R Projects

2024-07-25

R Markdown

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When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```r
# READ IN CSV FILES

setwd("/Users/sarahmirza/Documents/GitHub/QBS103_Repository/") # set the working directory
genes.df <- read.csv(file = "QBS103_GSE157103_genes.csv")
head(genes.df) # see if it worked
```

```
##          X COVID_01_39y_male_NonICU COVID_02_63y_male_NonICU
## 1    A1BG                      0.49                     0.29
## 2    A1CF                      0.00                     0.00
## 3     A2M                      0.21                     0.14
## 4   A2ML1                      0.04                     0.00
## 5 A3GALT2                      0.07                     0.00
## 6  A4GALT                      0.00                     0.00
##   COVID_03_33y_male_NonICU COVID_04_49y_male_NonICU COVID_05_49y_male_NonICU
## 1                     0.26                     0.45                     0.17
## 2                     0.00                     0.01                     0.00
## 3                     0.03                     0.09                     0.00
## 4                     0.02                     0.07                     0.05
## 5                     0.00                     0.00                     0.07
## 6                     0.00                     0.00                     0.00
##   COVID_06_.y_male_NonICU COVID_07_38y_female_NonICU COVID_08_78y_male_ICU
## 1                    0.21                       0.49                  0.12
## 2                    0.00                       0.01                  0.00
## 3                    0.08                       0.23                  0.08
## 4                    0.04                       0.03                  0.01
## 5                    0.00                       0.07                  0.00
## 6                    0.00                       0.00                  0.00
##   COVID_09_64y_female_ICU COVID_10_62y_male_ICU COVID_11_52y_female_NonICU
## 1                    0.51                  0.10                       0.38
## 2                    0.01                  0.00                       0.02
## 3                    0.88                  0.13                       0.47
## 4                    0.02                  0.01                       0.03
## 5                    0.79                  0.15                       0.08
## 6                    0.00                  0.00                       0.00
##   COVID_12_50y_male_ICU COVID_13_37y_male_NonICU COVID_14_55y_male_ICU
## 1                  0.45                     0.18                  0.23
## 2                  0.00                     0.00                  0.00
## 3                  0.16                     0.07                  0.22
```

```
## 4                     0.00                     0.01                     0.04
## 5                     1.75                     0.00                     0.93
## 6                     0.00                     0.00                     0.00
##   COVID_15_68y_male_ICU COVID_16_48y_male_NonICU COVID_17_54y_male_NonICU
## 1                  0.42                     0.41                     0.63
## 2                  0.00                     0.01                     0.02
## 3                  0.07                     0.58                     0.15
## 4                  0.00                     0.00                     0.02
## 5                  0.15                     0.19                     0.00
## 6                  0.03                     0.00                     0.00
##   COVID_18_70y_female_NonICU COVID_19_51y_male_NonICU COVID_20_62y_male_ICU
## 1                       0.47                     0.33                  0.32
## 2                       0.00                     0.02                  0.00
## 3                       0.30                     0.11                  0.07
## 4                       0.02                     0.02                  0.00
## 5                       0.06                     0.00                  0.22
## 6                       0.03                     0.00                  0.00
##   COVID_21_66y_male_ICU COVID_22_43y_male_ICU COVID_23_76y_male_ICU
## 1                  0.18                  0.09                   0.18
## 2                  0.00                  0.00                   0.01
## 3                  0.00                  0.06                   0.03
## 4                  0.00                  0.00                   0.00
## 5                  0.37                  0.06                   0.07
## 6                  0.03                  0.00                   0.03
##   COVID_24_55y_male_ICU COVID_25_55y_male_ICU COVID_26_41y_female_ICU
## 1                  0.22                  0.29                    0.42
## 2                  0.01                  0.00                    0.00
## 3                  0.11                  0.09                    0.18
## 4                  0.02                  0.03                    0.00
## 5                  0.15                  0.00                    0.87
## 6                  0.00                  0.00                    0.00
##   COVID_27_71y_female_ICU COVID_28_63y_male_ICU COVID_29_63y_female_ICU
## 1                    0.16                  0.18                    0.35
## 2                    0.01                  0.00                    0.00
## 3                    0.23                  0.18                    0.03
## 4                    0.01                  0.05                    0.03
## 5                    0.18                  0.45                    0.15
## 6                    0.00                  0.00                    0.03
##   COVID_30_54y_male_ICU COVID_31_50y_male_ICU COVID_32_72y_male_ICU
## 1                  0.23                  0.15                  0.34
## 2                  0.00                  0.00                  0.01
## 3                  0.11                  0.47                  0.04
## 4                  0.01                  0.00                  0.00
## 5                  0.00                  0.00                  0.29
## 6                  0.00                  0.03                  0.00
##   COVID_33_81y_male_NonICU COVID_34_64y_female_NonICU
## 1                     0.35                       0.36
## 2                     0.00                       0.00
## 3                     0.30                       0.11
## 4                     0.06                       0.00
## 5                     0.26                       0.12
## 6                     0.00                       0.00
##   COVID_35_58y_female_NonICU COVID_36_68y_male_NonICU COVID_37_87y_male_NonICU
## 1                       0.26                     0.18                     0.20
```

```
## 2                         0.00                        0.01                      0.00
## 3                         0.51                        0.09                      0.09
## 4                         0.02                        0.00                      0.07
## 5                         0.16                        0.08                      0.31
## 6                         0.00                        0.00                      0.00
##   COVID_38_68y_male_ICU COVID_39_80y_female_ICU COVID_40_66y_male_ICU
## 1                  0.29                    0.19                  0.22
## 2                  0.00                    0.00                  0.00
## 3                  0.10                    0.27                  0.17
## 4                  0.02                    0.00                  0.00
## 5                  0.35                    0.00                  0.08
## 6                  0.00                    0.07                  0.00
##   COVID_41_74y_male_ICU COVID_42_21y_female_ICU COVID_43_83y_female_ICU
## 1                  0.19                    0.24                    0.29
## 2                  0.00                    0.01                    0.00
## 3                  0.14                    0.33                    0.00
## 4                  0.00                    0.01                    0.00
## 5                  0.19                    0.39                    0.11
## 6                  0.00                    0.00                    0.00
##   COVID_44_46y_male_ICU COVID_45_62y_female_ICU COVID_46_62y_male_ICU
## 1                  0.22                    0.14                  0.53
## 2                  0.00                    0.00                  0.01
## 3                  0.14                    0.15                  0.10
## 4                  0.00                    0.03                  0.00
## 5                  0.00                    0.19                  0.06
## 6                  0.04                    0.00                  0.00
##   COVID_47_78y_male_ICU COVID_48_72y_female_ICU COVID_49_73y_male_ICU
## 1                  0.08                    0.19                  0.48
## 2                  0.01                    0.00                  0.00
## 3                  0.04                    0.06                  0.09
## 4                  0.03                    0.01                  0.03
## 5                  0.60                    0.23                  0.00
## 6                  0.00                    0.06                  0.00
##   COVID_50_37y_male_ICU COVID_51_58y_female_NonICU COVID_52_71y_male_NonICU
## 1                  0.08                      0.21                    0.25
## 2                  0.00                      0.00                    0.01
## 3                  0.01                      0.13                    0.00
## 4                  0.00                      0.00                    0.03
## 5                  0.00                      0.00                    0.00
## 6                  0.72                      0.00                    0.00
##   COVID_53_35y_female_NonICU COVID_55_62y_female_ICU COVID_56_33y_female_NonICU
## 1                       0.25                    0.09                      0.28
## 2                       0.00                    0.00                      0.00
## 3                       0.64                    0.09                      0.16
## 4                       0.10                    0.01                      0.09
## 5                       0.00                    0.00                      0.23
## 6                       0.00                    0.00                      0.00
##   COVID_57_30y_female_NonICU COVID_58_62y_male_NonICU COVID_59_55y_male_NonICU
## 1                       0.42                    0.39                    0.33
## 2                       0.00                    0.00                    0.00
## 3                       0.27                    0.08                    0.10
## 4                       0.01                    0.00                    0.00
## 5                       0.19                    0.00                    0.07
## 6                       0.05                    0.00                    0.00
```

```
##   COVID_60_49y_male_NonICU COVID_61_54y_female_NonICU COVID_62_78y_female_ICU
## 1                     0.22                       0.25                     0.21
## 2                     0.00                       0.00                     0.00
## 3                     0.14                       0.10                     0.04
## 4                     0.00                       0.03                     0.00
## 5                     0.00                       0.13                     0.05
## 6                     0.02                       0.00                     0.00
##   COVID_63_39y_female_ICU COVID_64_65y_male_ICU COVID_65_84y_male_NonICU
## 1                    0.29                  0.38                     0.40
## 2                    0.00                  0.01                     0.01
## 3                    0.01                  0.04                     0.07
## 4                    0.00                  0.02                     0.00
## 5                    0.14                  0.56                     0.58
## 6                    0.00                  0.00                     0.00
##   COVID_66_66y_female_NonICU COVID_67_57y_male_ICU COVID_68_79y_male_ICU
## 1                       0.64                  0.37                  0.58
## 2                       0.00                  0.00                  0.00
## 3                       0.00                  0.35                  0.15
## 4                       0.00                  0.00                  0.01
## 5                       0.00                  0.00                  0.00
## 6                       0.00                  0.00                  0.05
##   COVID_69_77y_female_NonICU COVID_70_81y_male_NonICU COVID_71_37y_male_ICU
## 1                       0.52                     0.27                  0.07
## 2                       0.00                     0.00                  0.01
## 3                       0.29                     0.07                  0.12
## 4                       0.02                     0.00                  0.01
## 5                       0.00                     0.00                  0.00
## 6                       0.00                     0.06                  0.00
##   COVID_72_50y_female_NonICU COVID_73_82y_male_NonICU COVID_74_55y_female_ICU
## 1                       0.52                     0.46                    0.24
## 2                       0.00                     0.01                    0.00
## 3                       0.10                     0.02                    0.12
## 4                       0.01                     0.02                    0.02
## 5                       0.00                     0.17                    0.26
## 6                       0.00                     0.04                    0.00
##   COVID_75_55y_male_NonICU COVID_76_73y_female_ICU COVID_77_55y_female_ICU
## 1                     0.23                    0.17                    0.05
## 2                     0.01                    0.00                    0.00
## 3                     0.14                    0.09                    0.01
## 4                     0.00                    0.01                    0.00
## 5                     0.00                    0.04                    0.00
## 6                     0.00                    0.00                    0.00
##   COVID_78_80y_male_NonICU COVID_79_27y_male_NonICU COVID_80_71y_male_ICU
## 1                     0.19                     0.08                  0.28
## 2                     0.00                     0.01                  0.00
## 3                     0.20                     0.03                  0.05
## 4                     0.00                     0.00                  0.00
## 5                     0.00                     0.00                  0.05
## 6                     0.00                     0.00                  0.00
##   COVID_82_67y_male_NonICU COVID_83_85y_female_NonICU
## 1                     0.39                       0.47
## 2                     0.01                       0.00
## 3                     0.10                       0.18
## 4                     0.00                       0.05
```

```
## 5                   0.00                      0.00
## 6                   0.00                      0.00
##   COVID_84_75y_female_NonICU COVID_85_62y_male_ICU COVID_86_52y_female_NonICU
## 1                       0.35                  0.29                       0.60
## 2                       0.00                  0.00                       0.00
## 3                       0.03                  0.04                       0.27
## 4                       0.00                  0.00                       0.02
## 5                       0.17                  0.00                       0.00
## 6                       0.00                  0.00                       0.00
##   COVID_87_61y_male_ICU COVID_89_90y_female_NonICU COVID_90_86y_female_NonICU
## 1                  0.65                       0.20                       0.40
## 2                  0.00                       0.00                       0.00
## 3                  0.15                       0.07                       0.05
## 4                  0.00                       0.03                       0.01
## 5                  0.00                       0.14                       0.31
## 6                  0.00                       0.00                       0.02
##   COVID_91_29y_female_NonICU COVID_92_82y_female_ICU COVID_93_81y_female_ICU
## 1                       0.60                    0.34                    0.37
## 2                       0.00                    0.00                    0.00
## 3                       0.03                    0.02                    0.11
## 4                       0.02                    0.04                    0.00
## 5                       0.05                    0.58                    0.05
## 6                       0.00                    0.00                    0.00
##   COVID_94_24y_female_NonICU COVID_95_49y_male_NonICU COVID_96_51y_male_NonICU
## 1                       0.81                     0.37                     1.61
## 2                       0.00                     0.01                     0.00
## 3                       0.17                     0.20                     0.02
## 4                       0.02                     0.02                     0.00
## 5                       0.00                     0.15                     0.00
## 6                       0.06                     0.00                     0.00
##   COVID_97_76y_male_ICU COVID_98_81y_male_NonICU COVID_99_71y_male_ICU
## 1                  0.19                     0.78                  0.33
## 2                  0.00                     0.00                  0.00
## 3                  0.02                     0.26                  0.02
## 4                  0.05                     0.00                  0.00
## 5                  0.12                     0.37                  0.04
## 6                  0.03                     0.00                  0.00
##   COVID_100_74y_female_NonICU COVID_101_58y_male_ICU COVID_102_84y_male_NonICU
## 1                        0.30                   0.33                      0.12
## 2                        0.00                   0.00                      0.00
## 3                        0.09                   0.11                      0.01
## 4                        0.00                   0.03                      0.01
## 5                        0.04                   0.05                      0.00
## 6                        0.00                   0.00                      0.07
##   COVID_103_83y_male_NonICU NONCOVID_01_54y_female_NonICU
## 1                      0.20                          0.89
## 2                      0.00                          0.00
## 3                      0.03                          0.04
## 4                      0.03                          0.00
## 5                      0.04                          0.00
## 6                      0.00                          0.00
##   NONCOVID_02_65y_male_ICU NONCOVID_03_65y_male_ICU NONCOVID_04_90y_male_NonICU
## 1                     0.32                     0.44                        0.21
## 2                     0.00                     0.00                        0.00
```

```
## 3                  0.01                     0.05                         0.05
## 4                  0.00                     0.02                         0.00
## 5                  0.04                     0.04                         0.21
## 6                  0.00                     0.00                         0.00
##   NONCOVID_05_83y_female_NonICU NONCOVID_06_75y_female_ICU
## 1                          0.31                       0.89
## 2                          0.00                       0.00
## 3                          0.01                       0.14
## 4                          0.01                       0.01
## 5                          0.00                       0.00
## 6                          0.00                       0.06
##   NONCOVID_07_50y_male_ICU NONCOVID_08_53y_female_ICU
## 1                     0.45                       0.47
## 2                     0.00                       0.01
## 3                     0.07                       0.04
## 4                     0.02                       0.00
## 5                     0.00                       0.15
## 6                     0.00                       0.00
##   NONCOVID_09_49y_female_NonICU NONCOVID_10_67y_male_ICU
## 1                          0.40                     0.33
## 2                          0.00                     0.00
## 3                          0.04                     0.05
## 4                          0.00                     0.01
## 5                          0.00                     0.23
## 6                          0.00                     0.08
##   NONCOVID_11_58y_female_NonICU NONCOVID_12_82y_male_ICU
## 1                          0.58                     0.12
## 2                          0.00                     0.00
## 3                          0.03                     0.02
## 4                          0.00                     0.00
## 5                          0.00                     0.00
## 6                          0.00                     0.02
##   NONCOVID_13_65y_male_ICU NONCOVID_14_75y_female_ICU
## 1                     0.31                       0.16
## 2                     0.00                       0.00
## 3                     0.04                       0.08
## 4                     0.01                       0.00
## 5                     0.32                       0.05
## 6                     0.02                       0.02
##   NONCOVID_15_83y_unknown_ICU NONCOVID_16_40y_female_ICU
## 1                        0.59                       0.34
## 2                        0.00                       0.00
## 3                        0.03                       0.07
## 4                        0.04                       0.00
## 5                        0.00                       0.13
## 6                        0.19                       0.00
##   NONCOVID_17_84y_female_ICU NONCOVID_18_88y_male_ICU
## 1                       0.37                     0.33
## 2                       0.00                     0.00
## 3                       0.07                     0.06
## 4                       0.01                     0.00
## 5                       0.18                     0.00
## 6                       0.00                     0.00
##   NONCOVID_19_66y_female_ICU NONCOVID_20_62y_female_ICU
```

```
## 1                   0.25                 0.20
## 2                   0.00                 0.00
## 3                   0.11                 0.01
## 4                   0.00                 0.02
## 5                   0.04                 0.00
## 6                   0.03                 0.07
##   NONCOVID_21_71y_male_NonICU NONCOVID_22_63y_male_NonICU
## 1                        0.40                        0.30
## 2                        0.00                        0.00
## 3                        0.04                        0.02
## 4                        0.02                        0.02
## 5                        0.00                        0.00
## 6                        0.00                        0.00
##   NONCOVID_23_42y_female_NonICU NONCOVID_24_32y_female_NonICU
## 1                          0.70                          0.75
## 2                          0.00                          0.00
## 3                          0.02                          0.27
## 4                          0.01                          0.00
## 5                          0.00                          0.06
## 6                          0.00                          0.00
##   NONCOVID_25_62y_male_NonICU NONCOVID_26_36y_male_ICU
## 1                        2.80                     0.22
## 2                        0.00                     0.00
## 3                        0.04                     0.28
## 4                        0.00                     0.00
## 5                        0.00                     0.00
## 6                        0.00                     0.00
```

```r
matrix.df <- read.csv(file="QBS103_GSE157103_series_matrix.csv")
head(matrix.df)
```

```
##            participant_id geo_accession              status
## 1 COVID_01_39y_male_NonICU   GSM4753021 Public on Aug 29 2020
## 2 COVID_02_63y_male_NonICU   GSM4753022 Public on Aug 29 2020
## 3 COVID_03_33y_male_NonICU   GSM4753023 Public on Aug 29 2020
## 4 COVID_04_49y_male_NonICU   GSM4753024 Public on Aug 29 2020
## 5 COVID_05_49y_male_NonICU   GSM4753025 Public on Aug 29 2020
## 6  COVID_06_:y_male_NonICU   GSM4753026 Public on Aug 29 2020
##   X.Sample_submission_date last_update_date type channel_count
## 1             Aug 28 2020      Aug 29 2020  SRA             1
## 2             Aug 28 2020      Aug 29 2020  SRA             1
## 3             Aug 28 2020      Aug 29 2020  SRA             1
## 4             Aug 28 2020      Aug 29 2020  SRA             1
## 5             Aug 28 2020      Aug 29 2020  SRA             1
## 6             Aug 28 2020      Aug 29 2020  SRA             1
##                 source_name_ch1 organism_ch1         disease_status age   sex
## 1 Leukocytes from whole blood Homo sapiens disease state: COVID-19  39  male
## 2 Leukocytes from whole blood Homo sapiens disease state: COVID-19  63  male
## 3 Leukocytes from whole blood Homo sapiens disease state: COVID-19  33  male
## 4 Leukocytes from whole blood Homo sapiens disease state: COVID-19  49  male
## 5 Leukocytes from whole blood Homo sapiens disease state: COVID-19  49  male
## 6 Leukocytes from whole blood Homo sapiens disease state: COVID-19   :  male
##   icu_status apacheii charlson_score mechanical_ventilation
## 1        no       15              0                    yes
## 2        no  unknown              2                     no
```

```
## 3         no   unknown              2                 no
## 4         no   unknown              1                 no
## 5         no        19              1                yes
## 6         no   unknown              1                 no
##   ventilator.free_days hospital.free_days_post_45_day_followup ferritin.ng.ml.
## 1                    0                                       0             946
## 2                   28                                      39            1060
## 3                   28                                      18            1335
## 4                   28                                      39             583
## 5                   23                                      27             800
## 6                   28                                      36             563
##   crp.mg.l. ddimer.mg.l_feu. procalcitonin.ng.ml.. lactate.mmol.l. fibrinogen
## 1      73.1              1.3                    36             0.9        513
## 2   unknown             1.03                  0.37         unknown    unknown
## 3      53.2             1.48                  0.07         unknown        513
## 4     251.1             1.32                  0.98            0.87        949
## 5     355.8             0.69                  4.92            1.48        929
## 6     129.1          unknown                  0.67            0.86        769
##      sofa
## 1       8
## 2 unknown
## 3 unknown
## 4 unknown
## 5       7
## 6 unknown
```

```r
# GENES DATA FRAME - transpose
genes.df <- as.data.frame(t(genes.df)) # transpose, convert rows to columns and columns to rows
names(genes.df) <- genes.df[1,] #set the first row in the data frame and set it to the column names for
genes.df <- genes.df[-1,] # remove the first row in the data frame so that the names are no longer a ro

genes.df$participant_id <- row.names(genes.df) # make new row called participant_id and with the gene.d
merged_matrix <- merge(genes.df,matrix.df,by = "participant_id") # merge the two data frames using part
head(merged_matrix) # see if it worked
```

```
##              participant_id  A1BG  A1CF    A2M A2ML1 A3GALT2 A4GALT A4GNT
## 1   COVID_01_39y_male_NonICU  0.49  0.00  0.21  0.04    0.07   0.00  0.03
## 2   COVID_02_63y_male_NonICU  0.29  0.00  0.14  0.00    0.00   0.00  0.05
## 3   COVID_03_33y_male_NonICU  0.26  0.00  0.03  0.02    0.00   0.00  0.07
## 4   COVID_04_49y_male_NonICU  0.45  0.01  0.09  0.07    0.00   0.00  0.00
## 5   COVID_05_49y_male_NonICU  0.17  0.00  0.00  0.05    0.07   0.00  0.00
## 6 COVID_07_38y_female_NonICU  0.49  0.01  0.23  0.03    0.07   0.00  0.00
##    AAAS AACS AADAC AADACL2 AADACL3 AADACL4 AADAT AAGAB  AAK1 AAMDC
## 1 18.92 4.07  0.00    0.00    0.00    0.00  0.00 22.93  7.12 17.19
## 2 18.68 3.00  0.00    0.00    0.06    0.00  0.00 21.69  6.46 13.06
## 3 13.85 1.83  0.00    0.00    0.00    0.00  0.00 18.27  3.92 13.35
## 4 22.11 4.22  0.00    0.00    0.00    0.00  0.00 26.69  8.74 17.53
## 5  8.45 1.17  0.00    0.00    0.00    0.00  0.03 17.02  7.26 10.14
## 6 28.59 4.24  0.00    0.00    0.00    0.00  0.03 26.28 12.78 12.62
##    AAMP AANAT   AAR2  AARD AARS1 AARS2 AARSD1 AASDH AASDHPPT  AASS
## 1 61.08  0.31 21.59  0.18 13.52  2.43   9.63  6.38    19.45  0.21
## 2 54.54  0.00 19.22  0.08 13.91  2.15  11.80  4.83    12.14  0.42
## 3 25.19  0.65  8.72  0.05  5.60  1.08   4.04  2.76     7.64  0.04
## 4 67.95  0.08 20.83  0.03 15.34  2.69  14.61  8.23    18.94  0.41
## 5 18.29  1.02  7.46  0.10  6.29  0.55   5.32  5.23    11.54  0.21
```

```
## 6  51.35   0.13  23.90    0.12  29.47   4.35  21.09    8.90     23.49    0.63
##        AATF   AATK   ABAT  ABCA1 ABCA10 ABCA12 ABCA13   ABCA2  ABCA3  ABCA4  ABCA5
## 1    45.83   5.60   9.63  32.30   0.32   0.00   0.49    8.47   0.37   0.01   1.86
## 2    39.37   9.79  10.36  15.84   0.37   0.00   3.36    9.49   0.71   0.00   2.81
## 3    42.35   5.34   4.59  34.38   0.29   0.00   0.26   14.24   0.17   0.00   2.17
## 4    41.92   4.73  11.02  14.24   0.31   0.00   0.13    6.37   0.94   0.00   2.94
## 5    30.56   1.50   4.42  18.39   0.19   0.00   0.16    5.90   0.17   0.00   1.38
## 6    44.16   4.16  12.02  14.66   0.55   0.00   0.23    9.16   0.75   0.00   3.60
##       ABCA6  ABCA7  ABCA8  ABCA9  ABCB1 ABCB10 ABCB11  ABCB4  ABCB5  ABCB6  ABCB7
## 1     0.19  39.31   0.00   0.27   1.61  15.59   0.38    0.01   0.04   2.77   6.42
## 2     0.11  30.42   0.00   0.20   1.68  10.98   0.25    0.19   0.04   2.52   5.80
## 3     0.07  54.85   0.00   0.33   0.59   4.04   0.14    0.09   0.15   3.14   2.59
## 4     0.02  18.91   0.01   0.30   3.14  10.00   0.18    0.74   0.11   2.11   7.42
## 5     0.03  23.28   0.00   0.21   1.66   5.69   0.07    0.21   0.04   1.14   3.40
## 6     0.05  30.95   0.00   0.23   4.20  15.09   0.18    0.81   0.11   3.99   7.33
##       ABCB8  ABCB9  ABCC1 ABCC10 ABCC11 ABCC12   ABCC2  ABCC3  ABCC4  ABCC5  ABCC6
## 1     2.95   0.20  11.20   8.85   0.04   0.00    1.65   7.19   5.96  14.83   6.62
## 2     2.35   0.51   9.39   4.46   0.01   0.00    1.31  16.21   4.49  22.21   5.87
## 3     1.57   0.05   4.74   4.08   0.09   0.00    1.72   1.44   0.58  13.02   3.13
## 4     2.71   0.31  13.05   5.75   0.02   0.01    1.55  11.11   4.09  17.49   3.37
## 5     0.71   0.12   4.29   1.91   0.02   0.00    2.56   3.13   7.37   5.53   1.66
## 6     3.51   1.11  12.24   7.33   0.02   0.00    1.57   5.34   8.10  23.46   3.61
##       ABCC8  ABCC9  ABCD1  ABCD2  ABCD3  ABCD4   ABCE1  ABCF1  ABCF2 ABCF2-H2BE1
## 1     0.00   1.53  11.26   1.55  10.62  11.19   14.09  24.40   8.77       11.67
## 2     0.00   1.89   4.65   1.08  11.23   9.86   15.52  16.84   7.21        8.84
## 3     0.00   1.97   5.83   0.39   3.99   7.83    4.50   7.89   3.12        3.06
## 4     0.00   2.82   4.80   1.74  12.38  13.60   21.20  23.92   8.26       12.51
## 5     0.00   1.84   1.93   0.59   8.19   5.43    7.16  12.33   2.76        4.72
## 6     0.00   2.31   3.96   5.25  13.14  12.96   28.46  28.37  11.28       13.61
##       ABCF3  ABCG1  ABCG2  ABCG4  ABCG5  ABCG8   ABHD1 ABHD10 ABHD11 ABHD12 ABHD12B
## 1    23.37  32.76   0.17   0.01   0.00   0.02    0.04  14.74   8.50  14.66    0.55
## 2    18.63  23.76   0.00   0.07   0.00   0.01    0.14  10.57   8.85   9.02    1.18
## 3    11.57  41.14   0.15   0.00   0.00   0.00    0.00   6.84   8.22   4.84    0.88
## 4    23.62  15.72   0.14   0.00   0.00   0.04    0.31  16.73   9.64  13.22    0.68
## 5     9.86   9.43   0.03   0.00   0.00   0.04    0.04   6.93   4.02   3.36    0.68
## 6    25.96  14.96   0.05   0.05   0.00   0.02    0.38  18.21   8.27  13.35    0.32
##      ABHD13 ABHD14A ABHD14A-ACY1 ABHD14B ABHD15 ABHD16A ABHD16B ABHD17A ABHD17B
## 1    15.58    6.89         0.00   18.53   6.82   77.48    0.29   13.79    8.78
## 2    14.33    7.08         0.00   18.78   5.76   57.11    0.19   11.89    7.38
## 3     9.97    2.12         0.00    7.63   2.41   77.73    0.08    6.88    5.59
## 4    16.70    9.21         0.00   28.23   8.12   56.77    0.05   12.28    9.89
## 5    21.02    1.95         0.00    6.49   2.26   63.66    0.04    4.11    6.64
## 6    16.37   13.20         0.17   36.75   8.38   57.29    0.18   12.89   11.82
##     ABHD17C ABHD18  ABHD2  ABHD3  ABHD4  ABHD5   ABHD6  ABHD8   ABI1   ABI2
## 1     1.37   6.93  46.50  73.51  44.47  60.14    3.47   3.27  75.36   3.22
## 2     3.34   5.10  63.70  80.70  44.43  79.17    4.54   0.99  60.41   3.68
## 3     1.64   4.06  36.05 113.96  37.71  77.50    2.15   2.59  61.63   0.67
## 4     1.24   6.57  54.52 106.44  41.75  69.89    7.84   1.86  66.52   4.99
## 5     1.17   7.94  72.44 190.95  29.65  51.39    1.45   1.11  79.84   2.12
## 6     2.60   7.49  44.91 121.66  31.88  41.47    5.11   2.22  66.89   5.82
##   geo_accession                 status X.Sample_submission_date last_update_date
## 1    GSM4753021 Public on Aug 29 2020                Aug 28 2020      Aug 29 2020
## 2    GSM4753022 Public on Aug 29 2020                Aug 28 2020      Aug 29 2020
## 3    GSM4753023 Public on Aug 29 2020                Aug 28 2020      Aug 29 2020
```

```
## 4     GSM4753024 Public on Aug 29 2020                          Aug 28 2020         Aug 29 2020
## 5     GSM4753025 Public on Aug 29 2020                          Aug 28 2020         Aug 29 2020
## 6     GSM4753027 Public on Aug 29 2020                          Aug 28 2020         Aug 29 2020
##   type channel_count                  source_name_ch1 organism_ch1
## 1  SRA             1 Leukocytes from whole blood Homo sapiens
## 2  SRA             1 Leukocytes from whole blood Homo sapiens
## 3  SRA             1 Leukocytes from whole blood Homo sapiens
## 4  SRA             1 Leukocytes from whole blood Homo sapiens
## 5  SRA             1 Leukocytes from whole blood Homo sapiens
## 6  SRA             1 Leukocytes from whole blood Homo sapiens
##              disease_status age    sex icu_status apacheii charlson_score
## 1 disease state: COVID-19  39    male         no       15              0
## 2 disease state: COVID-19  63    male         no  unknown              2
## 3 disease state: COVID-19  33    male         no  unknown              2
## 4 disease state: COVID-19  49    male         no  unknown              1
## 5 disease state: COVID-19  49    male         no       19              1
## 6 disease state: COVID-19  38  female         no  unknown              7
##   mechanical_ventilation ventilator.free_days
## 1                    yes                    0
## 2                     no                   28
## 3                     no                   28
## 4                     no                   28
## 5                    yes                   23
## 6                     no                   28
##   hospital.free_days_post_45_day_followup ferritin.ng.ml. crp.mg.l.
## 1                                       0             946      73.1
## 2                                      39            1060   unknown
## 3                                      18            1335      53.2
## 4                                      39             583     251.1
## 5                                      27             800     355.8
## 6                                      42             366   unknown
##   ddimer.mg.l_feu. procalcitonin.ng.ml.. lactate.mmol.l. fibrinogen      sofa
## 1              1.3                    36             0.9        513         8
## 2             1.03                  0.37         unknown    unknown   unknown
## 3             1.48                  0.07         unknown        513   unknown
## 4             1.32                  0.98            0.87        949   unknown
## 5             0.69                  4.92            1.48        929         7
## 6             0.87                  0.06            1.17        478   unknown
```

```r
# Load required package
library(ggplot2)

# Convert AAMP to numeric to read into histogram easier
merged_matrix$AAMP <- as.numeric(merged_matrix$AAMP)

# Create histogram using the new data frame, the gene chosen was AAMP
histo <- ggplot(merged_matrix, aes(x = AAMP)) +
  geom_histogram(binwidth = 1, fill = "darkseagreen4", color = "black") +
  labs(title = "AAMP Gene Expression",
       x = "AAMP Gene Expression",
       y = "Frequency")
plot(histo)
```
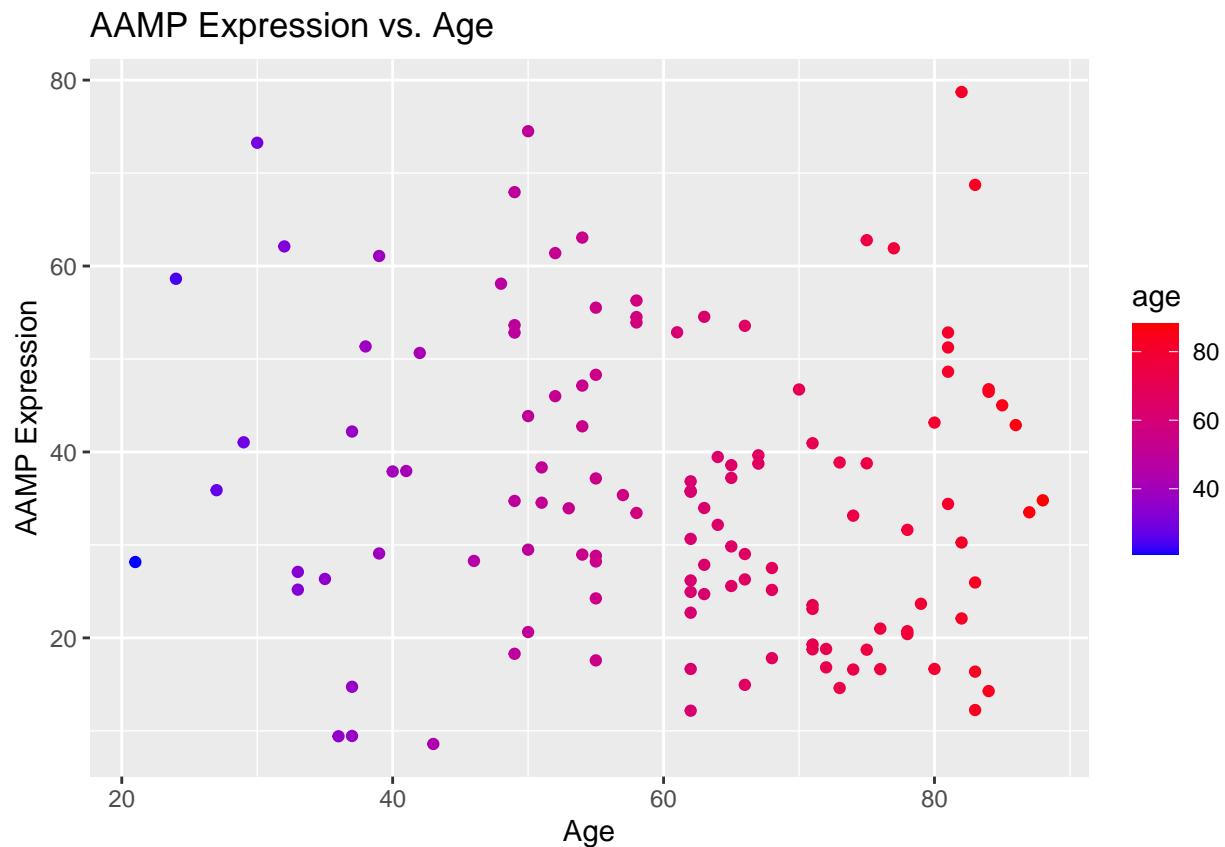
AAMP Gene Expression
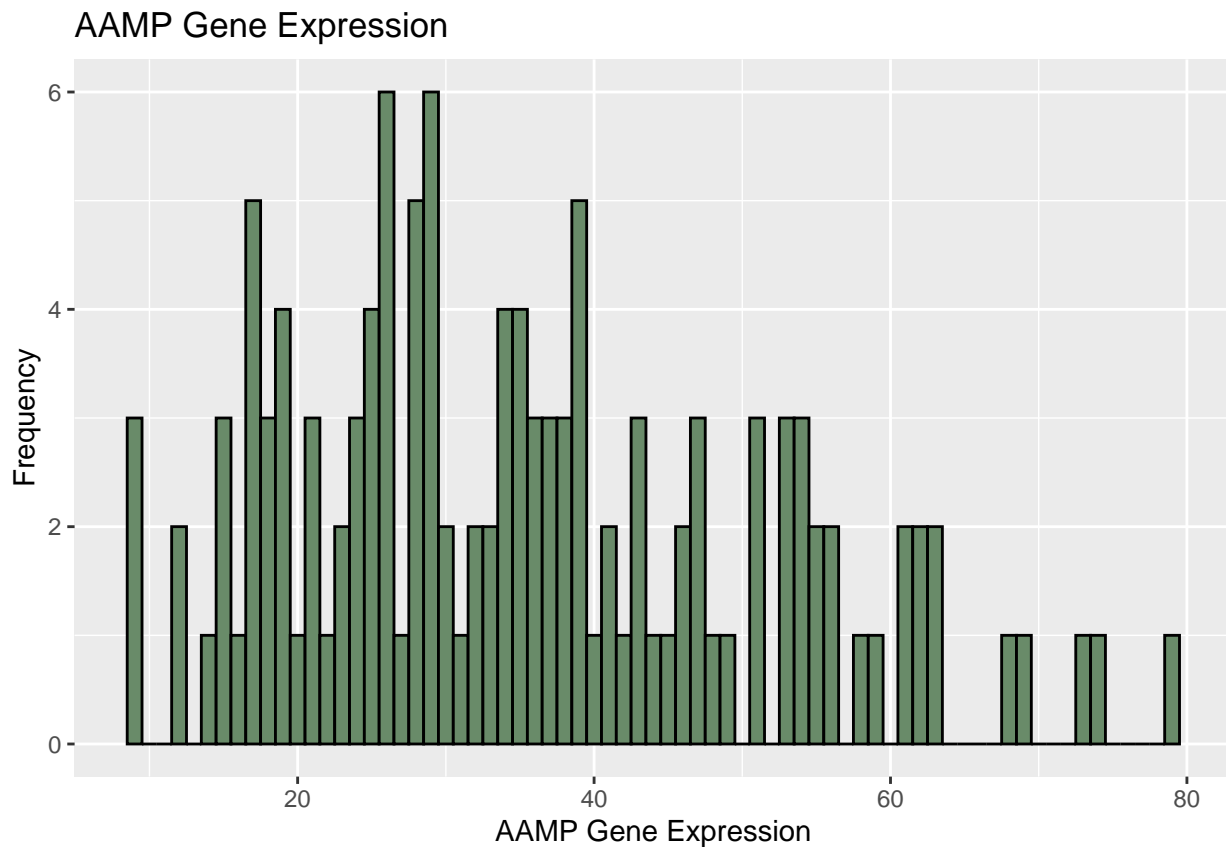

```r
library(ggplot2)
setwd("/Users/sarahmirza/Documents/GitHub/QBS103_Repository/")

# Convert columns to numeric for a gradient label
merged_matrix$AAMP <- as.numeric(merged_matrix$AAMP)
merged_matrix$age <- as.numeric(merged_matrix$age)
```

Warning: NAs introduced by coercion

```r
# Create scatterplot of AAMP expression vs. age
scatter <- ggplot(merged_matrix, aes(x = age, y = AAMP,color = age)) + # color = age gives the color ba
  geom_point() +
  scale_color_gradient(low = "blue", high = "red") +
  labs(title = "AAMP Expression vs. Age",
       x = "Age",
       y = "AAMP Expression")
plot(scatter)
```

Warning: Removed 2 rows containing missing values or values outside the scale range
(`geom_point()`).

AAMP Expression vs. Age


```r
# Save the plot to a file
ggsave("AAMP_gene_expression_vs_age.pdf", plot = scatter, width = 8, height = 5)
```

```
## Warning: Removed 2 rows containing missing values or values outside the scale range
## (`geom_point()`).
```

```r
library(ggplot2)
setwd("/Users/sarahmirza/Documents/GitHub/QBS103_Repository/")



#a boxplot of AAMP expression separated by sex and ICU Status
ggplot(merged_matrix, aes(x = icu_status, y = AAMP, fill = sex)) +
  geom_boxplot() +
  labs(title = "AAMP Expression by ICU Status and Sex",
       x = "ICU Status",
       y = "AAMP Expression",
       fill = "sex")
```

AAMP Expression by ICU Status and Sex
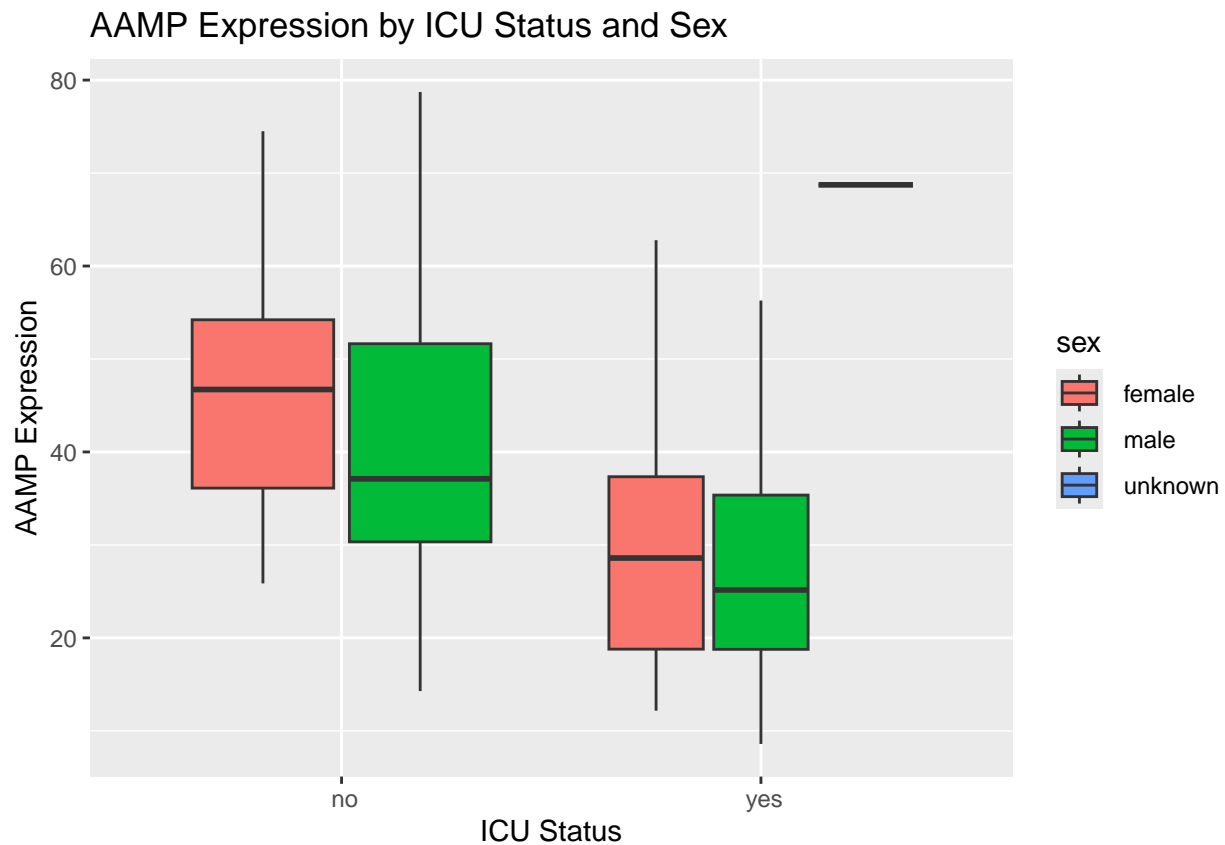

```
#merged_matrix$ferritin.ng.ml. <- as.factor(merged_matrix$ferritin.ng.ml.)
#merged_matrix$icu_status <- as.factor(merged_matrix$icu_status)

# Create a boxplot of AAMP expression separated by icu status and ferritin.ng.ml.
#ggplot(merged_matrix, aes(x = icu_status, y = AAMP, fill = ferritin.ng.ml.)) +
#  geom_boxplot() +
#  labs(title = "AAMP Expression by ICU Status and ferritin.ng.ml.",
#       x = "ICU Status",
#       y = "AAMP Expression",
#       fill = "ferritin.ng.ml.")

# Create a boxplot of AAMP expression separated by source_name_ch1 and icu status
#ggplot(merged_matrix, aes(icu_status, y = AAMP, fill = source_name_ch1)) +
#  geom_boxplot() +
#  labs(title = "AAMP Expression by ICU Status and source_name_ch1",
#       x = "icu_status",
#       y = "AAMP Expression",
#       fill = "source_name_ch1")
```