**Part 1: Introduction**

**Interviewer:** Okay, recording now. Hello.

**Participant:** Yup.

**Interviewer:** Before starting our interview, I would like to briefly introduce about my research topic and the objective of our interview. First, let's talk about ... Ah, hmm, I cannot control my screen. Okay, it's okay now. Yeah, we start continuing. Now, first, let's start with the AI4Code models, recent years witnessed the significant development of artificial intelligence or AI. Moreover, the development of the software engineering and open-source projects also create many very large code databases from multiple resources such as GitHub, StackOverflow or Gerrit. And as a result, researchers and practitioners have been proposed AI models that training on very large code database to automate a lot of corporate tasks such as bug detection, bug fixing or code completion. These models are as usually referred to the AI4Code models and show very great promising results. Despite the promise of AI4Code model is not perfect. To understand, let's see the example in slide. This sample is about the AI4Code for vulnerability detection task. And in this task, the model answer for the question: is this function or vulnerable or clean from input function. And now, assume that we have this function with the label is clean from a AI4Code model. Now, we change from variable name from queue to buffer. Now, how do you think about the prediction of AI4Code model tomorrow should be?

**Participant:** Can you repeat the question again,

**Interviewer:** Now, we have an input function, this function, and the prediction from AI4Code model is clean, and now we change the variable from queue to buffer, just change variable name. So, how do you think about the prediction of AI4Code model?

**Participant:** I think the model will be impacted. Do I need to understand to explain why I guess it is impacted.

**Interviewer:** Sorry, what is your prediction?

**Participant:** My prediction is the model will be impact

**Interviewer:** Why is it impact?

**Participant:** Because the when we change the variable name from queue to buffer, the name of variable here could be similar to one variable type in the in Java programming language and if the modal architecture using the tokenizer method to tokenize to tokenize, the source code data, the buffer in the variable name be mislead to the data type. And it can lead to some something wrong in the model prediction. And I would say,

**Interviewer:** yeah, it is correct. You're correct. In this case, the model is a mispredict the code in from clean to vulnerable despite the fact that the code snippet is similar, and actually the same in terms of semantic. From developer side, we will consider two code is the same. And if the first code is clean, the second code should be clean. But for the AI4Code model, because it rely on the textual data and not fully understand the data. So they could create a wrong prediction of vulnerable. And it's very dangerous because now we have a clean function, and they predict that vulnerable. So, if so, the unrobust of AI4Code models against semantic-preserving transformations. To assess the robustness of AI4Code model, one effective way is to use code transformation, in which we transform from original code into the new code and use the new code to test the model. And, the approach is motivated from, the facts, the nature of programming in which we have a different implementation for same programming tasks. For example, these three program serve for same purpose of calculating the sum of two input numbers, but due to different coding styles and different environment, we have a different implementations. And now, we want AI4Code models should perform the same in these variants. And, to understand the capability of model, we need to transform from the first one into other one. Towards it, we need a good code transformation. And, towards this, as I mentioned before, prior work used the semantic-preserving transformations in which they convert from original program into new program while keeping the semantics same. For example, in this slide, we renamed the variable from A to x and B to y. And now we have a new program with same semantics, but the texture data is different. And we also expect that AI4Code model perform same in the variants, but semantic preserving transformation is not enough. For example, in the slide, we can see that now we do not change from A to x and B to y. Instead, we change from A and B to random strings. And now, we have very weird implementation, and it may be not happen in the real-world coding. Therefore, we want to ensure the second property, natural, that mean we want to make sure that the transformation naturally happen in the real-world coding. And but nature is an ambiguous definition. And now we need we understand what is naturalness of code transformation. So, our plan is to use human annotator to annotate the data into the two types: artificial and natural transformations. But we still stuck in the first question: what the nature of transformation is. So, we need a concrete and desirable definition of the natural transformation. So, we conduct an interview to ask you and as a other senior developers about a your thoughts about the natural code transformation. Now, we will start with an example. We have a two source code in the slide. The first one is the original data and now we do the variable renaming to rename variables to create a new data. My question is: do you think this change is natural?

**Participant:** I don't think so. I don't think the transformed data keep the naturalness from the original scope. The problem could be like I am not sure about what is a naturalness in the natural code transformation. So from what I see is the variable name to be changed, but it is not similar to variable name that typically the programmer used

**Interviewer:** Yeah, yeah, it's a problem. it is a common question. When prior works ask people to assess the natural code transformation, they just ask if the code transformation is natural or not? But the definition is ambiguous. We even do not sure about what is naturalness. It is a very basic question, but we still do not know. That is the reason why we have as the interview we want to talk to others and to come up with something relevant to naturalness from your experiences.

**Part 2: Properties**

**Interviewer:** Yeah. And now we start with our first question: From your experiences, which properties do you think are relevant to the naturalness of a code transformation?

**Participant:** In general, for me is coding style, but coding style is quite, how to say, is too general and I would like to focus more on what is coding style. I would say the naturalness for the coding should be the naming convention, the coding styles like how we structure the algorithm and the any related information like code comments, code structure, and maybe the other one is the coding structure like the OOP like object-oriented programming. I would say the that is the for me is that characteristic of the coding naturalness.

**Interviewer:** Okay, so we can go one by one first about naming convention. So can you give us the example of our naming convention? And from experiences, how you can define the naming convention for your projects? Or where do you follow about the naming convention?

**Participant:** Yep, I see the point. Yes, I will take my working experience in the software companies I work before last few year. And in those companies, we before, before starting a new project, the program manager and also the technical lead of the project will give us instructions on how to do the coding convention, a naming convention for the whole project. For example, like for the variable type, we decided to use the format like the first few, the first word in the variable name is the data type. For example, like in int for integer or bool for boolean, caf for character or string for string or kind of dark, and followed by the business object for the variable. For example, like, if I work in a banking project, and I need to define a variable to keep the amount of balance for a client, I would like to use the naming convention like the double the double as a prefix, and followed by the balance for the business object. And with the balance, we use the B in the capitalization to make sure the people look at it and know that the prefix is data type and the following part is the abuse object. Yep.

**Interviewer:** I see. I see. Yeah. Thank you. So how about the next property about the how we structure algorithm and create the information? Do you do you? Do you mean the coding convention?

**Participant:** Yeah, the way we structure the code, I'm not sure about the terminology, I will say it is a coding style. For example, like Yeah, we try to divide the program into three layer the first layer is UI, on of the function we write, user, we bring it to the first layer SEC define and all of the music logic for example, like update updating the balance, deduct or add in the balance add in the new amount for the balance or calculate report for the statement, we bring it to the second layer business logic, and the last one is database layer like how we interact with the database, like most of them is the function to call to add new or insert or edit or delete a record in the database. So we try to structure the project based on those three layer and from that, we expect that the cost structure is more okay. I mean, to understand for the maintenance, yeah.

**Interviewer:** So it lie in the high-level structure. Do you have any examples for the low-level structure like within function or within a fine?

**Participant:** Yeah, so for low level, for example, like a method, we try to instruct the programmer to follow the same format file when we design a new method to use. In the method, we try to start a method with the data type for the output, for example, like a method when we when we introduced output as integer. So the method we'd have the integers as a prefix, followed by the name of the business activity, for example, like calculate the number of transaction and the name of the method would be integer that calculate the number of transaction and follow the method name, it should be a lot of comment lines to explain the purpose of this method followed by the all the parameters need for this output. And for this method, and at the end, the output with the data type and maybe some example. And after the info to explain the method, name and purpose, the cost structure will follow. And for all of the code lines below, we try to ask all of the programmer to add the comments to explain on specialize to make sure that the next person to come to the method, he can understand what he was the previous people do. That is the way we do it.

**Interviewer:** So, where the rules you follow come from? Like from the, from the teammate, the manager, or you follow some universal rule like common practice in specific language, or you do both?

**Participant:** Yeah, I think the program manager and also the technical lead, learn that instruction from a CMMI, a standard for software engineering.

**Interviewer:** CCMI?

**Participant:** CMMI. The version should be fine. I think CMMI 5. I'm not sure. But yeah, the name is CMMI. I'm not sure about the version number. Yeah. So they learn, they learn the structure from that. And they try to educate all of the programmer in the project to follow. And yep. And also, we have another team in the project like QA to take out all of the code at the end, when we leave the project. Make sure that on the follow the same instruction.

**Interviewer:** Okay. Yeah, I see. So about a next thing. Do you think any other properties you think related to this problem?

**Participant:** From my point of view, nowadays, a lot more of company and actually the senior developer, the involves some more tooling to help them do coding, for example, like code pilot, or maybe just ChatGPT. And the code will be mixed up between the the person code and generated code. It could be caused the some, I mean, the anomaly in the code, the naturalness of the coding. So, I think it could be an impact. Okay, for this.

**Interviewer:** I see. Okay, so I want to ask you more question. Do you think like, is code readability related to this problem?

**Participant:** Oh, yes, I think, yes. Let's take the example in the screen as a example, like, I would say the code in the left hand side is the code written by human. I can get start. And I'm quite sure that is correct. But in the code from the right hand side, they use a lot of very long variable name, and the variable name doesn't tell me why it is so complicated. And for me, as a senior developer, when I look at this I'm not sure I understand fully the context of the method. When I look at this variable name, maybe it's yeah, just too complicated.

**Interviewer:** Okay, yeah, I see. Okay. So, next, so, I think how about the code complexity? Do you think it related to the naturalness of transformation if we if we use a code transformation to transform this one for this one. It is not example. But now we can we use other code transformations? And now we can have new code which is more complex compared to the original one, do you think it affect the naturalness of the code transformation?

**Participant:** I think it will affect. To me, when a developer writing his code, maybe he doesn't consider on the aspect of the global variable or local variable name and maybe they mix up between them and it potentially cause the issue when at the at the program level rather than the class or method level. But when we use when you use the code transformation for the task, and the model to transform the code could consider this characteristic and avoid that mistake. The naturalness could be affected but might be better. Yeah, that I understand that the idea I answer the question directly?

**Interviewer:** Not really. Like, look a little bit about this example, what we want to consider the naturalness of code transformation here is we do not want to transform the program. Instead, because in the testing, we only have this program and now, to transform it into the equivalent program that may happen in the real-world the coding. So, to increase the robustness of the model, what we want is, if we apply a transformation here, it will create a realistic program on or it create a very strange program like this. So, now, my question is, like if we transform this program, and into the new program, but it affects the complexity of the program. Do you think this code transformation is natural or not? If you are not sure, just say not sure. It is no problem then.

**Participant:** I think it's it’s the natural is from what I see is the natural, keep the nature. But, but harder for humans to understand the code, if it happened, the last case.

**Interviewer:** I see.

**Participant:** Yeah, I would say yes. Then return the naturalness.

**Part 3: Context**

**Interviewer:** Okay, yeah, I see. Okay. Yeah, I think he's done for my current path. So we want to go to next time, we want to talk about like, how do we assess if code transformation between two code snippet is the natural or not based on the properties? Like, which context you need to assess if the transformation between two code are natural?

**Participant:** Yep, I think that's basically it. Yeah, the naming convention. Now, I

**Interviewer:** No, l mean, which information you need, like, you need to see the method, or do you need to see the whole file? Or do you need to see whole project?

**Participant:** Okay. I would say, at least we need a whole file.

**Interviewer:** The whole file, okay.

**Participant:** I think the just method or just like code is not enough, because we don't have the full context to understand the interaction between those live code or those those methods, we are the ones so we cannot, we cannot guarantee our answer. But for the whole fine, it could be possible. Like we can see that the method called by some other method, or maybe the way the way the method structure in the class or kind of that, we can guess.

**Interviewer:** Okay, I see. Yeah. So do you need to see the whole project? Like for capture the naming convention or the coding convention? Do you need to capture the whole project?

**Participant:** I think the best way to the best way to get is having the whole project. Yep. Yeah. Yeah. From the helpers, we will have a full context to to make the prediction.

**Interviewer:** okay. Yeah. I see. Yeah, I think is enough for our interview. Thank you for your participant. And now we I will stop my recording first and ask some personal information.