OMNeT++ Community Summit 2021 Hackathon
Machine Learning in OMNeT++

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While Machine Learning (ML) gets increasingly popular in the communication networks research community, the use of OMNeT++ in this particular area is sparse. The objective of this hackathon is to exchange ideas and try out different ways to use ML frameworks such as TensorFlow[1] or PyTorch[2] in OMNeT++. The outcomes of this hackathon should be made available to the community in form of documentation, tutorials, example projects and pre-build environments such as Docker[3] containers. This will help newcomers to get started with ML in OMNeT++ and can increase the use of OMNeT++ in this research area.

Related Work

In [1], OMNeT++ interfaces with Keras[4] by using text files, while using the TensorFlow C++ Application Programming Interface (API) is considered as future work. In [2], OMNeT++ communicates with external Reinforcement Learning (RL) agents via a Representational State Transfer (REST) API. The agents are implemented using the RL library RLlib[5] and executed on the distributed execution framework Ray[6]. The authors of [3] implemented an OpenAI Gym[7] in Python that embeds and interacts with the OMNeT++ based Veins[8] simulator. In [4], ML models are trained in PyTorch and used in OMNeT++ via the ATen[9] C++ library.

The initiator of this hackathon has successfully linked TensorFlow to OMNeT++ by installing OMNeT++ into the Docker container provided by the tensorflow_cc project [5] and implemented a RL agent based on Deep Q-Learning.

References

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[5] F. Matzner. *FloopCZ/tensorflow_cc*. URL: https://github.com/FloopCZ/tensorflow_cc (visited on 08/06/2021).

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[2] https://pytorch.org/
[3] https://www.docker.com/
[4] https://keras.io/
[5] https://docs.ray.io/en/master/rllib.html
[6] https://ray.io/
[7] https://gym.openai.com/
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[9] https://pytorch.org/cppdocs/#aten