P-4

We face with this type of requirements and I will say that in the case of machine learning, sometimes the development process is not that really well defined.

P-4

A person who has a lot of experience in a particular field, this user maybe has an idea about what is going to be the output but this machine learning system cause with the totally different output. This person might to say ok, but why I’m getting this output. I will say it’s very important and don’t know how much it’s part of non-functional requirement or traditional software.

P-2

Depending on the implementation, if you use like deep learning you can’t really test everything when you develop the software like traditional you can more or less define the test cases, but in deep learning it’s very difficult to understand how the system behaves, so in that respect it’s tricky to test if non-functional requirements are really guaranteed.

P-2

I don’t know it’s getting more and more complex so the testing needs to become more and more complex . in some point you can’t really get in complex testing. So you need some other method of testing like simulations things like that. So I guess that would also play role when you do machine learning. Maybe consider this.

P-2

I guess especially in safety domain, like you need to guarantee that it is always trigger when you assume it should be triggered and its always executed in the same way so that it doesn’t fail like for example I don’t know the active safety system its should avoid the accident it should always be triggered before there is a crush right or near to a crush. So you defined the situation and you need really guaranteed that it always be executed.

P-2

Actually the system will change something at run time.

P-2

Then the dependency between different requirements, if you have over the updates then if you have changes afterwards after system is delivered, Usually once the system is delivered at the end everything will be tested and then things are fine. Then if you do over the updates you can’t really test everything. Now I’m speculating right, I haven’t worked on that. That’s what I can imagine.

P-7

I guess the biggest difference is actually the expectations. Usually when you talk about software before, you know they come over and they just say if you click this button it should do this. And the client also don’t understands which the demand and then exactly what they want. For example, when they come for a non-functional requirement in a machine learning project, usually client comes over to me without project, where they think they will need artificial intelligence or machine learning. But in the end It is actually possible to solve it by quicker, faster, cheaper and without AI.

P-7

According to my own work experience what I have noticed that the usability which is a bit different from me when I work in machine learning compared to when I would create the software for other companies. I have realized that most of my clients never ask me to have the software working according to what they want. I’m the one who is controlling this software. So they do not want to deal with anything without it. They don’t even want to click buttons. All they want to do is just get the answers from me. So, I guess that’s like a recent experience that is followed upon the biggest differences.

P-7

Usually clients come over to me and they tell me kind of the problem they have. Kind of manage to tell about what they expect in the end and in the middle there is black box. Like I said before sometimes they are not even aware that they even don’t need machine learning. Sometimes it is easier to solve by just using simple programming.

P-9

My point of view is, if you have our traditional software product, they are normally very rule based, so that means if you have the supply input A, you have the rule saying input A than to B and that is kind of straight forward program. However, if you have Machine Learning and deep learning or neural network, then this is much more complicated because you cannot tell the neural network directly if input A to B instead you will present the neural network with a lot of training data and you ask the neural network that here is your training data so now you tell me the rule that you see in the training data. And then it has a rule trained and you give it data in runtime or in real time during the operation, and you hope it exactly the rule that you actually wanted to train on actually on is actually inside of your neural network. But it is not guaranteed really that you have exactly the rule you wanted and that makes a very hard from the safety point of view for example, because safety requirements of work that you’re confined are like boundaries on your system which can operate, quite hard that you say System operates all the setup of safety boundary then you shut the system off and you try to get this stop. But in Machine Learning you don’t really know you cannot really set these boundaries in a neural network because mathematically it is too complex to prove this network is always behaving the certain way. That makes it much more challenging from the safety point of view.

P-9

In fact the traditional software engineering is much easier because as I mentioned that this was very much rule-based, so you program the rules into the system and then you could very clearly or mathematically prove that whatever you do you will end in a safe situation and with Machine Learning or especially with deep learning when neural network, this is much more a challenge. It has not been completely solved yet.

P-9

Completeness mean that you completely cover all the possibilities how the system could react in a non-safe way. So, to guarantee safety, you have to guarantee that you also capture all possibilities that could go wrong in your system. And in some deep learning or neural network, you are never entirely sure if there might be some training data that you selected wrong that makes the system decide wrong in a certain situation. And the only way to kind of mitigate this problem a little bit is to do excessive testing of your newer network. But excessive testing is expensive and time consuming. While in traditional software coding, you could use some formal methods to prove that the software code you wrote is always behaving in a certain way.

P-8

I used to be in Palo Alto Networks, a cyber security company. My client wants me to have a higher precision or higher recall and, you know, the textbook says, OK, go ahead and ask for cosmetics and they will say how much false positive cost and how much false negative cost. You will find the optimal points for that. I’ve tried that a few times for the guy and they are extremely talented and intelligent people, but it just doesn’t work.

P-10

We have limited labeled data. But from that limited label data, let’s say a human can understand any labels just showing one or two examples of a cat or dog, but it’s not the same case in machines. So, what we are trying to do, we can also try to make the improvements of the few shot learning better, learning from fewer labels, also trying to see for which reason and for which kind of features, it took that decision.

P-10

So, I would say that there are a lot of questions if we want to implement Machine Learning. There are many other factors we have to take into account that you say that fairness, transparency, explain ability. And it’s not only having an accuracy measure. Although some people for some cases on the accuracy may help. But I don’t know, for deployment as a responsible company in critical systems, always there needs to have some transparency, some feedback and the Machine Learning should also be implemented based on the law. It cannot violate the laws that is defined by the US laws and the EU laws. That’s the other costs of having Machine Learning.

P-5

One of them, we don’t have complete freedom as we might have you car industry or elsewhere. If you provide any recommendation from an AI system to the doctor and you don’t give them to any of the fact that answer to why you made that decision or why machine will make that decision, they will not use it. And when you present your evidence, you have to also make sure that things going on right direction. If something is going to opposite way than what you would expect, like if you have the saturation in your blood for example and you expect that you have low oxygen level in your blood, that’s bad. But if your care goes to other way around them, even if your decision support system is good, nobody will use it.

P-5

So that’s the one thing and the other thing is that many of these systems you need to have some sort of clinical evidence to be able to provide to the customers, and that’s a tough one because first of all you need to develop it and you need to prove that it actually does what it supposed to do. So, you can have your data, you can train it and you can show that it has this performance, this specific sensitivity and so on. Then in a way to do it correctly, you need to do also run it live in hospital for sometime like clinical evaluation that can actually prove more like a clinical study where you evaluate the performance of it. Perhaps that goes to the functional requirements, I’m not assessing. I don’t know where the border line goes.

P-5

There is lot of discussions going on and if you talk to different people you will get different answers and where some is more liberal saying that you should just start using the algorithm where the others say no, this is not possible you need to take the patient data, you need to make it available for all future, so they can see that, and when you put those requirements, you more or less stop all development of machine learning system, because you are not allowed.

P-5

When it comes to clinical data and you have the primary use and then secondary use. The primary use is where most patient will give consent, so you are allowed to use this for this and that purpose. When you start to use it for other things, its really boarder line what you allowed to do and make it publicly available that is most often out of the question. What you can do is perhaps to the process the data or derive some intermediate data then aggregate and then you start for your training which works in some cases and then make that available. It also not one hundred percent clear that you should do that correctly.

P-1

There are also lot of strategic decisions about how to format, what type of support is needed for the AI projects. What do the researchers need in terms of competence data, access to data, regulations etc. Again I am also involved in practical work and I have my own kind of research area where I work on hands on AI development as well.