CERN openlab online summer intern project presentations

Report of Contributions

Contribution ID: **1**   Type: **not specified**

Welcome and introduction

Thursday, 24 September 2020 16:30 (5 minutes)

Contribution ID: **2**   Type: **not specified**

Development of BioDynaMo Notebook Service

Thursday, 24 September 2020 16:35 (7 minutes)

Presenter: BANDIC, Berina (International Burch University)

Contribution ID: **3**

Type: **not specified**

Service Level Objectives : What's working and what's not?

Thursday, 24 September 2020 16:42 (7 minutes)

The constant evolution of the IT technologies brings possibility of providing new services which also contributes to the increased expectations regarding their functionality and reliability. This results in a constant race of delivering new features whilst aiming to keep the services as reliable as possible and triggers one fundamental question: "How do we know that our service is still good enough in the client's eyes?"

This is where the Service Level Objectives come in place and help identifying the quality of the provided service. Their usage is a standard practice in many organisations to monitor and improve the operations, and to establish better communication with the users. SLOs are set on top of measured Service Level Indicators (SLIs) and represent the required percent of time that a given SLI should meet the expected quality standards.

The major goal of this project is to implement a central SLO dashboard for the IT Monitoring Service at CERN. It will provide SLI/SLO information in near real-time and notify in case of drop in the service availability.

Presenter: BASTOS, Felipe (Federal University of Pará (UFPA))

Contribution ID: **4**   Type: **not specified**

HEP Analysis workloads for the benchmarking suite

Thursday, 24 September 2020 16:49 (7 minutes)

Presenter: KANKOWSKA, Dominika (Gdańsk University of Technology)

Contribution ID: **5**   Type: **not specified**

Deep learning for 40 MHz scouting with Level-1 trigger muons for CMS at LHC run-3

Thursday, 24 September 2020 16:56 (7 minutes)

Project Description: CMS will include a new paradigm for the Level 1 Trigger at CMS run 3. This is the approach of reading out trigger objects at the full collision rate (40 MHz), in order to perform studies and take measurements not possible with the constraints of the allowed 100 KHz Level 1 rate. One such set of trigger objects are the Global Muon Trigger objects. The Global Muon Trigger accumulates muon candidates from barrel, endcap, and overlap trigger regions, and selects eight based on their quality and transverse momentum to send to the Global Trigger. A deep learning machine inference solution has been proposed to manipulate these trigger objects such that are more usable in offline or semi-offline analysis, rather than simply near the triggering thresholds. This can be done by targeting the offline reconstructed objects with an artificial neural network. This machine inference will be done in Micron provided FPGA-based data-processing PCIe boards. The project will focus on data analysis and the development of machine learning models.

Presenter: POPA, Maria (Babes Bolyai University, Cluj Napoca, Romania)

Contribution ID: **6**   Type: **not specified**

Exploring hybrid quantum-classical neural networks for particle tracking

Thursday, 24 September 2020 17:03 (7 minutes)

Presenter: RIEGER, Carla (ETH Zurich)

Contribution ID: **7**   Type: **not specified**

Deep Learning for disaster relief: generating synthetic high resolution images

Thursday, 24 September 2020 17:10 (7 minutes)

Presenter: THAPA, Surendrabikram (Delhi Technological University)

Contribution ID: **8**   Type: **not specified**

Using Intel oneAPI for Reconstruction algorithms

Thursday, 24 September 2020 17:31 (9 minutes)

Presenters: CAPELLI, Laura (Alma Mater Studiorum, Università di Bologna);   CAVALLINI, Viola (University of Ferrara, Italy)

Contribution ID: **9**   Type: **not specified**

Anomaly Detection with Spiking Neural Networks

Thursday, 24 September 2020 17:41 (7 minutes)

The detection of gravitational waves (GW) from stellar binaries such as black hole and neutron star mergers have ushered in a new era of analyzing the universe. With this, the Laser Interferometer Gravitational-wave Observatory (LIGO) can peer into deep space giving astronomers the ability to uncover hidden stellar processes. Instrumental on the software side of these observations are the algorithms which pick up the faint signals of GWs from a strongly isolated and increasingly quantum noise environment. The identification of GWs presents itself as a good candidate for machine learning approaches which can learn complex non-linear relationships in their data.

The aim of this project is an exploration into the unsupervised regime of detection algorithms such as deep autoencoders for Gravitational Wave Anomaly Detection. Moreover, we propose a set of artificial neural network architectures for supervised learning in order to classify GWs on the labeled dataset. Eventually, we discuss the accuracy of both approaches and accelerate their inference by low-level optimization of code in hls4ml library and Intel oneAPI toolkits designed for cross-hardware deployment. Finally, we propose an experimental path for anomaly detection with biologically-inspired Spiking Neural Networks deployed on Intel Loihi neuromorphic chips and benefit from time-dependency of generated data

Presenter: BORZYSZKOWSKI, Bartłomiej (Gdańsk University of Technology)

Contribution ID: **10**   Type: **not specified**

Intel oneAPI Integration Tests With the ATLAS Offline Software

Thursday, 24 September 2020 17:48 (7 minutes)

Presenter: CZIRKOS, Angéla (Eötvös Loránd University, Budapest)

Contribution ID: **11**   Type: **not specified**

CMS Hadronic and Electromagnetic Calorimeters Reconstruction with oneAPI

Presenter: CAVALLINI, Viola (University of Ferrara, Italy)

Contribution ID: **12**   Type: **not specified**

Inference engine for custom neural networks with oneAPI

Thursday, 24 September 2020 18:03 (7 minutes)

Presenter: SWINIARSKI, Marcin (Gdańsk University of Technology, Poland)

Contribution ID: **13**   Type: **not specified**

Wrap up

Thursday, 24 September 2020 18:10 (5 minutes)

Contribution ID: **14**   Type: **not specified**

Estimating Support Size of Generative models for High Energy Physics

Thursday, 24 September 2020 17:17 (7 minutes)

Presenter: JARUSKOVA, Kristina (Czech Technical University in Prague)

Contribution ID: **15**   Type: **not specified**

Heterogeneous computing for Deep Learning: deploying generative models via Intel OneAPI

Thursday, 24 September 2020 17:56 (7 minutes)

Presenter: DONAYRE, Silke (Karlsruhe Institute of Technology)

Contribution ID: **16**   Type: **not specified**

Deep learning for 40 MHz scouting with Global Muon Trigger objects for CMS at LHC run 3

Presenter: MILUTINOVIĆ, Marija (University of Belgrade, School of Electrical Engineering)

Contribution ID: **17**　　　　　　　　　　　　　　　　　　Type: **not specified**

Pre-processing for Anomaly Detection on Linear Accelerator

Thursday, 24 September 2020 17:24 (7 minutes)

Presenter:　MOLAN, Martin