in machine learning systems?

00:12:46 Interviewee

OK.

00:12:48 Interviewee

So challenges I think is getting.

00:12:53 Interviewee

The right data at the right time.

00:12:57 Interviewee

So what I mean is that there may be architectural design decision that you cannot take because you don't have the data that helps you to take that decision.

00:13:12 Interviewee

So temporization I would say synchronisation between the the data collection and analysis and the software architecture part. I think it's it's very important.

00:13:28 Interviewee

Indeed, there is also the privacy part.

00:13:33 Interviewee

Because uh, most of the time, you don't have the data or you cannot easily collect the data that you need for your architecture for GDPR.

00:13:45 Interviewer

Yeah. Yeah, exactly.

00:13:46 Interviewee

Privacy regulations so our system could do much better, but we cannot do that because we cannot get the data that would allow us to create a better system because we cannot get that data.

00:14:03 Interviewer

Yeah, exactly. Yeah. Yeah, I can understand. Yeah.

00:14:08 Interviewer

So towards the last questions question, what are the main architecture decisions on software architecture, design of different machine learning systems?

00:14:19 Interviewee

OK. So let me think about that. So which are the main design decisions?

00:14:28 Interviewer

Yeah. Which are the major architectural decisions.

00:14:30 Interviewee

Yes, so let me vocalise one second.

00:14:37 Interviewee

To imagine.

00:14:40 Interviewee

Let me just do this.

00:14:55 Interviewee

Again, one, one of the thing that is extremely important.

00:14:59 Interviewee

That that is much less important in other systems is about the data.

00:15:06 Interviewee

OK. Which type of data I can use when I will get the data? How precise is the data?

00:15:18 Interviewee

I think another design decision is related also about the precision of the data that we get.

00:15:26 Interviewee

UM.

00:15:30 Interviewee

In terms of architectural styles.

00:15:34 Interviewee

I think that it's more or less quite clear.

00:15:40 Interviewee

Because anyway, we need to go through uh, a microservice architecture and adaptive architecture. So that's I think that's not obliged, but what you frequently expect to happen.

00:15:58 Interviewee

UM.

00:16:01 Interviewee

It's it's very much important to.

00:16:05 Interviewee

Take decisions that take into account the different stakeholders, because the stakeholders here are much more varied because on one side you have the architect, but on the other side you have the data scientist.

00:16:20 Interviewee

But the that engineer, the expert about ethics, the machine learning model develop.

00:16:28 Interviewee

So, uh, when we take architectural design decision, the number of the and the kind of stakeholders we need to interact may be different from engineering and non machine learning process.

00:16:50 Interviewee

Let me.

00:16:54 Interviewee

Also how to?

00:16:58 Interviewee

How to describe an architecture may vary because you have different concerns and different stakeholders. So maybe it's not very much more on components and connectors.

00:17:16 Interviewee

But it's much more on components connectors.

00:17:20 Interviewee

How they realise how they computed the data, how the machine learning model that you get in input interact in the system and so on.

00:17:32 Interviewee

So I think that those can be some of the the same decision that need to be taken and then there is evolution.

00:17:41 Interviewee

I think another important point is evolution, because if the machine learning model change, you may need to change your architecture model as well.

00:18:09 Interviewer

Yeah, I think so. These answers are very helpful that it seems to be very I learned a.

00:18:15 Interviewer

Lot. Yeah, so.

00:18:20 Interviewer

Yeah, that was a nice session, I would say.

00:18:23 Interviewee

OK, OK, so I'm sending to you and also to Patricia that Patricia, that was in a copy this workshop paper.

00:18:37 Interviewee

That we just presented.

00:18:42 Interviewee

Again, keep in touch. Let us know you know what? What is the output of your research?

00:18:51 Interviewee

Because we are also making a follow up on our paper, and indeed it's important to know what has been already done by others so not to overlap and rather to complement also because you may know that both Patricia and myself are located in Lakeland the same city.

00:19:10 Interviewee

But it's also you see here the paper.

00:19:13 Interviewee

I was read.

00:19:16 Interviewer

Yeah, sure. Yeah. Yeah, I think so. Yeah. In 1 1/2 month it will be somehow we have results and.

00:19:18 Interviewee

That's where I.

00:19:24 Interviewee

OK, so the the, your YOUR plan is that you're running these interviews with those questions with the number of companies and researchers, right?

00:19:33 Interviewee

And then you will write about what are the findings to those research questions?

00:19:38 Interviewer

Yeah, because the the idea is like if we have a I, I I will get extract the results from the SLR.

00:19:47 Interviewer

And then through the practitioner I will we will do the comparison validation.

00:19:53

OK.

00:19:53 Interviewer

Because you know that actually that was a plan that we.

00:19:58 Interviewer

Shows to the practitioner the finding of SLR, but because of.

00:20:03 Interviewee

The SNR is on on which specific topic.

00:20:08 Interviewer

The same topic, the topic is best practises of the software architecture design.

00:20:13 Interviewer

Of machine learning.

00:20:16 Interviewer

Very common common challenges and the major architecture design decisions for.

00:20:22 Interviewee

OK. And then you want to compare what comes from the SLR and what comes from the interviews?

00:20:27 Interviewer

Yeah, yeah, because because the comparison, because of the pandemic. Sorry, because of the summer vacations because in July mostly people will will be away in August, mostly other part of the European people.

00:20:28 Interviewee

I see. I see.

00:20:34 Interviewee

Yeah, yeah.

00:20:40 Interviewee

Yeah, yeah, yeah, indeed, yes, yes.

00:20:40 Interviewer

Will be away.

00:20:42 Interviewer

So that was the plan like to do simultaneously, because now I am extracting the Sr results and then.

00:20:50 Interviewer

Also, the keeping keep going the interviews.

00:20:53 Interviewee

OK. OK, good. Good. Yeah. OK. So yeah, yeah, I sent that short paper. That was our based on our experience. So, but we are also progressing, you know, going outside experience but making it more systematic as well.

00:20:57 Interviewer

I think I received the e-mail.

00:21:13 Interviewee

Yeah. I also have one master student working now on a on a systematic study, which is more general than I think what you're doing with the Patricia.

00:21:24 Interviewer

OK. Yeah. OK. Yeah, great. Yeah, I think I think I will keep. I will keep in touch with you and share.

00:21:27 Interviewee

OK.

00:21:31 Interviewee

OK. Thank you.