

Variable Selection Result: Random Survival Forest

Mingcheng Hu

Table of contents

Minimally-adjusted Model	1
Partially-adjusted Model	4
Fully-adjusted Model	6

Minimally-adjusted Model

```
library(tidyverse)
```

```
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
v dplyr      1.1.4      v readr      2.1.4
v forcats    1.0.0      v stringr    1.5.1
v ggplot2    3.4.4      v tibble     3.2.1
v lubridate  1.9.3      v tidyr      1.3.0
v purrr      1.0.2
-- Conflicts ----- tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()     masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become
```

```
library(randomForestSRC)
```

```
randomForestSRC 3.3.3
```

Type `rfsrc.news()` to see new features, changes, and bug fixes.

Attaching package: 'randomForestSRC'

The following object is masked from 'package:purrr':

`partial`

```
source("/work/users/y/u/youkias/BIOS-Material/BIOS992/utils/csv_utils.r")
# * Don't use setwd() for Quarto documents!
# setwd("/work/users/y/u/youkias/BIOS-Material/BIOS992/data")
```

```
adjust_type_str <- "minimal"
impute_type_str <- "unimputed"
include_statin <- "no"
file_path_minimal <- get_data_path("vimp_rsf",
                                   adjust_type_str,
                                   impute_type_str,
                                   include_statin,
                                   model = "rsf")
load(file_path_minimal)
```

```
print(vimp_rsf$importance)
```

HRV_KFD	HRV_CD	HRV_SI	HRV_IALS
0.0120709079	0.0141230547	0.0077236797	0.0050860638
HRV_PIP	HRV_SD2a	HRV_ApEn	HRV_LZC
0.0048443062	0.0121208239	0.0064542563	-0.0005560018
HRV_PI	HRV_PAS	HRV_CSI_Modified	HRV_ShanEn
0.0035581599	0.0070936715	0.0130650744	0.0085501731
HRV_GI	HRV_C2d	HRV_PSS	
0.0068713003	0.0070785720	0.0032849754	

```
print(vimp_rsf_full$importance)
```

HRV_SD1	HRV_SD2
2.136505e-03	5.614053e-03

HRV_SD1SD2	HRV_S
2.797289e-03	4.939103e-03
HRV_CSI	HRV_CVI
3.183902e-03	4.191366e-03
HRV_CSI_Modified	HRV_PIP
7.344859e-03	-5.153380e-04
HRV_IALS	HRV_PSS
-3.476631e-05	-3.792793e-04
HRV_PAS	HRV_GI
3.805846e-03	2.981081e-03
HRV_SI	HRV_AI
3.671429e-03	2.784226e-03
HRV_PI	HRV_C1d
3.512909e-03	6.568889e-04
HRV_C1a	HRV_SD1d
1.190114e-03	2.222749e-03
HRV_SD1a	HRV_C2d
4.597664e-04	3.721871e-03
HRV_C2a	HRV_SD2d
3.367713e-03	3.477711e-03
HRV_SD2a	HRV_Cd
9.522304e-03	3.566069e-03
HRV_Ca	HRV_SDNNd
2.792614e-03	2.954861e-03
HRV_SDNNa	HRV_ApEn
4.815235e-03	1.475234e-03
HRV_ShanEn	HRV_FuzzyEn
4.293097e-03	1.686561e-04
HRV_MSEn	HRV_CMSEn
9.589168e-04	2.057079e-03
HRV_RCMSEn	HRV_CD
9.501592e-04	6.651324e-03
HRV_HFD	HRV_KFD
2.506876e-04	6.358864e-03
HRV_LZC	HRV_DFA_alpha1
-2.040789e-03	2.775691e-04
HRV_MFDFA_alpha1_Width	HRV_MFDFA_alpha1_Peak
1.540411e-03	2.104263e-03
HRV_MFDFA_alpha1_Mean	HRV_MFDFA_alpha1_Max
1.400694e-03	9.127033e-04
HRV_MFDFA_alpha1_Delta	HRV_MFDFA_alpha1_Asymmetry
1.383616e-03	1.531143e-03
HRV_MFDFA_alpha1_Fluctuation	HRV_MFDFA_alpha1_Increment

1.488281e-03

1.143851e-03

Partially-adjusted Model

```
adjust_type_str <- "partial"
impute_type_str <- "unimputed"
include_statin <- "no"
file_path_partial <- get_data_path("vimp_rsf",
                                   adjust_type_str,
                                   impute_type_str,
                                   include_statin,
                                   model = "rsf")
load(file_path_partial)
```

```
print(vimp_rsf$importance)
```

HRV_Prc20NN	HRV_CD	HRV_MaxNN	HRV_KFD	HRV_SI	HRV_ApEn
0.017085480	0.017826369	0.025160180	0.014392589	0.011884425	0.012215355
HRV_MedianNN	HRV_LZC				
0.008534522	0.003489593				

```
print(vimp_rsf_full$importance)
```

HRV_MeanNN	HRV_SDNN
7.907376e-03	5.287221e-03
HRV_RMSSD	HRV_SSD
1.627471e-03	1.811840e-03
HRV_CVNN	HRV_CVSD
1.856904e-03	1.502647e-03
HRV_MedianNN	HRV_MadNN
1.203487e-03	2.190835e-03
HRV_MCVNN	HRV_IQRNN
9.988755e-04	1.939145e-03
HRV_SDRMSSD	HRV_Prc20NN
4.155045e-03	2.670076e-03
HRV_Prc80NN	HRV_pNN50
4.185476e-03	1.123924e-03
HRV_pNN20	HRV_MinNN

3.909435e-03	7.267611e-03
HRV_MaxNN	HRV_HTI
1.112739e-02	2.733773e-03
HRV_TINN	HRV_LF
6.481876e-03	3.045087e-03
HRV_HF	HRV_VHF
1.588228e-03	3.208610e-03
HRV_TP	HRV_LFHF
1.949309e-03	2.164909e-03
HRV_LFn	HRV_HFn
2.395356e-03	2.222386e-03
HRV_LnHF	HRV_SD1
1.693834e-03	2.149402e-03
HRV_SD2	HRV_SD1SD2
5.123144e-03	2.297207e-03
HRV_S	HRV_CSI
4.038754e-03	1.278363e-03
HRV_CVI	HRV_CSI_Modified
3.610515e-03	6.074494e-03
HRV_PIP	HRV_IALS
1.597225e-03	1.432696e-03
HRV_PSS	HRV_PAS
6.653687e-04	4.430928e-03
HRV_GI	HRV_SI
2.133659e-03	1.446265e-03
HRV_AI	HRV_PI
3.022687e-03	3.697729e-03
HRV_C1d	HRV_C1a
2.083447e-03	2.067141e-03
HRV_SD1d	HRV_SD1a
1.969954e-03	1.002391e-03
HRV_C2d	HRV_C2a
3.101055e-03	3.022173e-03
HRV_SD2d	HRV_SD2a
2.540756e-03	8.211587e-03
HRV_Cd	HRV_Ca
2.572273e-03	2.620033e-03
HRV_SDNNd	HRV_SDNNa
2.942423e-03	3.575838e-03
HRV_ApEn	HRV_ShanEn
2.594732e-03	1.496388e-03
HRV_FuzzyEn	HRV_MSEn
5.345699e-04	1.291413e-03

HRV_CMSEn	HRV_RCMSEn
2.790826e-03	1.406210e-03
HRV_CD	HRV_HFD
6.020359e-03	5.668310e-04
HRV_KFD	HRV_LZC
4.378172e-03	-9.422945e-05
HRV_DFA_alpha1	HRV_MFDFA_alpha1_Width
5.755128e-04	1.182881e-03
HRV_MFDFA_alpha1_Peak	HRV_MFDFA_alpha1_Mean
1.731624e-03	1.380528e-03
HRV_MFDFA_alpha1_Max	HRV_MFDFA_alpha1_Delta
1.150815e-03	1.631513e-03
HRV_MFDFA_alpha1_Asymmetry	HRV_MFDFA_alpha1_Fluctuation
8.173868e-04	1.174268e-03
HRV_MFDFA_alpha1_Increment	
1.219562e-03	

Fully-adjusted Model

```
adjust_type_str <- "full"
impute_type_str <- "imputed"
include_statin <- "no"
file_path_full1 <- get_data_path("vimp_rsf",
                                adjust_type_str,
                                impute_type_str,
                                include_statin,
                                model = "rsf")
file_path_full2 <- get_data_path("vimp_rsf_full",
                                adjust_type_str,
                                impute_type_str,
                                include_statin,
                                model = "rsf")
load(file_path_full1)
load(file_path_full2)
```

```
print(vimp_rsf$importance)
```

age	sexFemale
0.1759200908	0.0230215027

sexMale	hypertension_treatmentYes
0.0264274977	0.0349145190
systolic_bp	max_workload
0.0230034093	0.0202413789
BMI	max_heart_rate
0.0199327837	0.0180837258
hdl_chol	educationA levels/AS levels
0.0133878003	0.0013224935
education0 levels/GCSEs	educationCSEs
-0.0002583208	-0.0003464689
educationNVQ/HND/HNC	educationOther professional
0.0175015510	0.0022651699
educationNone of the above	educationPrefer not to answer
0.0204056520	0.0340783123
diabetesYes	diabetesDo not know
0.0038101725	0.0206359402
diabetesPrefer not to answer	HRV_Prc20NN
0.0035604557	0.0154653174
total_chol	smokingPrevious
0.0150605163	0.0000442906
smokingCurrent	smokingPrefer not to answer
0.0015281829	0.0090785345
HRV_MinNN	HRV_ApEn
0.0328295029	0.0149180899

```
print(vimp_rsf_full$importance)
```

age	sexFemale
1.093649e-01	2.157333e-02
sexMale	ethnicityMixed
2.295661e-02	-1.063479e-04
ethnicityAsian/Asian British	ethnicityBlack/Black British
-1.351683e-03	2.133472e-03
ethnicityChinese	ethnicityOther
-2.812663e-04	2.065875e-03
BMI	smokingPrevious
1.186147e-02	3.662928e-04
smokingCurrent	smokingPrefer not to answer
7.419960e-04	6.547387e-03
diabetesYes	diabetesDo not know
3.789793e-03	8.612787e-03
diabetesPrefer not to answer	systolic_bp

1.904642e-03	2.299251e-02
hypertension_treatmentYes	total_chol
2.792798e-02	6.664882e-03
hdl_chol	educationA levels/AS levels
6.580559e-03	-1.736643e-04
education0 levels/GCSEs	educationCSEs
-9.601800e-05	-7.809246e-04
educationNVQ/HND/HNC	educationOther professional
7.730079e-03	2.150305e-03
educationNone of the above	educationPrefer not to answer
1.711807e-02	1.425712e-02
activityModerate	activityHigh
1.139662e-04	-5.674767e-05
max_workload	max_heart_rate
2.270492e-02	1.808745e-02
HRV_MeanNN	HRV_SDNN
6.110814e-03	5.665156e-03
HRV_RMSSD	HRV_SSD
2.819939e-03	3.200041e-03
HRV_CVNN	HRV_CVSD
3.179037e-03	2.677599e-03
HRV_MedianNN	HRV_MadNN
6.658187e-03	6.506320e-03
HRV_MCVNN	HRV_IQRNN
4.102856e-03	5.208031e-03
HRV_SDRMSSD	HRV_Prc20NN
4.153746e-03	1.625783e-02
HRV_Prc80NN	HRV_pNN50
6.254883e-03	4.860026e-03
HRV_pNN20	HRV_MinNN
5.471915e-03	9.926377e-03
HRV_MaxNN	HRV_HTI
8.120847e-03	3.239295e-03
HRV_TINN	HRV_LF
1.063885e-02	3.050130e-03
HRV_HF	HRV_VHF
1.682283e-03	4.411929e-03
HRV_TP	HRV_LFHF
2.114558e-03	2.167909e-03
HRV_LFn	HRV_HFn
1.989923e-03	1.567373e-03
HRV_LnHF	HRV_SD1
1.366251e-03	2.937252e-03

HRV_SD2	HRV_SD1SD2
4.234839e-03	2.418633e-03
HRV_S	HRV_CSI
4.337747e-03	3.324222e-03
HRV_CVI	HRV_CSI_Modified
5.864114e-03	6.570365e-03
HRV_PIP	HRV_IALS
5.911396e-03	6.282641e-03
HRV_PSS	HRV_PAS
2.935766e-03	5.052320e-03
HRV_GI	HRV_SI
2.746017e-03	2.930615e-03
HRV_AI	HRV_PI
2.686493e-03	8.155512e-03
HRV_C1d	HRV_C1a
1.401240e-03	1.614592e-03
HRV_SD1d	HRV_SD1a
2.029935e-03	2.732630e-03
HRV_C2d	HRV_C2a
3.700505e-03	3.537887e-03
HRV_SD2d	HRV_SD2a
3.598032e-03	8.138272e-03
HRV_Cd	HRV_Ca
4.233361e-03	2.985144e-03
HRV_SDNNd	HRV_SDNNa
4.612350e-03	4.382848e-03
HRV_ApEn	HRV_ShanEn
6.352881e-03	3.382064e-03
HRV_FuzzyEn	HRV_MSEn
2.717820e-03	1.782467e-03
HRV_CMSEn	HRV_RCMSEn
3.076794e-03	2.826286e-03
HRV_CD	HRV_HFD
6.430582e-03	4.039021e-03
HRV_KFD	HRV_LZC
4.511630e-03	5.363653e-03
HRV_DFA_alpha1	HRV_MFDFA_alpha1_Width
1.751027e-03	2.529534e-03
HRV_MFDFA_alpha1_Peak	HRV_MFDFA_alpha1_Mean
1.244293e-03	2.188225e-03
HRV_MFDFA_alpha1_Max	HRV_MFDFA_alpha1_Delta
3.683435e-03	3.026250e-03
HRV_MFDFA_alpha1_Asymmetry	HRV_MFDFA_alpha1_Fluctuation

	1.735433e-03	2.594947e-03
HRV_MFDFA_alpha1_Increment		
	2.808129e-03	