Dalla Lana
School of Public Health

Datathon 2: Assessing Mortality Risk in Heart Failure Patients

Team 20: Hunter Pozzebon, Sarra Ali, Brenleigh Jebb

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1. Can the features predict mortality?
2. Are any features associated with the outcome of mortality?
3. Do the associated features predict mortality any better?

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Data analysis process and main findings

Clean Data (No missing data, No outliers of concern)

⇩

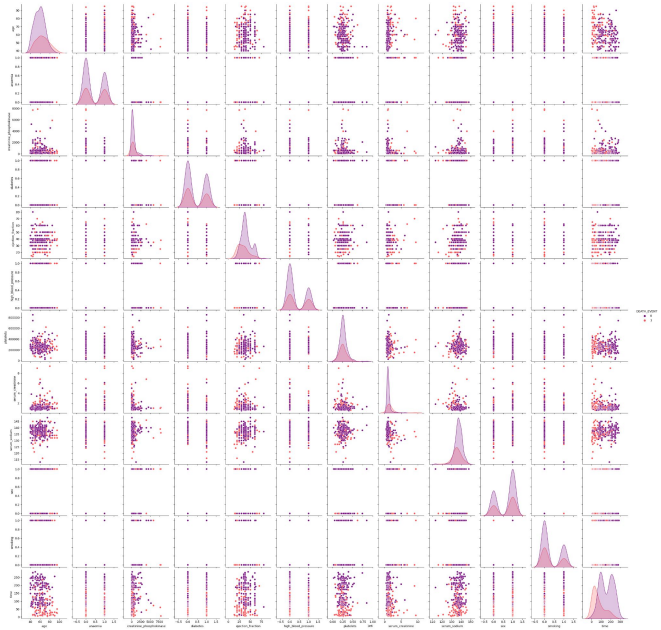
Pre-Processing (Data visualization showed no significant associations, further analysis needed)

⇩

Fit Logistic regression

⇩

Performance

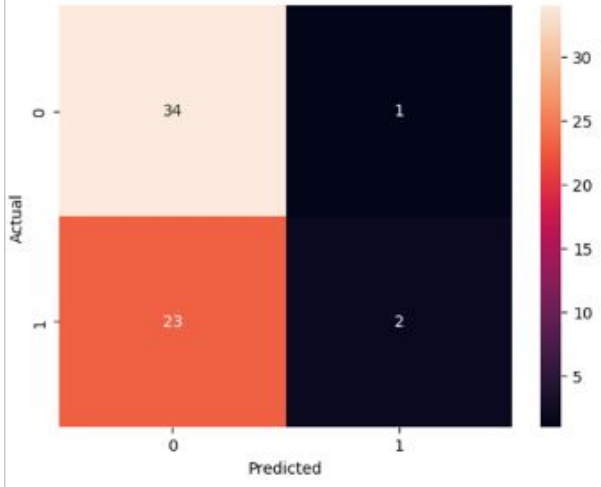


```
Optimization terminated successfully.
         Current function value: 0.492108
         Iterations 6
                           Logit Regression Results
==============================================================================
Dep. Variable:            DEATH_EVENT   No. Observations:                  299
Model:                          Logit   Df Residuals:                      287
Method:                          MLE   Df Model:                           11
Date:               Sun, 01 Oct 2023   Pseudo R-squ.:                  0.2160
Time:                       21:39:56   Log-Likelihood:                -147.14
converged:                      True   LL-Null:                       -187.67
Covariance Type:            nonrobust   LLR p-value:                 9.169e-13
============================================================================================
                               coef    std err          z      P>|z|      [0.025      0.975]
--------------------------------------------------------------------------------------------
const                        4.9643      4.601      1.079      0.281      -4.054      13.982
smoking                      0.1356      0.349      0.389      0.697      -0.548       0.819
age                          0.0557      0.013      4.241      0.000       0.030       0.081
anaemia                      0.4179      0.301      1.389      0.165      -0.172       1.008
creatinine_phosphokinase     0.0003      0.000      2.034      0.042    1.06e-05       0.001
diabetes                     0.1514      0.297      0.509      0.611      -0.431       0.734
ejection_fraction           -0.0703      0.015     -4.731      0.000      -0.099      -0.041
high_blood_pressure          0.4189      0.306      1.369      0.171      -0.181       1.019
platelets                -7.094e-07   1.62e-06     -0.439      0.661   -3.88e-06    2.46e-06
serum_creatinine             0.6619      0.173      3.817      0.000       0.322       1.002
serum_sodium                -0.0567      0.033     -1.698      0.090      -0.122       0.009
sex                         -0.3990      0.351     -1.137      0.255      -1.087       0.289
============================================================================================
```

```
Classification Report:
              precision    recall  f1-score   support

           0       0.60      0.97      0.74        35
           1       0.67      0.08      0.14        25

    accuracy                           0.60        60
   macro avg       0.63      0.53      0.44        60
weighted avg       0.63      0.60      0.49        60
```



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Model Improvements and Implications

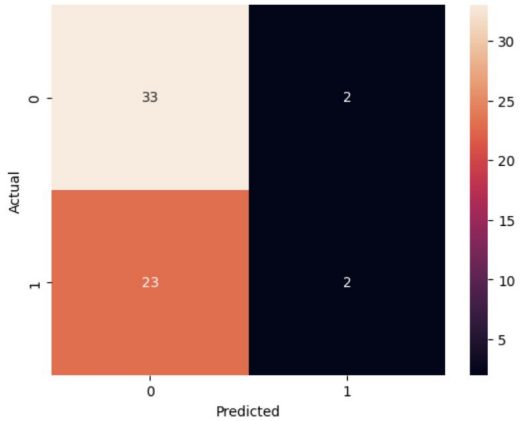
Additional models

⇩

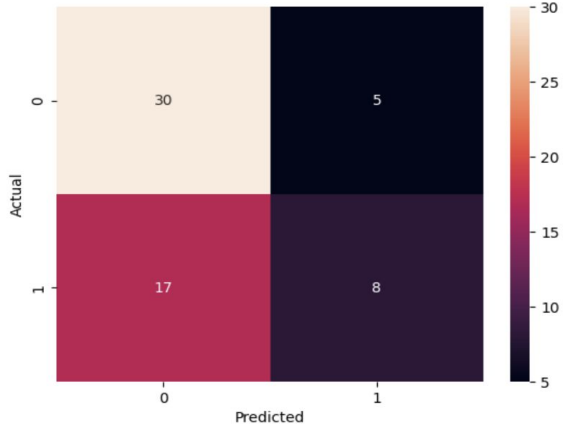
Performance

	coef	std err	z	P>|z|
const	4.9643	4.601	1.079	0.281
smoking	0.1356	0.349	0.389	0.697
age	0.0557	0.013	4.241	0.000
anaemia	0.4179	0.301	1.389	0.165
creatinine_phosphokinase	0.0003	0.000	2.034	0.042
diabetes	0.1514	0.297	0.509	0.611
ejection_fraction	-0.0703	0.015	-4.731	0.000
high_blood_pressure	0.4189	0.306	1.369	0.171
platelets	-7.094e-07	1.62e-06	-0.439	0.661
serum_creatinine	0.6619	0.173	3.817	0.000
serum_sodium	-0.0567	0.033	-1.698	0.090
sex	-0.3990	0.351	-1.137	0.255

Pseudo-R-squared = 0.085
Accuracy = 58%



Pseudo-R-squared = 0.192
Accuracy = 63%



Implications

Use with CAUTION!

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