Chapter 16
Machine Learning–Based Mobile Applications Using Python and Scikit–Learn

Santhosh Kumar Rajamani

 https://orcid.org/0000-0001-6552-5578
Maharashtra Institute of Medical Education and Research, India & Dr. Bhausaheb Sardesai Talegoan Rural Hospital, India

Radha Srinivasan Iyer

 https://orcid.org/0000-0001-7387-4401
SEC Centre for Independent Living, India

ABSTRACT

This chapter gives a broad outline of machine learning on Android mobile phones using the Scikit-learn module. The first section introduces the reader to Python language; next, Python on Android is introduced with a brief historical note on implementations of Python on Android mobile phones. Pydroid3 is introduced in the subsequent section. This is followed by instructions on setting up an Android phone for machine learning. This is followed by a description of supportive modules for machine learning that are available for Pydroid3, and some example codes, namely: os, pathlib, Pandas, NumPy, SciPy, Matplotlib, Seaborn, PySimpleGUI, NetworkX, Biopython, WordCloud, Kivy, and Jupyter Notebook. The last section of this compilation describes the Scikit-learn library, basic concepts of the Scikit-learn module, and algorithms available with this module, namely: Linear Regression, Logistic Regression, Principal Component Analysis (PCA), XGBoost, K-nearest neighbors, and support vector machine.

INTRODUCTION

A robust and user-friendly toolkit for the Python programming language, *Scikit-learn* offers several machine learning methods. Because of its extensive toolkit, which includes modules for data pre-processing, model creation, model evaluation, and model selection, it is one of the most popular libraries among developers. Along with factor analysis, ability to extricate features, and scale dimensions on complex datasets. *Scikit-learn* also supports many supervised and unsupervised learning techniques like random forests, k-nearest neighbors, and support vector machine SVM. It is based on the well-known Python libraries *NumPy* and *SciPy*. Additionally, its algorithms are simple to use because of the detailed documentation and tutorials that provide step-by-step explanations, making it the perfect tool for anyone perusing machine learning. Finally, *Scikit-learn* module is the best choice for many machine learning applications thanks to its user-friendly API and strong emphasis on automation (Lutz, 2013).

PYTHON

Python is a popular, easy to learn, simple, object-oriented, interpreted, high-level programming language, based on more abstract, difficult, and symbolic C language. Python was created by Guido van Rossum in 1990s. It has become known for its ease of use, readability, low-level syntax, and ability to rapid develop ideas. Python also has a wealth of robust machine learning libraries that make it easy to implement complex algorithms and platforms in Python. This makes Python an attractive choice when working with machine learning problems. Python and its source code are released under liberal GNU General Public License (GPL) which makes it attractive option even for commercial projects (Lutz, 2006).

Currently, Python is the preferred programming language of more than 80% of the developers. One key advantage of using Python is that it is generally easier to get started with than many other languages promoted as suitable for machine learning. This is partly due to Python's readability and partly due to the abundance of free resources available online. Additionally, Python has been widely adopted by data scientists, making it a familiar toolkit that can be easily integrated into existing neural networks and business applications. For example, Flutter (Dart)is currently the de facto language of Android development is a bracket hell, brackets to enclose chunks of code, brackets to enclose those brackets, *ad infinitum*., making code confusing and incomprehensible to the reader (Lutz, 2013 and https://neurodeb.pirsquared.org)

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