Guide to replicate
SurvLIMEpy experiments

Version 0.0.9

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1   Introduction

This document is created to help the reviewers run the code of the experiments of the manuscript "SurvLIMEpy: A Python package implementing SurvLIME".

All the material is split into two folders: *analyses* and *experiments*. The first folder contains just an script that generates "Table 1", "Table 2" and "Table 3" of our manuscript. Section 2 is devoted to explain how to run this script.

Regarding the *experiments* folder, it contains all the scripts needed to reproduce the experiments presented in Section "4. Experiments". These scripts allow to generate all the data needed to obtain the figures in Section "4. Experiments". Additionally, they also generate the figures. Sections 3 to 9 are devoted to explain how to run those scripts.

Note that all the submitted material is available in our *GitHub* repository[1], as it is explained in the manuscript.

2   Bivariate descriptive analysis tables

The tables related to the bivariate descriptive analysis have been generated using R language ("Table 1", "Table 2" and "Table 3" of our manuscript). The script is inside the folder *analyses* and it is called *bivariate_analyses.R*. Before starting the analyses, *tidyverse* package is installed. After that, the script analyses all the datasets and it produces all the tables. Note that to have a successful execution, the datasets need to be in the same folder as the scripts, as it is currently submitted. A single execution of the script produces all the tables.

3   Preliminary for experiments

From this section onwards, we assume that the reviewer is located inside the folder *experiments*. All the scripts are coded using Python language. Before running the experiments, we recommend to create an isolated environment, since some packages are required to be installed. Once the environment is created, it is needed to install all the packaged present in the file *requirements.txt*. It can be done by running the command provided in Listing 1.

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[1]https://github.com/imatge-upc/SurvLIME-experiments

```
pip install -r requirements.txt
```

Listing 1: Install requirements.

The code is spread in 7 different scripts which are all combined in the *all_experiments_script.py* script:

- all_experiments_script.py

- experiment_1_montecarlo.py

- experiment_1_2_montecarlo.py

- experiment_real_dataset_ml.py

- deepsurv_rds.py

- make_plots_script.py

- hyperparams.py

We recommend to use this *all_experiments_script.py* script if the reviewers want to execute any experiment of the manuscript. Throughout the following sections, it is explained how to use this script.

Our experiments take longer than 1 hour to run as, at its core, we are solving optimisation problems multiple times. We provide some details that helps reduce de execution time.

In our manuscript, we repeat some experiments 100 times. However, in the submitted script, this parameter has been set to 10 in order to shorten the execution time. Therefore, the results obtained will not be exactly the same as the one submitted in the paper. Nonetheless, we will provide details about what to do in order to obtain the same results. If so, the experiments will last more than 1 hour.

In any case, we also provide the data we have obtained to generate the manuscript so that the reviewers can either inspect it or use it.

4 Experiments of Section "4.1. Simulated data"

In case the reviewers want to obtain similar results as the ones provided in Section "4.1. Simulated data", execute in the terminal the command displayed in Listing 2.

```
python all_experiments_script.py --exp simulated
```

Listing 2: Command for simulated data.

```
python all_experiments_script.py --exp simulated --repetitions 100
```

Listing 3: Command for simulated data using all repetitions.

In case the reviewers want to obtain exactly the same results as the ones submitted in the manuscript, the code provided in Listing 3 allows to obtain them.

The directory *computed_weights_csv/exp2* is created and the data is stored in that directory. There, multiple csv files are stored:

- center_cluster_1.csv: data needed in order to create Figure 3 left.

- center_cluster_2.csv: data needed in order to create Figure 3 right.

- exp_2_cluster_1_mean.csv: data needed in order to create Figure 4 top left.

- exp_2_cluster_1_min.csv: data needed in order to create Figure 4 top middle.

- exp_2_cluster_1_max.csv: data needed in order to create Figure 4 top right.

- exp_2_cluster_2_mean.csv: data needed in order to create Figure 4 bottom left.

- exp_2_cluster_2_min.csv: data needed in order to create Figure 4 bottom middle.

- exp_2_cluster_2_max.csv: data needed in order to create Figure 4 bottom right.

If the reviewers want more details about the experiments related to this section, please inspect scripts *all_experiments_script.py*, *experiment_1_montecarlo.py* and *experiment_1_2_montecarlo.py*.

Once all the data is stored, it is used to generate the figures related to this section. The script that manages this part is *make_plots_script.py*. It is not needed to execute it since the script *all_experiments_script.py* is in charge of executing it. Before storing the figures, a directory called *figures* is created. Afterwards, all the figures are stored. Concretely, the following figures are created:

- center_cluster_1.png: Figure 3 left.

- center_cluster_2.png: Figure 3 right.

- simulated_exp_cluster1_mean_values.png: Figure 4 top left.

- simulated_exp_cluster1_min_values.png: Figure 4 top middle.

- simulated_exp_cluster1_max_values.png: Figure 4 top right.

- simulated_exp_cluster2 _mean_values.png: Figure 4 bottom left.

- simulated_exp_cluster2_min_values.png: Figure 4 bottom middle.

- simulated_exp_cluster2_max_values.png: Figure 4 bottom right.

5 Experiments of Section "4.2. Real data"

In case the reviewers want to obtain similar results as the ones provided in Section "4.2: Real data", they must execute in the terminal the command provided in Listing 4.

```
python all_experiments_script.py --exp real
```

Listing 4: Command for real data.

In case the reviewers want to obtain exactly the same results as the ones reported in the manuscript, the command provided in Listing 5 must be executed.

```
python all_experiments_script.py --exp real --repetitions 100
```

Listing 5: Command for real data taking into account all the repetitons.

Note that the execution time of the previous command takes longer than 1 hour. After executing it, all the models are trained using the same train/test used for the manuscript. Additionally, the set of hyperparamenters are provided to the models. This set is the same as the one used for the manuscript. In order to obtain more details about the set of hyperparameters, please inspect the script *hyperparams.py*

Once the models are trained, the data needed to produce the results are obtained. Concretely, the data obtained is:

- cox_exp_udca_surv_weights.csv: data needed in order to create Figure 5 top.

- rsf_exp_udca_surv_weights.csv: data needed in order to create Figure 5 bottom left.

- xgb_exp_udca_surv_weights.csv: data needed in order to create Figure 5 bottom right.

- cox_exp_lung_surv_weights.csv: data needed in order to create Figure 6 top.

- rsf_exp_lung_surv_weights.csv: data needed in order to create Figure 6 bottom left.

- xgb_exp_lung_surv_weights.csv: data needed in order to create Figure 6 bottom right.

- cox_exp_veteran_surv_weights.csv: data needed in order to create Figure 7 top.

- rsf_exp_veteran_surv_weights.csv: data needed in order to create Figure 7 bottom left.

- xgb_exp_veteran_surv_weights.csv: data needed in order to create Figure 7 bottom right.

All these files are store in the folder *computed_weights_csv/exp_real_datasets*. If this folder does not exist, it is created before storing the files. After storing the data, the figures are produced and stored in the folder *figures*. Concretely, the set of figures created are:

- cox_udca.png: Figure 5 top.

- rsf_udca.png: Figure 5 bottom left.

- xgb_udca.png: Figure 5 bottom right.

- cox_lung.png: Figure 6 top.

- rsf_lung.png: Figure 6 bottom left.

- xgb_lung.png: Figure 6 bottom right.

- cox_veterans.png: Figure 7 top.

- rsf_veterans.png: Figure 7 bottom left.

- xgb_veterans.png: Figure 7 bottom right.

It is not needed to execute the whole script if just a subset of figures is needed. For instance, if just the experiments related to UDCA are needed, the command provided in Listing 6 shows how to do it. The code executed is just

```
python all_experiments_script.py --exp real --detaset udca
```

Listing 6: Command needed to obtain UDCA results.

the one needed in order to produce the data and the figures related to UDCA dataset. If 100 repetitions are needed, include this option in the terminal. In order to replicate the results for the other two datasets, the code provided in Listing 7 shows how to do it.

```
python all_experiments_script.py --exp real --detaset lung
python all_experiments_script.py --exp real --detaset veterans
```

Listing 7: Command needed to obtain LUNG and Veteran results.

In case the reviewers want to obtain more details about the experiments of Section "4.2. Real data", please inspect the scripts *all_experiments_script.py* and *experiment_real_datasets_ml.py*.

6 Experiments of Section "4.3. Simulated data and deep learning models"

In case the reviewers want to obtain similar results as the ones provided in Section "4.3 Simulated data and deep learning models", they must execute the command provided in Listing 8.

```
python all_experiments_script.py --exp dl
```

Listing 8: Command to obtain deep learning results.

In case the reviewers want to obtain exactly the same results as the ones reported in the manuscript, the command provided in Listing 9 must be executed.

After executing this command, the directory *computed_weights_csv/exp_deepsurv_rds* is created. There, the following csv files is stored:

```
python all_experiments_script.py --exp dl --repetitions 100
```

Listing 9: Command to obtain deep learning results taking into account all repetitions.

- exp_deepsurv_rds_surv_weights.csv: data needed in order to create Figure 8.

Once all the data is stored, it is used to generate the figure related to this section. The script that manages this part is *make_plots_script.py*. It is not needed to execute it since the script *all_experiments_script.py* is in charge of executing it. Before storing the figures, a directory called *figures* is created. Afterwards, the figures is stored. Concretely, the following figure is created:

- deepsurv_rds.png: Figure 8.

In case the reviewers need more details, please inspect scripts *all_experiments_script.py* as well as *deepsurv_rds.py*

7 Executing all experiments at the same time

The script *all_experiments_script.py* can also be execute to generate all the data and all the figures explained in Sections 4 to 6 using a single command. In case the reviewers want to obtain similar results as the ones provided in our manuscript, the command provided in Listing 10 must be executed.

```
python all_experiments_script.py --exp all
```

Listing 10: Command to execute all the experiments.

In case the reviewers want to obtain exactly the same results as the ones reported in the manuscript, they should execute the command in Listing 11.

```
python all_experiments_script.py --exp all --repetitions 100
```

Listing 11: Command to execute all the experiments taking into account all repetitions.

This will create all the data as well as all the figures described in Sections 4 to 6. Note that it will take much longer than 1 hour.

8   Experiments tables

In Sections "4.2. Real data" and "4.3. Simulated data and deep learning models" we provide some tables which compare the coefficients of Cox Proportional Hazards Model and SurvLIME coefficients: "Table 6", "Table 7", "Table 8" and "Table 10". In order to obtain them, first all the experiments must be executed using the command provided in Listing 11. After that, the command provided in Listing 12 is in charge of providing the results related to the tables.

```
python all_experiments_script.py --exp only_plot
```

Listing 12: Command to execute to obtain the results of the tables.

9   Providing our data

Apart from the scripts, we are also providing the data we have obtained to generate the manuscript. It is stored in the folder *authors_computed_weights_csv*. This data allows to create all the figures presented in our manuscript. The command provided in Listing 12 produces all of them.

Before running the script, the folder *authors_computed_weights_csv* must be renamed to *computed_weights_csv*. The code is in charge of creating a folder called *figures* and storing there all the figures. Note that the figures stored in the folder *figures* are explained in Sections 4 to 6.