FIT5149

Introduction

This work proposed a deep learning model that is capable of detecting the working condition (On - Off) of five appliances, including air conditioner, electric vehicle charger, oven, cloth washer and dryer.

The first part of the project is EDA, you can find our work at the FIT5149_EDA_FINAL_VERSION.ipynb notebook. Then, the best model that we have found will be presented below

Installation

To run the program, some libraries are required.

Use the package manager pip to install some python packages: torch, pandas, numpy, scikit-learn, pathlib, matplotlib, multiprocess, tsfresh, tqdm

```
 pip install torch
pip install pandas
pip install numpy
pip install scikit-learn
pip install pathlib
pip install mathplotlib
pip install multiprocess
pip install tsfresh
pip install tqdm
```

In case you're using Conda or Miniconda, here are sample steps to create an environment (My computer is running Ubuntu OS, core i9, and RTX 3080 GPU, thus you might need some minor changes to get it running on your computer).

```
 conda create --name group1ass2 python=3.8.6 pytorch=1.7.1 cudatoolkit=11.0.221 cudatoolkit-dev cmake=3.18.2 cudnn --channel pytorch
conda activate group1ass2
conda install pandas, numpy
conda install -c anaconda scikit-learn, pathlib
conda install -c conda-forge matplotlib, multiprocess, tsfresh, tqdm
```

As Pytorch allow us to train the model using GPU, which is much faster than the current CPU performance. To start, you will need the GPU version of Pytorch, and please make sure that your computer has a higher end NVIDIA GPU that is CUDA enabled, other wise the model will be trained on CPU, we haven't tried to train it on CPU before but pretty sure it will take at least a day.

Usage

To reproduce the model, the first Jupyter Notebook file that should be run is: "CNN_model_training" After installing all the required packages, you can simply hit the "Kernel -> Restart and Run All"

The model would take roughly 4 hours to finish the training phase (1 hour for preprocessing, 3 hours for training). The final models (1 with best accuracy, 1 with best F1 score, and one after finish training) will be saved in the "trained_model" directory

For the inference and testing part, you can open the "CNN_model_intererence" notebook, and click "Kernel -> Restart and Run All". It will take around 1h to preprocess and run, the output would be generated as a csv file.

Note: If you want to save 2 hour preprocessing data on your computer (which is heavy and might crash your computer if it not strong enough). Preprocessed data can be downloaded here: https://drive.google.com/drive/folders/1eFRQ70vebFuOiMC7n1k_PU0uK5plU5qM?usp=sharing They should be placed in the preprocessed_data folder, and comment+uncomment the code like instructed inside the file

Contribution

If you want to make any contribution to our current work, pull requests are welcome. If you want any further discussion, you can send us an email via: mngu0072@student.monash.edu or dlee0059@student.monash.edu