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Survey on Automated Machine Learning (AutoML) and Meta learning

Ashwini Doke
Assistant Professor
CMR Institute Of Technology
Bengaluru ,India
yavani@outlook.com

Madhava Gaikwad
Senior Software Engineer
Microsoft
Hyderabad ,India
mgaikwad@microsoft.com

Abstract— Automated Machine Learning is an area of research that has gained lots of research in the past few years. To build a high qualitymodel for Machine learning we need technical experts who have good knowledge in exploring various machines learning algorithm as well as to tune the hyperparameters efficiently. The size of data is increasing, it is observed that data scientist cannot address this challenging tasks due to lack of expertise and experience in the respective domain. So, there is a need to automate such crucial task inthe domain of machine learning. Metalearning is "learning to learn" like human expertise. This paper is initial survey of ongoing research in field of Meta Learning and AutoML.

Key Terms— AutoML, Deep Learning, Few shot learning, General AI, MetaLearning, Machine learning, Neural Networks, Meta-Reinforcement Learning, Meta-imitation Learning, One shot learning

I. INTRODUCTION

Automated Machine learning is the area of research which has gained lots of research in past few years, In general to build high quality model for Machine learning we need technical experts who has good knowledge in exploring various machine learning algorithm as well as to tune the hyper parameters efficiently. But with increasing size of data its observed that data scientist cannot address this challenging tasks due to lack of expertise and experience in respective domain. So, there is need to automate such crucial task in the domain of machine learning [1].

As discussed [4] compare to last two decades state of computer vision machine learning has gain more success which can be used to solve many real world vision problems. The convolution Neural network can be used for all types of image classification problem but methodology is not generic where as AutoMl in general and uses automated Neural architecture search which promises us to avoid all manual efforts by using automl methods. To do this they have used CIFAR dataset which is most Known to all, where one network will be fully trained with few hours only.

Meta learning is another domain which is currently under research. In this domain each model is trained with different set of training tasks which contributes or say something about that task and gain knowledge even though it is performing poor finally result of such models are combined to form a knowledge system. Which can be applied to new unknowing tasks and result can be analyzed. Such concept is known as "learning to learn" like human and this is the main idea behind the phase of Meta learning. [9] This paper is a initial survey of ongoing research in the field of AutoMl and Meta learning. We hope to make use of this knowledge to bridge identified gap. Rest of this paper is organized as section II Background where will gives compare how AutoMl is different from Traditional ML section III discuss about different data sets and tools which are available for study section IV will give conclusion and section V will be references.

II LITERATURE REVIEW

Deep Learning is used to solve many tough tasks in different areas like, Object detection, Image processing , image classification and many more. However, model designed to perform such tasks are based on trial-and-error process which need ample of resources and time for development. Which involve more cost to design. To reduce this development cost and time novel approach is to automate the complete process of machine learning. Several research gives the different definitions of machine learning e.g.[8] AutoMl is reduce the demand for data scientist and enable the domain experts to automatically build the ML application without much requirement of ML and statistic knowledge. Fig1 Shows how AutoMl is different from Normal ML approach.

As shown in fig 1 in general machine learning involves Data Acquisition, Data exploration, data preparation, feature engineering, model selection, model training, Hyper parameter tuning and finally predictions. Among all above the data engineering involves from Data acquisition to data preparation whereas data scientists work on experiment and model optimization [7].