Case 1: BrainCreators

Titel: Exploring efficient interactions between human and machine intelligence for infrastructure inspection

One of BrainCreators' products aims to support infrastructure inspections with visual deep learning. In particular, road surface distresses are detected, put on the map, and given an estimate about their future development. When aggregated this information is vital for planning maintenance activities and understanding future risk and costs.

In this project we will be interested in per-pixel segmentation of road distresses (cracks) for the purpose of accurate localization and for an estimation of distress severity based on segmentation mask geometries.

Case 2: eScience Center

Titel: Do machines learn non-explicit semantics?

Many modern research challenges need to be tackled with (deep) neural network (DNN) models. Despite their high predictive accuracy, DNNs lack inherent explainability which earned them the "black boxes" label. Inarguably, explainers of black boxes are crucial, especially to scientists using AI models trained on their scientific data and designed to aid their research. Also, researchers gain access to the way machines learn as a potential source of new scientific insights. Many post-hoc eXplainability AI (XAI) methods (explainers), illuminate the black boxes via the so called "feature importance" explanations. They indicate the relevance, contribution or attribution of the individual data item features to the decision made by a DNN model about this item. These features are the (super)pixels, words, time samples or different variables in the scientific data modality of interest: image, text, time series or tabular data, respectively. Explainers get a data item and a trained model as input and output a feature importance map for that item.

Goals of the workshop:
(i) Definition of "semantic continuity" as a scientifically relevant XAI property
(ii) Defining experiments to measure the semantic continuity for the simple models and XAI test datasets
(iii) Systematically investigate the semantic continuity of the explainers on images, text and time-series by using the DIANNA package and datasets3

Case 3: Axini

AI/LLMs and Model Based Testing

Introduction

One of the challenges in testing is to come up with good test-cases. Axini uses an AI-based technique called model-based testing that uses a combination of mathematical models and AI algorithms that reason about those models.

As you are probably aware, the application of Large Language Models has taken a big step forward, with ChatGPT from OpenAI as a prime example.

At Axini, and our clients as well, we are wondering if and how LLMs can be applied to testing in general and model-based testing in particular. For example:

- Can LLMs learn to generate test-cases based on specifications of systems?
- Can LLMs learn models needed for model-based testing, based on example traces from the system (for example from log-files)?
- Can LLMs learn models needed for model-based testing, based in example test-cases?

Challenge

The mission, should you accept it, is to work with a team of AI specialists, Computer Scientists, Software Engineers and Axini's on the application of LLMs in testing.

Axini can provide example models, example systems to test, test-cases etc, including access to our Model-Based Platform.

Case 4: Axini

Modeling and Model Based Testing of 3D games

Challenges

Are you aware that a serious game like a Formula 1 simulator is tested by (expensive) Formula 1 drivers in order to ensure that the simulator correlates with reality. But even the testing of less serious 3D games like first person shooters costs millions of euros. On top of that, most of the testing is manual. We'd like to get this one step further: model based testing of 3D games. How cool would it be if we could model and model-based test professional Formula 1 simulators?

Figure 1: Formule 1 in 2050 by McLaren

https://youtu.be/JgZGZcb3Zyg

Axini. The Next Level of Test Automation

One of the challenges in gaming, and virtual racing in particular, is testing. A big and important part of testing is manual testing done by a human,

often professional, driver. There are also automated tests and it is a big challenge to keep them running. To thoroughly test a game we need thousands of test-scripts and this is a big challenge to maintain. Wouldn't it be great to have automated testing without the need to program test-scripts and test-data. Look no further, that technique exists and is called model-based-testing, also known as no-code scriptless testing. Axini is a leader in the development and application of model-based testing with their Axini Modeling Platform. Axini is wondering how model-based testing can be applied to gaming like serious virtual racing.

Workshop

Today racing games are developed using all kinds of configuration parameters to simulate the behavior of the car on a track. Final testing is always performed by a (professional) human test driver. The test driver's feedback is used to tweak the track and environmental conditions to get as close as possible to the reality of a real racing car.

A first step to a pure virtual racing environment is the replacement of a test driver by a model. How can we transform the professional test diver into a model to execute the primary testing and reduce the testing effort of humans by 80%. During the workshop we would like to investigate all aspects and physical feedback parameters of a professional test driver and create a model out of it for testing purposes at first. Next steps are to take the physical aspects of the track, the environmental conditions and complex interactions between driver and environment into consideration.

As we learned in the last ICT with industry, maybe professional Formula 1 simulators is one step too far for current theory and practice, but modeling and testing of 3D games in general is well within reach. In this ICT with Industry we want to come up with the next level of test automation for 3D games.