In [1]:

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import pandas as pd
import numpy as np
from lifelines import CoxPHFitter
from sklearn.preprocessing import StandardScaler

# Load the data from the Excel file
data = pd.read_excel('data1.xlsx')

# Standardize the covariates
scaler = StandardScaler()
data[['DEATH', 'AGE', 'CompositeStage', 'LNInvolment', 'Comorbidity']] = scaler.fit_transform(data[['DEATH', 'AGE', 'Composite

# Perform univariate analysis for each column separately
for col in data.columns:
    if col not in ['Months', 'DEATH', 'AGE']:
        cph_univariate = CoxPHFitter(penalizer=0.1)
        cph_univariate.fit(data[[col, 'Months', 'DEATH', 'AGE']], 'Months', 'DEATH', show_progress=True)

        # Display the univariate analysis results for the current column
        print(f"\nUnivariate analysis for column: {col}")
        print(cph_univariate.summary)
```

```
Iteration 1: norm_delta = 0.24443, step_size = 0.9500, log_lik = -1663.17959, newton_decrement = 12.49691, seconds_since_start
= 0.0
Iteration 2: norm_delta = 0.00668, step_size = 0.9500, log_lik = -1650.99935, newton_decrement = 0.00772, seconds_since_start =
0.0
Iteration 3: norm_delta = 0.00033, step_size = 0.9500, log_lik = -1650.99166, newton_decrement = 0.00002, seconds_since_start =
0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1650.99164, newton_decrement = 0.00000, seconds_since_start =
0.0
Convergence success after 4 iterations.

Univariate analysis for column: ID
               coef  exp(coef)  se(coef)  coef lower 95%  coef upper 95%  \
covariate
ID         0.002337   1.002340  0.000471        0.001413        0.003261
AGE       -0.048967   0.952212  0.052646       -0.152151        0.054217

           exp(coef) lower 95%  exp(coef) upper 95%  cmp to         z  \
covariate
ID                    1.001414             1.003267     0.0  4.957504
AGE                   0.858858             1.055713     0.0 -0.930126

                      p  -log2(p)
covariate
ID         7.140460e-07  20.41748
AGE        3.523058e-01   1.50510
Iteration 1: norm_delta = 0.02554, step_size = 0.9500, log_lik = -1663.17959, newton_decrement = 0.12225, seconds_since_start =
0.0
Iteration 2: norm_delta = 0.00120, step_size = 0.9500, log_lik = -1663.05786, newton_decrement = 0.00027, seconds_since_start =
0.0
Iteration 3: norm_delta = 0.00006, step_size = 0.9500, log_lik = -1663.05758, newton_decrement = 0.00000, seconds_since_start =
0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.05758, newton_decrement = 0.00000, seconds_since_start =
0.0
Convergence success after 4 iterations.

Univariate analysis for column: SEX
               coef  exp(coef)  se(coef)  coef lower 95%  coef upper 95%  \
covariate
SEX        0.036028   1.036685  0.105515       -0.170776        0.242833
AGE       -0.018326   0.981841  0.052213       -0.120660        0.084009
```

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           exp(coef) lower 95%  exp(coef) upper 95%  cmp to         z  \
covariate
SEX                   0.843010             1.274856     0.0  0.341454
AGE                   0.886335             1.087639     0.0 -0.350979

                  p  -log2(p)
covariate
SEX        0.732762  0.448583
AGE        0.725604  0.462746
Iteration 1: norm_delta = 0.43180, step_size = 0.9500, log_lik = -1663.17959, newton_decrement = 27.14843, seconds_since_start
= 0.0
Iteration 2: norm_delta = 0.04180, step_size = 0.9500, log_lik = -1635.50777, newton_decrement = 0.23026, seconds_since_start =
0.0
Iteration 3: norm_delta = 0.00240, step_size = 0.9500, log_lik = -1635.27713, newton_decrement = 0.00075, seconds_since_start =
0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.27638, newton_decrement = 0.00000, seconds_since_start =
0.0
Convergence success after 4 iterations.

Univariate analysis for column: CompositeStage
                    coef  exp(coef)  se(coef)  coef lower 95%  coef upper 95%  \
covariate
CompositeStage  0.451465   1.570611  0.061942        0.330061        0.572868
AGE             0.013370   1.013460  0.053478       -0.091446        0.118185

                exp(coef) lower 95%  exp(coef) upper 95%  cmp to         z  \
covariate
CompositeStage             1.391053             1.773346     0.0  7.288543
AGE                        0.912611             1.125453     0.0  0.250006

                           p   -log2(p)
covariate
CompositeStage  3.133250e-13  41.537405
AGE             8.025824e-01   0.317279
Iteration 1: norm_delta = 0.14048, step_size = 0.9500, log_lik = -1663.17959, newton_decrement = 4.00489, seconds_since_start =
0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1659.09305, newton_decrement = 0.03361, seconds_since_start =
0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.05942, newton_decrement = 0.00010, seconds_since_start =
```

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0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.05932, newton_decrement = 0.00000, seconds_since_start =
0.0
Convergence success after 4 iterations.

Univariate analysis for column: LNInvolment
                coef  exp(coef)  se(coef)  coef lower 95%  coef upper 95%  \
covariate
LNInvolment -0.143911   0.865965  0.051475       -0.244800       -0.043022
AGE         -0.027609   0.972769  0.052098       -0.129719        0.074502

             exp(coef) lower 95%  exp(coef) upper 95%  cmp to         z  \
covariate
LNInvolment              0.782861             0.957891     0.0 -2.795740
AGE                      0.878342             1.077347     0.0 -0.529935

                   p  -log2(p)
covariate
LNInvolment  0.005178  7.593362
AGE          0.596157  0.746236
Iteration 1: norm_delta = 0.06728, step_size = 0.9500, log_lik = -1663.17959, newton_decrement = 0.79933, seconds_since_start =
0.0
Iteration 2: norm_delta = 0.00280, step_size = 0.9500, log_lik = -1662.38626, newton_decrement = 0.00141, seconds_since_start =
0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38485, newton_decrement = 0.00000, seconds_since_start =
0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38484, newton_decrement = 0.00000, seconds_since_start =
0.0
Convergence success after 4 iterations.

Univariate analysis for column: Comorbidity
                coef  exp(coef)  se(coef)  coef lower 95%  coef upper 95%  \
covariate
Comorbidity -0.066494   0.935669  0.054836       -0.173970        0.040982
AGE          0.004068   1.004076  0.055230       -0.104182        0.112317

             exp(coef) lower 95%  exp(coef) upper 95%  cmp to         z  \
covariate
Comorbidity              0.840322             1.041833     0.0 -1.212605
AGE                      0.901062             1.118867     0.0  0.073650
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```
                    p  -log2(p)
covariate
Comorbidity  0.225281  2.150203
AGE          0.941289  0.087290
Iteration 1: norm_delta = 0.03241, step_size = 0.9500, log_lik = -1663.17959, newton_decrement = 0.19925, seconds_since_start =
0.0
Iteration 2: norm_delta = 0.00091, step_size = 0.9500, log_lik = -1662.98363, newton_decrement = 0.00017, seconds_since_start =
0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1662.98346, newton_decrement = 0.00000, seconds_since_start =
0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.98346, newton_decrement = 0.00000, seconds_since_start =
0.0
Convergence success after 4 iterations.

Univariate analysis for column: FamiliyHistoryOfCancer
                            coef  exp(coef)  se(coef)  coef lower 95%  \
covariate
FamiliyHistoryOfCancer  0.080913   1.084277  0.155784       -0.224418
AGE                    -0.016309   0.983823  0.052481       -0.119169

                        coef upper 95%  exp(coef) lower 95%  \
covariate
FamiliyHistoryOfCancer        0.386244             0.798981
AGE                           0.086551             0.887658

                        exp(coef) upper 95%  cmp to         z         p  \
covariate
FamiliyHistoryOfCancer             1.471444     0.0  0.519395  0.603485
AGE                                1.090407     0.0 -0.310763  0.755981

                        -log2(p)
covariate
FamiliyHistoryOfCancer  0.728609
AGE                     0.403579
```

In [ ]: