Efficient tuning of automated machine learning pipelines

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Propositions

accompanying the thesis

Efficient Tuning of Automated Machine Learning Pipelines

by Duc Anh Nguyen

1. Human expertise is required to select appropriate performance metrics in classification problems, especially in cases of significant imbalance in the class distribution. *Chapter 4*

2. Compared to commonly used methods like grid and random search, Bayesian optimization offers greater efficiency for hyperparameter tuning and AutoML tasks. *Chapter 5*

3. Finding the perfect classification model for all classes may be impossible in practice. *Chapter 6*

4. Maximizing the coverage of the AutoML search space by sampling various algorithm combinations can significantly improve the performance of history-based optimization approaches such as Bayesian optimization. *Chapter 7*

5. Given limited optimization resources, to find optimal configurations, it is necessary to allocate more computational resources to promising Machine Learning (ML) algorithms while conserving resources for less promising ones. *Chapter 8*

6. Selecting an optimal sequence of algorithms within an ML pipeline, along with their tuned hyperparameters, can significantly enhance problem-solving performance.

7. AutoML has the potential to make ML accessible to non-experts, enabling them to develop ML models for practical problems with just a basic understanding of the field.

8. Many black-box optimization techniques have been employed to solve AutoML optimization problems, leading to concerns about the interpretability and potential biases in model outcomes due to their black-box nature.

9. Several ML algorithms exhibit similar behaviors and mechanisms, resulting in comparable performance for specific problems. Therefore, guidelines are needed to cluster these algorithms based on their performance for specific problems.

10. Investing more resources leads to a higher chance of finding a better solution to a problem. This statement applies to AutoML as well as to life.

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