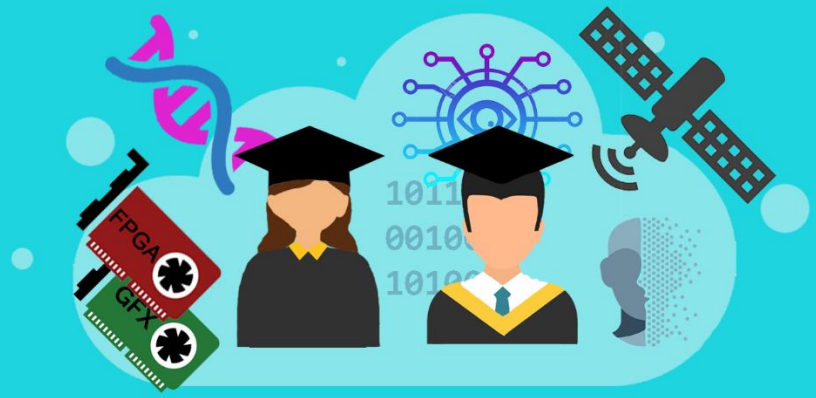


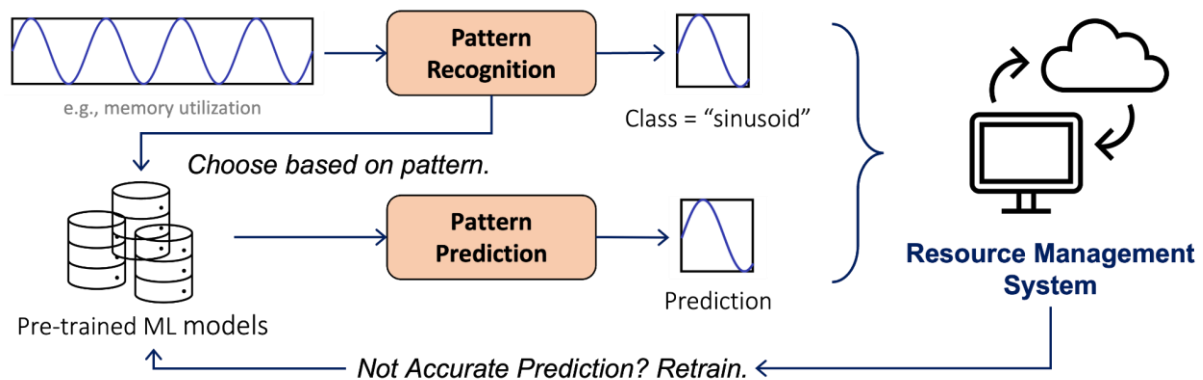
Diploma Thesis

Microprocessors and Digital Systems Laboratory



Machine Learning for Cloud Resource Management

Cloud computing has revolutionized the accessibility and use of commodity and cutting-edge hardware resources. Users from any background can run their applications and services using cloud resources of various hardware technologies, ranging from few virtual machines all the way to massive clusters, depending on the needs and cost. Cloud computing environments often exhibit low resource efficiency, due to the users requesting more resources than using in practice or due to suboptimal decisions of cluster management and scheduling systems. The efficiency can be improved by using accurate predictions of metrics such as the resource consumption, the utilization pattern, the lifetime and size of cloud workloads and virtual machines, as described in open datasets [1].



This group of diploma thesis will explore machine learning methods to build forecasting models of cloud resource usage metrics for the purpose of improving the management, efficiency and performance of cloud computing environments. Depending on the background and interests of the student, here are some potential lines of exploration:

- Deployment of cutting-edge forecasting machine learning models (e.g., recurrent neural networks, transformers, reinforcement learning).
- Transfer learning from available pre-trained state-of-the-art machine learning models.

Explainable Artificial Intelligence (XAI) methods for understanding the use and effectiveness of machine learning methods deployed for cloud resource forecasting.

RELATED MATERIAL

- Google Cluster Workload Traces 2019 (<https://research.google/resources/datasets/google-cluster-workload-traces-2019/>)

PREREQUISITES:

- Linux, Bash/Shell scripting.
- Python, Machine Learning frameworks and libraries, such as tensorflow, keras etc.

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