MIMIC II Data Analysis

Ivana Malenica and Rachael Phillips

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Overview

1 Overview of the Data

We only considered patients that had:

- at least 8 hours of data.
- at most 1 min time gap between two consecutive measurements.

We can see a list of all the covariates available, as well as the basic summary statistic for each below.

```
##  [1] "abpsys"                "abpdias"
##  [3] "abpmean"               "spo2"
##  [5] "imputed_abpmean"       "imputed_abpsys_abpdias"
##  [7] "hypo_event"            "amine"
##  [9] "sedation"              "ventilation"
## [11] "rank_icu"              "gender"
## [13] "age"                   "sapsi_first"
## [15] "sofa_first"            "bmi"
## [17] "care_unit"             "admission_type_descr"
## [19] "imputed_age"           "imputed_bmi"
## [21] "imputed_sofa"          "imputed_sapsi"
```

We further explore the number of total hypotensive episodes experiences per each patient.

Finally, we expore how many patients had at least one episode. 442 of the 698 subjects experienced at least one hypotensive event, and the outcome function `Y1` was used to specify hypotensive events. By definition, an hypotensive episode is defined as a 5 minute window with mean arterial pressure (MAP) below 62 mmHg.

2 Prepare Data for the Analysis

Below we list covariates we use for the further analysis. In particular, we can classify them as follows:

1. Baseline Covariates

```
##  [1] "gender"                "age"                   "care_unit"
##  [4] "admission_type_descr" "sapsi_first"           "sofa_first"
##  [7] "bmi"                   "rank_icu"              "imputed_age"
## [10] "imputed_bmi"           "imputed_sofa"          "imputed_sapsi"
```

1.Time-varying Covariates

```
## [1] "amine"           "sedation"        "ventilation"     "spo2"
## [5] "hr"              "abpmean"         "imputed_abpmean"
```

3 Build the Combined Super Learner

The combined online super learner also uses the individual super learner, which learns only from one sample at a time. For the individual super learner, we incorporate the above described covariates as well. In addition, we consider two different Cross-Validation schemes:

- Rolling Origin:
  - initial training set size 15 minutes
  - test set size 15 minutes
  - increase training set size by increments of 5 minutes
- Rolling Window:
  - each window size is 15 minutes
  - test set size 15 minutes
  - increase training set size by increments of 5 minutes

For the combined super learner, we incorporate a gap of 30 minutes between the last trained time point and the first prediction time point. If round hour, we include a gap of 0, due to the data-setup. Therefore, the prediction is for a 15 minute period 30 minutes in the future (since the last trained time-point).

As explored in previous simulations, we only consider the binary outcome, instead of the continuous (even though the combined Super Learner has support for both).

For the base learning library, we consider 8 variations of xgboost:

[1] “Lrnr_xgboost_20_1_4_0.001” “Lrnr_xgboost_20_1_8_0.001” [3] “Lrnr_xgboost_20_1_4_0.01” “Lrnr_xgboost_20_1_8_0.01” [5] “Lrnr_xgboost_20_1_4_0.1” “Lrnr_xgboost_20_1_8_0.1” [7] “Lrnr_xgboost_20_1_4_0.2” “Lrnr_xgboost_20_1_8_0.2”

4 Examine Results for Combined Super Learner

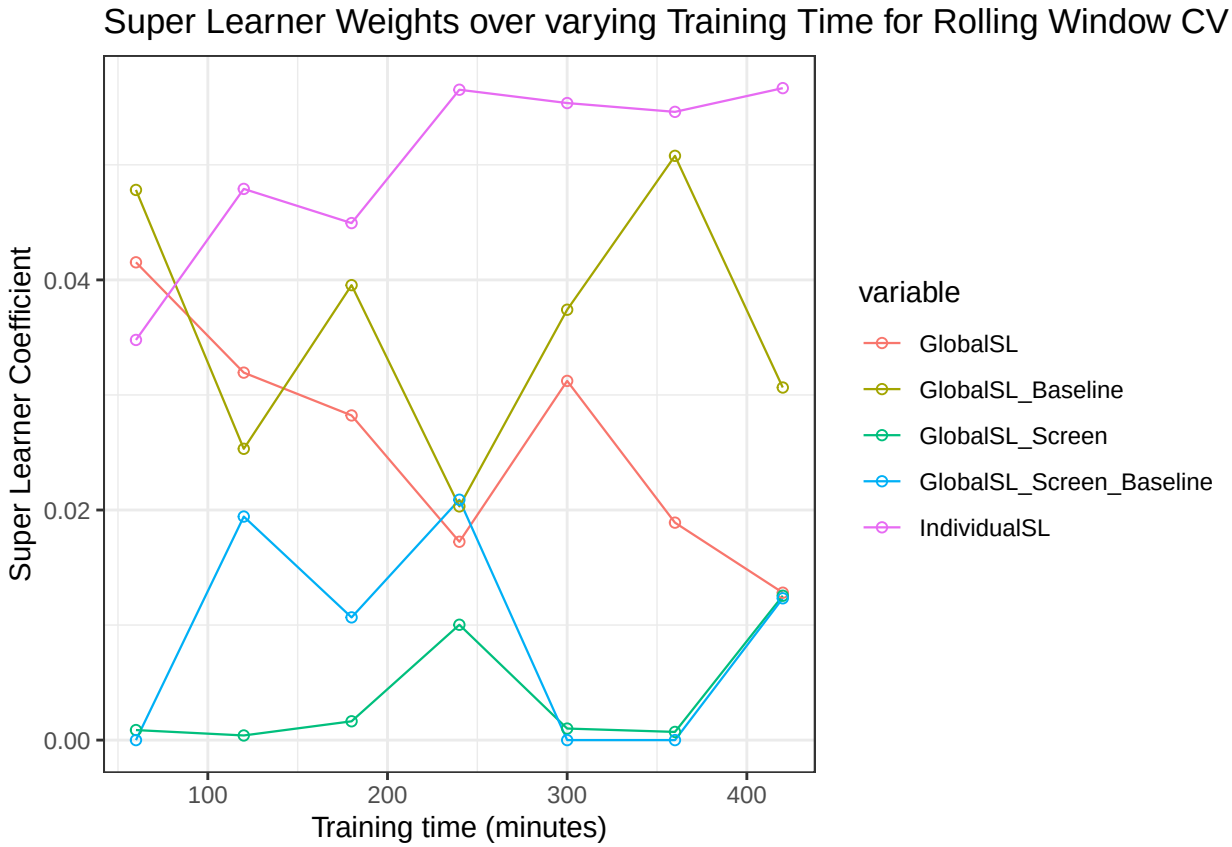

Table 1: **Risk for all different SLs considered for Rolling Window CV**

	loss_online_SL	loss_regular_SL	loss_individual_SL
t=60	0.1858675402	0.2130141915	0.7316000287
t=120	0.1642030357	0.1921674220	0.5049301639
t=180	0.1835364538	0.2069144820	0.4828999435
t=240	0.1662170399	0.1998173694	0.3666914719
t=300	0.1917679758	0.2188869184	0.3407229895
t=360	0.1620297859	0.1886945592	0.3523024722
t=420	0.1782965104	0.2044575612	0.2996297284

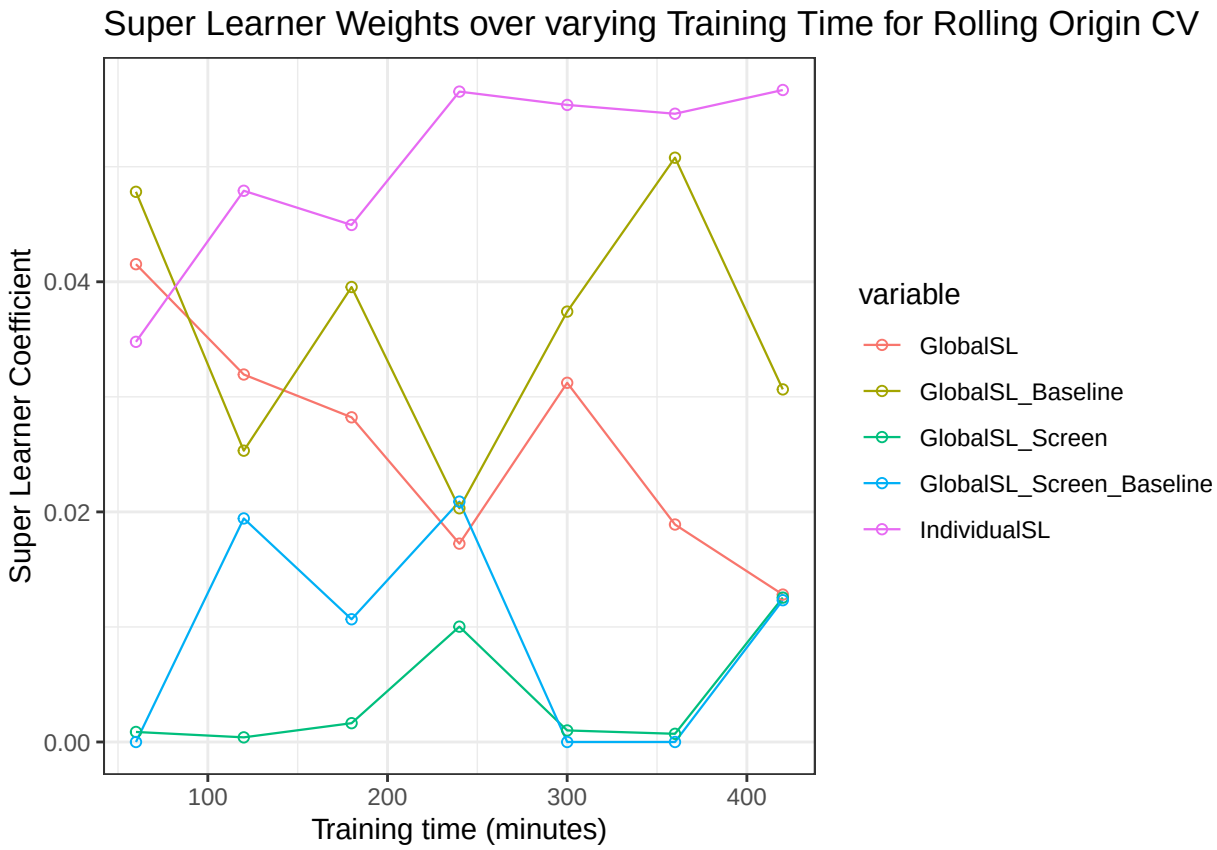

Table 2: **Risk for all different SLs considered for Rolling Origin CV**

	loss_online_SL	loss_regular_SL	loss_individual_SL
t=60	0.1858675402	0.2130141915	0.7316000287
t=120	0.1642030357	0.1921674220	0.5049301639
t=180	0.1835364538	0.2069144820	0.4828999435
t=240	0.1662170399	0.1998173694	0.3666914719
t=300	0.1917679758	0.2188869184	0.3407229895
t=360	0.1620297859	0.1886945592	0.3523024722
t=420	0.1782965104	0.2044575612	0.2996297284