

Thesis
B.Sc.

Thesis
M.Sc.

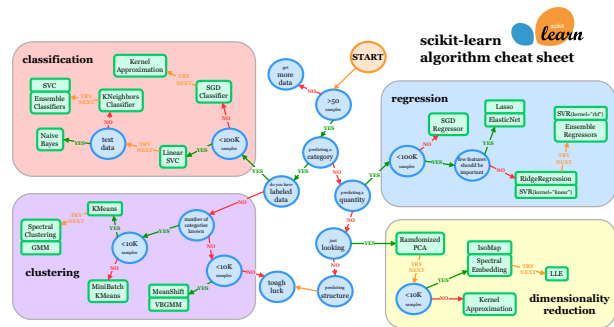
IDP

AutoML for ISP-Grade Network Management

Motivation

Modern computer networks are becoming increasingly complex, requiring sophisticated methods for monitoring, troubleshooting, and optimization. Traditional network management relies heavily on manual interaction, which can be time-consuming and error-prone.

Machine Learning (ML) offers promising approaches to automate these tasks, enabling self-managing networks. However, applying ML in networking typically requires significant domain expertise, both in ML techniques and network operations. For example, see the Figure with the `scikit-learn` algorithm cheat sheet, which contains some of the options that need to be considered when deciding on the ML approach. AutoML provides an accessible alternative by automating key steps in the ML pipeline, allowing network researchers to leverage AI-driven insights without deep ML knowledge. The goal of this thesis is to explore the use of AutoML for common network challenges in ISP-grade environments, such as link aggregation (LAG) inconsistencies, routing anomalies, and failure recovery. By leveraging AutoML frameworks like `auto-sklearn` [2], the goal is to evaluate approaches to predict, diagnose, and mitigate network issues efficiently.



scikit-learn algorithm cheat sheet [1].

Your Task

- Familiarize yourself with AutoML and its frameworks (e.g., `auto-sklearn` [2])
- Get to know typical data that is generated by ISP-grade networks (cf. NETCONF [3] and YANG [4] as two typical techniques in that regard)
- Apply AutoML to datasets obtained from a virtualized ISP-grade network (provided by us)
- Evaluate the applicability of AutoML for tasks like root cause detection and mitigation action determination

Requirements

- Basic machine learning knowledge
- Motivation to work with realistic datasets (including inconsistencies, noise, ...)

References

- [1] https://scikit-learn.org/stable/machine_learning_map.html
[2] <https://automl.github.io/auto-sklearn/master/>
[3] RFC 6241 [4] RFC 6020

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