diabetes.R

Trishala

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```
my_data <- read.csv("C:/Users/Trishala/Desktop/diabetes.csv")
summary(my_data)
```

```
##   Pregnancies        Glucose      BloodPressure    SkinThickness
##  Min.   : 0.000   Min.   :  0.0   Min.   :  0.00   Min.   : 0.00
##  1st Qu.: 1.000   1st Qu.: 99.0   1st Qu.: 62.00   1st Qu.: 0.00
##  Median : 3.000   Median :117.0   Median : 72.00   Median :23.00
##  Mean   : 3.845   Mean   :120.9   Mean   : 69.11   Mean   :20.54
##  3rd Qu.: 6.000   3rd Qu.:140.2   3rd Qu.: 80.00   3rd Qu.:32.00
##  Max.   :17.000   Max.   :199.0   Max.   :122.00   Max.   :99.00
##     Insulin           BMI        DiabetesPedigreeFunction      Age
##  Min.   :  0.0   Min.   : 0.00   Min.   :0.0780           Min.   :21.00
##  1st Qu.:  0.0   1st Qu.:27.30   1st Qu.:0.2437           1st Qu.:24.00
##  Median : 30.5   Median :32.00   Median :0.3725           Median :29.00
##  Mean   : 79.8   Mean   :31.99   Mean   :0.4719           Mean   :33.24
##  3rd Qu.:127.2   3rd Qu.:36.60   3rd Qu.:0.6262           3rd Qu.:41.00
##  Max.   :846.0   Max.   :67.10   Max.   :2.4200           Max.   :81.00
##     Outcome
##  Min.   :0.000
##  1st Qu.:0.000
##  Median :0.000
##  Mean   :0.349
##  3rd Qu.:1.000
##  Max.   :1.000
```

```
#columns
#PregnanciesNumber of times pregnant
#GlucosePlasma glucose concentration a 2 hours in an oral glucose tolerance test
#BloodPressureDiastolic blood pressure (mm Hg)
#SkinThicknessTriceps skin fold thickness (mm)
#Insulin2-Hour serum insulin (mu U/ml)
#BMIBody mass index (weight in kg/(height in m)^2)
#DiabetesPedigreeFunctionDiabetes pedigree function
#AgeAge (years)
#OutcomeClass variable (0 or 1) 268 of 768 are 1, the others are 0
head(my_data)
```

```
##   Pregnancies Glucose BloodPressure SkinThickness Insulin  BMI
## 1           6     148            72            35       0 33.6
## 2           1      85            66            29       0 26.6
## 3           8     183            64             0       0 23.3
## 4           1      89            66            23      94 28.1
## 5           0     137            40            35     168 43.1
## 6           5     116            74             0       0 25.6
##   DiabetesPedigreeFunction Age Outcome
## 1                    0.627  50       1
## 2                    0.351  31       0
## 3                    0.672  32       1
## 4                    0.167  21       0
## 5                    2.288  33       1
## 6                    0.201  30       0
```

```
structure(my_data)
```

```
##     Pregnancies Glucose BloodPressure SkinThickness Insulin  BMI
## 1             6     148            72            35       0 33.6
## 2             1      85            66            29       0 26.6
## 3             8     183            64             0       0 23.3
## 4             1      89            66            23      94 28.1
## 5             0     137            40            35     168 43.1
## 6             5     116            74             0       0 25.6
## 7             3      78            50            32      88 31.0
## 8            10     115             0             0       0 35.3
```

```
## 9            2     197            70            45     543 30.5
## 10           8     125            96             0       0  0.0
## 11           4     110            92             0       0 37.6
## 12          10     168            74             0       0 38.0
## 13          10     139            80             0       0 27.1
## 14           1     189            60            23     846 30.1
## 15           5     166            72            19     175 25.8
## 16           7     100             0             0       0 30.0
## 17           0     118            84            47     230 45.8
## 18           7     107            74             0       0 29.6
## 19           1     103            30            38      83 43.3
## 20           1     115            70            30      96 34.6
## 21           3     126            88            41     235 39.3
## 22           8      99            84             0       0 35.4
## 23           7     196            90             0       0 39.8
## 24           9     119            80            35       0 29.0
## 25          11     143            94            33     146 36.6
## 26          10     125            70            26     115 31.1
## 27           7     147            76             0       0 39.4
## 28           1      97            66            15     140 23.2
## 29          13     145            82            19     110 22.2
## 30           5     117            92             0       0 34.1
## 31           5     109            75            26       0 36.0
## 32           3     158            76            36     245 31.6
## 33           3      88            58            11      54 24.8
## 34           6      92            92             0       0 19.9
## 35          10     122            78            31       0 27.6
## 36           4     103            60            33     192 24.0
## 37          11     138            76             0       0 33.2
## 38           9     102            76            37       0 32.9
## 39           2      90            68            42       0 38.2
## 40           4     111            72            47     207 37.1
## 41           3     180            64            25      70 34.0
## 42           7     133            84             0       0 40.2
## 43           7     106            92            18       0 22.7
## 44           9     171           110            24     240 45.4
## 45           7     159            64             0       0 27.4
## 46           0     180            66            39       0 42.0
## 47           1     146            56             0       0 29.7
## 48           2      71            70            27       0 28.0
## 49           7     103            66            32       0 39.1
## 50           7     105             0             0       0  0.0
## 51           1     103            80            11      82 19.4
## 52           1     101            50            15      36 24.2
## 53           5      88            66            21      23 24.4
## 54           8     176            90            34     300 33.7
## 55           7     150            66            42     342 34.7
## 56           1      73            50            10       0 23.0
## 57           7     187            68            39     304 37.7
## 58           0     100            88            60     110 46.8
## 59           0     146            82             0       0 40.5
## 60           0     105            64            41     142 41.5
## 61           2      84             0             0       0  0.0
## 62           8     133            72             0       0 32.9
## 63           5      44            62             0       0 25.0
## 64           2     141            58            34     128 25.4
## 65           7     114            66             0       0 32.8
## 66           5      99            74            27       0 29.0
## 67           0     109            88            30       0 32.5
## 68           2     109            92             0       0 42.7
## 69           1      95            66            13      38 19.6
## 70           4     146            85            27     100 28.9
## 71           2     100            66            20      90 32.9
## 72           5     139            64            35     140 28.6
## 73          13     126            90             0       0 43.4
## 74           4     129            86            20     270 35.1
## 75           1      79            75            30       0 32.0
## 76           1       0            48            20       0 24.7
## 77           7      62            78             0       0 32.6
## 78           5      95            72            33       0 37.7
## 79           0     131             0             0       0 43.2
## 80           2     112            66            22       0 25.0
## 81           3     113            44            13       0 22.4
```

```
## 81            3     113            44            13       0 22.4
## 82            2      74             0             0       0  0.0
## 83            7      83            78            26      71 29.3
## 84            0     101            65            28       0 24.6
## 85            5     137           108             0       0 48.8
## 86            2     110            74            29     125 32.4
## 87           13     106            72            54       0 36.6
## 88            2     100            68            25      71 38.5
## 89           15     136            70            32     110 37.1
## 90            1     107            68            19       0 26.5
## 91            1      80            55             0       0 19.1
## 92            4     123            80            15     176 32.0
## 93            7      81            78            40      48 46.7
## 94            4     134            72             0       0 23.8
## 95            2     142            82            18      64 24.7
## 96            6     144            72            27     228 33.9
## 97            2      92            62            28       0 31.6
## 98            1      71            48            18      76 20.4
## 99            6      93            50            30      64 28.7
## 100           1     122            90            51     220 49.7
## 101           1     163            72             0       0 39.0
## 102           1     151            60             0       0 26.1
## 103           0     125            96             0       0 22.5
## 104           1      81            72            18      40 26.6
## 105           2      85            65             0       0 39.6
## 106           1     126            56            29     152 28.7
## 107           1      96           122             0       0 22.4
## 108           4     144            58            28     140 29.5
## 109           3      83            58            31      18 34.3
## 110           0      95            85            25      36 37.4
## 111           3     171            72            33     135 33.3
## 112           8     155            62            26     495 34.0
## 113           1      89            76            34      37 31.2
## 114           4      76            62             0       0 34.0
## 115           7     160            54            32     175 30.5
## 116           4     146            92             0       0 31.2
## 117           5     124            74             0       0 34.0
## 118           5      78            48             0       0 33.7
## 119           4      97            60            23       0 28.2
## 120           4      99            76            15      51 23.2
## 121           0     162            76            56     100 53.2
## 122           6     111            64            39       0 34.2
## 123           2     107            74            30     100 33.6
## 124           5     132            80             0       0 26.8
## 125           0     113            76             0       0 33.3
## 126           1      88            30            42      99 55.0
## 127           3     120            70            30     135 42.9
## 128           1     118            58            36      94 33.3
## 129           1     117            88            24     145 34.5
## 130           0     105            84             0       0 27.9
## 131           4     173            70            14     168 29.7
## 132           9     122            56             0       0 33.3
## 133           3     170            64            37     225 34.5
## 134           8      84            74            31       0 38.3
## 135           2      96            68            13      49 21.1
## 136           2     125            60            20     140 33.8
## 137           0     100            70            26      50 30.8
## 138           0      93            60            25      92 28.7
## 139           0     129            80             0       0 31.2
## 140           5     105            72            29     325 36.9
## 141           3     128            78             0       0 21.1
## 142           5     106            82            30       0 39.5
## 143           2     108            52            26      63 32.5
## 144          10     108            66             0       0 32.4
## 145           4     154            62            31     284 32.8
## 146           0     102            75            23       0  0.0
## 147           9      57            80            37       0 32.8
## 148           2     106            64            35     119 30.5
## 149           5     147            78             0       0 33.7
## 150           2      90            70            17       0 27.3
## 151           1     136            74            50     204 37.4
## 152           4     114            65             0       0 21.9
## 153           9     156            86            28     155 34.3
```

```
## 154           1     153            82            42     485 40.6
## 155           8     188            78             0       0 47.9
## 156           7     152            88            44       0 50.0
## 157           2      99            52            15      94 24.6
## 158           1     109            56            21     135 25.2
## 159           2      88            74            19      53 29.0
## 160          17     163            72            41     114 40.9
## 161           4     151            90            38       0 29.7
## 162           7     102            74            40     105 37.2
## 163           0     114            80            34     285 44.2
## 164           2     100            64            23       0 29.7
## 165           0     131            88             0       0 31.6
## 166           6     104            74            18     156 29.9
## 167           3     148            66            25       0 32.5
## 168           4     120            68             0       0 29.6
## 169           4     110            66             0       0 31.9
## 170           3     111            90            12      78 28.4
## 171           6     102            82             0       0 30.8
## 172           6     134            70            23     130 35.4
## 173           2      87             0            23       0 28.9
## 174           1      79            60            42      48 43.5
## 175           2      75            64            24      55 29.7
## 176           8     179            72            42     130 32.7
## 177           6      85            78             0       0 31.2
## 178           0     129           110            46     130 67.1
## 179           5     143            78             0       0 45.0
## 180           5     130            82             0       0 39.1
## 181           6      87            80             0       0 23.2
## 182           0     119            64            18      92 34.9
## 183           1       0            74            20      23 27.7
## 184           5      73            60             0       0 26.8
## 185           4     141            74             0       0 27.6
## 186           7     194            68            28       0 35.9
## 187           8     181            68            36     495 30.1
## 188           1     128            98            41      58 32.0
## 189           8     109            76            39     114 27.9
## 190           5     139            80            35     160 31.6
## 191           3     111            62             0       0 22.6
## 192           9     123            70            44      94 33.1
## 193           7     159            66             0       0 30.4
## 194          11     135             0             0       0 52.3
## 195           8      85            55            20       0 24.4
## 196           5     158            84            41     210 39.4
## 197           1     105            58             0       0 24.3
## 198           3     107            62            13      48 22.9
## 199           4     109            64            44      99 34.8
## 200           4     148            60            27     318 30.9
## 201           0     113            80            16       0 31.0
## 202           1     138            82             0       0 40.1
## 203           0     108            68            20       0 27.3
## 204           2      99            70            16      44 20.4
## 205           6     103            72            32     190 37.7
## 206           5     111            72            28       0 23.9
## 207           8     196            76            29     280 37.5
## 208           5     162           104             0       0 37.7
## 209           1      96            64            27      87 33.2
## 210           7     184            84            33       0 35.5
## 211           2      81            60            22       0 27.7
## 212           0     147            85            54       0 42.8
## 213           7     179            95            31       0 34.2
## 214           0     140            65            26     130 42.6
## 215           9     112            82            32     175 34.2
## 216          12     151            70            40     271 41.8
## 217           5     109            62            41     129 35.8
## 218           6     125            68            30     120 30.0
## 219           5      85            74            22       0 29.0
## 220           5     112            66             0       0 37.8
## 221           0     177            60            29     478 34.6
## 222           2     158            90             0       0 31.6
## 223           7     119             0             0       0 25.2
## 224           7     142            60            33     190 28.8
## 225           1     100            66            15      56 23.6
## 226           1      87            78            27      32 34.6
```

```
## 227           0     101            76             0       0 35.7
## 228           3     162            52            38       0 37.2
## 229           4     197            70            39     744 36.7
## 230           0     117            80            31      53 45.2
## 231           4     142            86             0       0 44.0
## 232           6     134            80            37     370 46.2
## 233           1      79            80            25      37 25.4
## 234           4     122            68             0       0 35.0
## 235           3      74            68            28      45 29.7
## 236           4     171            72             0       0 43.6
## 237           7     181            84            21     192 35.9
## 238           0     179            90            27       0 44.1
## 239           9     164            84            21       0 30.8
## 240           0     104            76             0       0 18.4
## 241           1      91            64            24       0 29.2
## 242           4      91            70            32      88 33.1
## 243           3     139            54             0       0 25.6
## 244           6     119            50            22     176 27.1
## 245           2     146            76            35     194 38.2
## 246           9     184            85            15       0 30.0
## 247          10     122            68             0       0 31.2
## 248           0     165            90            33     680 52.3
## 249           9     124            70            33     402 35.4
## 250           1     111            86            19       0 30.1
## 251           9     106            52             0       0 31.2
## 252           2     129            84             0       0 28.0
## 253           2      90            80            14      55 24.4
## 254           0      86            68            32       0 35.8
## 255          12      92            62             7     258 27.6
## 256           1     113            64            35       0 33.6
## 257           3     111            56            39       0 30.1
## 258           2     114            68            22       0 28.7
## 259           1     193            50            16     375 25.9
## 260          11     155            76            28     150 33.3
## 261           3     191            68            15     130 30.9
## 262           3     141             0             0       0 30.0
## 263           4      95            70            32       0 32.1
## 264           3     142            80            15       0 32.4
## 265           4     123            62             0       0 32.0
## 266           5      96            74            18      67 33.6
## 267           0     138             0             0       0 36.3
## 268           2     128            64            42       0 40.0
## 269           0     102            52             0       0 25.1
## 270           2     146             0             0       0 27.5
## 271          10     101            86            37       0 45.6
## 272           2     108            62            32      56 25.2
## 273           3     122            78             0       0 23.0
## 274           1      71            78            50      45 33.2
## 275          13     106            70             0       0 34.2
## 276           2     100            70            52      57 40.5
## 277           7     106            60            24       0 26.5
## 278           0     104            64            23     116 27.8
## 279           5     114            74             0       0 24.9
## 280           2     108            62            10     278 25.3
## 281           0     146            70             0       0 37.9
## 282          10     129            76            28     122 35.9
## 283           7     133            88            15     155 32.4
## 284           7     161            86             0       0 30.4
## 285           2     108            80             0       0 27.0
## 286           7     136            74            26     135 26.0
## 287           5     155            84            44     545 38.7
## 288           1     119            86            39     220 45.6
## 289           4      96            56            17      49 20.8
## 290           5     108            72            43      75 36.1
## 291           0      78            88            29      40 36.9
## 292           0     107            62            30      74 36.6
## 293           2     128            78            37     182 43.3
## 294           1     128            48            45     194 40.5
## 295           0     161            50             0       0 21.9
## 296           6     151            62            31     120 35.5
## 297           2     146            70            38     360 28.0
## 298           0     126            84            29     215 30.7
## 299          14     100            78            25     184 36.6
```

```
## 299          14     100             78             25     184 36.6
## 300           8     112             72              0       0 23.6
## 301           0     167              0              0       0 32.3
## 302           2     144             58             33     135 31.6
## 303           5      77             82             41      42 35.8
## 304           5     115             98              0       0 52.9
## 305           3     150             76              0       0 21.0
## 306           2     120             76             37     105 39.7
## 307          10     161             68             23     132 25.5
## 308           0     137             68             14     148 24.8
## 309           0     128             68             19     180 30.5
## 310           2     124             68             28     205 32.9
## 311           6      80             66             30       0 26.2
## 312           0     106             70             37     148 39.4
## 313           2     155             74             17      96 26.6
## 314           3     113             50             10      85 29.5
## 315           7     109             80             31       0 35.9
## 316           2     112             68             22      94 34.1
## 317           3      99             80             11      64 19.3
## 318           3     182             74              0       0 30.5
## 319           3     115             66             39     140 38.1
## 320           6     194             78              0       0 23.5
## 321           4     129             60             12     231 27.5
## 322           3     112             74             30       0 31.6
## 323           0     124             70             20       0 27.4
## 324          13     152             90             33      29 26.8
## 325           2     112             75             32       0 35.7
## 326           1     157             72             21     168 25.6
## 327           1     122             64             32     156 35.1
## 328          10     179             70              0       0 35.1
## 329           2     102             86             36     120 45.5
## 330           6     105             70             32      68 30.8
## 331           8     118             72             19       0 23.1
## 332           2      87             58             16      52 32.7
## 333           1     180              0              0       0 43.3
## 334          12     106             80              0       0 23.6
## 335           1      95             60             18      58 23.9
## 336           0     165             76             43     255 47.9
## 337           0     117              0              0       0 33.8
## 338           5     115             76              0       0 31.2
## 339           9     152             78             34     171 34.2
## 340           7     178             84              0       0 39.9
## 341           1     130             70             13     105 25.9
## 342           1      95             74             21      73 25.9
## 343           1       0             68             35       0 32.0
## 344           5     122             86              0       0 34.7
## 345           8      95             72              0       0 36.8
## 346           8     126             88             36     108 38.5
## 347           1     139             46             19      83 28.7
## 348           3     116              0              0       0 23.5
## 349           3      99             62             19      74 21.8
## 350           5       0             80             32       0 41.0
## 351           4      92             80              0       0 42.2
## 352           4     137             84              0       0 31.2
## 353           3      61             82             28       0 34.4
## 354           1      90             62             12      43 27.2
## 355           3      90             78              0       0 42.7
## 356           9     165             88              0       0 30.4
## 357           1     125             50             40     167 33.3
## 358          13     129              0             30       0 39.9
## 359          12      88             74             40      54 35.3
## 360           1     196             76             36     249 36.5
## 361           5     189             64             33     325 31.2
## 362           5     158             70              0       0 29.8
## 363           5     103            108             37       0 39.2
## 364           4     146             78              0       0 38.5
## 365           4     147             74             25     293 34.9
## 366           5      99             54             28      83 34.0
## 367           6     124             72              0       0 27.6
## 368           0     101             64             17       0 21.0
## 369           3      81             86             16      66 27.5
## 370           1     133            102             28     140 32.8
## 371           3     173             82             48     465 38.4
```

```
## 372           0     118            64            23      89  0.0
## 373           0      84            64            22      66 35.8
## 374           2     105            58            40      94 34.9
## 375           2     122            52            43     158 36.2
## 376          12     140            82            43     325 39.2
## 377           0      98            82            15      84 25.2
## 378           1      87            60            37      75 37.2
## 379           4     156            75             0       0 48.3
## 380           0      93           100            39      72 43.4
## 381           1     107            72            30      82 30.8
## 382           0     105            68            22       0 20.0
## 383           1     109            60             8     182 25.4
## 384           1      90            62            18      59 25.1
## 385           1     125            70            24     110 24.3
## 386           1     119            54            13      50 22.3
## 387           5     116            74            29       0 32.3
## 388           8     105           100            36       0 43.3
## 389           5     144            82            26     285 32.0
## 390           3     100            68            23      81 31.6
## 391           1     100            66            29     196 32.0
## 392           5     166            76             0       0 45.7
## 393           1     131            64            14     415 23.7
## 394           4     116            72            12      87 22.1
## 395           4     158            78             0       0 32.9
## 396           2     127            58            24     275 27.7
## 397           3      96            56            34     115 24.7
## 398           0     131            66            40       0 34.3
## 399           3      82            70             0       0 21.1
## 400           3     193            70            31       0 34.9
## 401           4      95            64             0       0 32.0
## 402           6     137            61             0       0 24.2
## 403           5     136            84            41      88 35.0
## 404           9      72            78            25       0 31.6
## 405           5     168            64             0       0 32.9
## 406           2     123            48            32     165 42.1
## 407           4     115            72             0       0 28.9
## 408           0     101            62             0       0 21.9
## 409           8     197            74             0       0 25.9
## 410           1     172            68            49     579 42.4
## 411           6     102            90            39       0 35.7
## 412           1     112            72            30     176 34.4
## 413           1     143            84            23     310 42.4
## 414           1     143            74            22      61 26.2
## 415           0     138            60            35     167 34.6
## 416           3     173            84            33     474 35.7
## 417           1      97            68            21       0 27.2
## 418           4     144            82            32       0 38.5
## 419           1      83            68             0       0 18.2
## 420           3     129            64            29     115 26.4
## 421           1     119            88            41     170 45.3
## 422           2      94            68            18      76 26.0
## 423           0     102            64            46      78 40.6
## 424           2     115            64            22       0 30.8
## 425           8     151            78            32     210 42.9
## 426           4     184            78            39     277 37.0
## 427           0      94             0             0       0  0.0
## 428           1     181            64            30     180 34.1
## 429           0     135            94            46     145 40.6
## 430           1      95            82            25     180 35.0
## 431           2      99             0             0       0 22.2
## 432           3      89            74            16      85 30.4
## 433           1      80            74            11      60 30.0
## 434           2     139            75             0       0 25.6
## 435           1      90            68             8       0 24.5
## 436           0     141             0             0       0 42.4
## 437          12     140            85            33       0 37.4
## 438           5     147            75             0       0 29.9
## 439           1      97            70            15       0 18.2
## 440           6     107            88             0       0 36.8
## 441           0     189           104            25       0 34.3
## 442           2      83            66            23      50 32.2
## 443           4     117            64            27     120 33.2
## 444           8     108            70             0       0 30.5
```

```
## 445           4     117            62            12       0 29.7
## 446           0     180            78            63      14 59.4
## 447           1     100            72            12      70 25.3
## 448           0      95            80            45      92 36.5
## 449           0     104            64            37      64 33.6
## 450           0     120            74            18      63 30.5
## 451           1      82            64            13      95 21.2
## 452           2     134            70             0       0 28.9
## 453           0      91            68            32     210 39.9
## 454           2     119             0             0       0 19.6
## 455           2     100            54            28     105 37.8
## 456          14     175            62            30       0 33.6
## 457           1     135            54             0       0 26.7
## 458           5      86            68            28      71 30.2
## 459          10     148            84            48     237 37.6
## 460           9     134            74            33      60 25.9
## 461           9     120            72            22      56 20.8
## 462           1      71            62             0       0 21.8
## 463           8      74            70            40      49 35.3
## 464           5      88            78            30       0 27.6
## 465          10     115            98             0       0 24.0
## 466           0     124            56            13     105 21.8
## 467           0      74            52            10      36 27.8
## 468           0      97            64            36     100 36.8
## 469           8     120             0             0       0 30.0
## 470           6     154            78            41     140 46.1
## 471           1     144            82            40       0 41.3
## 472           0     137            70            38       0 33.2
## 473           0     119            66            27       0 38.8
## 474           7     136            90             0       0 29.9
## 475           4     114            64             0       0 28.9
## 476           0     137            84            27       0 27.3
## 477           2     105            80            45     191 33.7
## 478           7     114            76            17     110 23.8
## 479           8     126            74            38      75 25.9
## 480           4     132            86            31       0 28.0
## 481           3     158            70            30     328 35.5
## 482           0     123            88            37       0 35.2
## 483           4      85            58            22      49 27.8
## 484           0      84            82            31     125 38.2
## 485           0     145             0             0       0 44.2
## 486           0     135            68            42     250 42.3
## 487           1     139            62            41     480 40.7
## 488           0     173            78            32     265 46.5
## 489           4      99            72            17       0 25.6
## 490           8     194            80             0       0 26.1
## 491           2      83            65            28      66 36.8
## 492           2      89            90            30       0 33.5
## 493           4      99            68            38       0 32.8
## 494           4     125            70            18     122 28.9
## 495           3      80             0             0       0  0.0
## 496           6     166            74             0       0 26.6
## 497           5     110            68             0       0 26.0
## 498           2      81            72            15      76 30.1
## 499           7     195            70            33     145 25.1
## 500           6     154            74            32     193 29.3
## 501           2     117            90            19      71 25.2
## 502           3      84            72            32       0 37.2
## 503           6       0            68            41       0 39.0
## 504           7      94            64            25      79 33.3
## 505           3      96            78            39       0 37.3
## 506          10      75            82             0       0 33.3
## 507           0     180            90            26      90 36.5
## 508           1     130            60            23     170 28.6
## 509           2      84            50            23      76 30.4
## 510           8     120            78             0       0 25.0
## 511          12      84            72            31       0 29.7
## 512           0     139            62            17     210 22.1
## 513           9      91            68             0       0 24.2
## 514           2      91            62             0       0 27.3
## 515           3      99            54            19      86 25.6
## 516           3     163            70            18     105 31.6
## 517           9     145            88            34     165 30.3
```

```
## 517           9     145             88             34     165 30.3
## 518           7     125             86              0       0 37.6
## 519          13      76             60              0       0 32.8
## 520           6     129             90              7     326 19.6
## 521           2      68             70             32      66 25.0
## 522           3     124             80             33     130 33.2
## 523           6     114              0              0       0  0.0
## 524           9     130             70              0       0 34.2
## 525           3     125             58              0       0 31.6
## 526           3      87             60             18       0 21.8
## 527           1      97             64             19      82 18.2
## 528           3     116             74             15     105 26.3
## 529           0     117             66             31     188 30.8
## 530           0     111             65              0       0 24.6
## 531           2     122             60             18     106 29.8
## 532           0     107             76              0       0 45.3
## 533           1      86             66             52      65 41.3
## 534           6      91              0              0       0 29.8
## 535           1      77             56             30      56 33.3
## 536           4     132              0              0       0 32.9
## 537           0     105             90              0       0 29.6
## 538           0      57             60              0       0 21.7
## 539           0     127             80             37     210 36.3
## 540           3     129             92             49     155 36.4
## 541           8     100             74             40     215 39.4
## 542           3     128             72             25     190 32.4
## 543          10      90             85             32       0 34.9
## 544           4      84             90             23      56 39.5
## 545           1      88             78             29      76 32.0
## 546           8     186             90             35     225 34.5
## 547           5     187             76             27     207 43.6
## 548           4     131             68             21     166 33.1
## 549           1     164             82             43      67 32.8
## 550           4     189            110             31       0 28.5
## 551           1     116             70             28       0 27.4
## 552           3      84             68             30     106 31.9
## 553           6     114             88              0       0 27.8
## 554           1      88             62             24      44 29.9
## 555           1      84             64             23     115 36.9
## 556           7     124             70             33     215 25.5
## 557           1      97             70             40       0 38.1
## 558           8     110             76              0       0 27.8
## 559          11     103             68             40       0 46.2
## 560          11      85             74              0       0 30.1
## 561           6     125             76              0       0 33.8
## 562           0     198             66             32     274 41.3
## 563           1      87             68             34      77 37.6
## 564           6      99             60             19      54 26.9
## 565           0      91             80              0       0 32.4
## 566           2      95             54             14      88 26.1
## 567           1      99             72             30      18 38.6
## 568           6      92             62             32     126 32.0
## 569           4     154             72             29     126 31.3
## 570           0     121             66             30     165 34.3
## 571           3      78             70              0       0 32.5
## 572           2     130             96              0       0 22.6
## 573           3     111             58             31      44 29.5
## 574           2      98             60             17     120 34.7
## 575           1     143             86             30     330 30.1
## 576           1     119             44             47      63 35.5
## 577           6     108             44             20     130 24.0
## 578           2     118             80              0       0 42.9
## 579          10     133             68              0       0 27.0
## 580           2     197             70             99       0 34.7
## 581           0     151             90             46       0 42.1
## 582           6     109             60             27       0 25.0
## 583          12     121             78             17       0 26.5
## 584           8     100             76              0       0 38.7
## 585           8     124             76             24     600 28.7
## 586           1      93             56             11       0 22.5
## 587           8     143             66              0       0 34.9
## 588           6     103             66              0       0 24.3
## 589           3     176             86             27     156 33.3
```

```
## 590           0      73             0             0       0 21.1
## 591          11     111            84            40       0 46.8
## 592           2     112            78            50     140 39.4
## 593           3     132            80             0       0 34.4
## 594           2      82            52            22     115 28.5
## 595           6     123            72            45     230 33.6
## 596           0     188            82            14     185 32.0
## 597           0      67            76             0       0 45.3
## 598           1      89            24            19      25 27.8
## 599           1     173            74             0       0 36.8
## 600           1     109            38            18     120 23.1
## 601           1     108            88            19       0 27.1
## 602           6      96             0             0       0 23.7
## 603           1     124            74            36       0 27.8
## 604           7     150            78            29     126 35.2
## 605           4     183             0             0       0 28.4
## 606           1     124            60            32       0 35.8
## 607           1     181            78            42     293 40.0
## 608           1      92            62            25      41 19.5
## 609           0     152            82            39     272 41.5
## 610           1     111            62            13     182 24.0
## 611           3     106            54            21     158 30.9
## 612           3     174            58            22     194 32.9
## 613           7     168            88            42     321 38.2
## 614           6     105            80            28       0 32.5
## 615          11     138            74            26     144 36.1
## 616           3     106            72             0       0 25.8
## 617           6     117            96             0       0 28.7
## 618           2      68            62            13      15 20.1
## 619           9     112            82            24       0 28.2
## 620           0     119             0             0       0 32.4
## 621           2     112            86            42     160 38.4
## 622           2      92            76            20       0 24.2
## 623           6     183            94             0       0 40.8
## 624           0      94            70            27     115 43.5
## 625           2     108            64             0       0 30.8
## 626           4      90            88            47      54 37.7
## 627           0     125            68             0       0 24.7
## 628           0     132            78             0       0 32.4
## 629           5     128            80             0       0 34.6
## 630           4      94            65            22       0 24.7
## 631           7     114            64             0       0 27.4
## 632           0     102            78            40      90 34.5
## 633           2     111            60             0       0 26.2
## 634           1     128            82            17     183 27.5
## 635          10      92            62             0       0 25.9
## 636          13     104            72             0       0 31.2
## 637           5     104            74             0       0 28.8
## 638           2      94            76            18      66 31.6
## 639           7      97            76            32      91 40.9
## 640           1     100            74            12      46 19.5
## 641           0     102            86            17     105 29.3
## 642           4     128            70             0       0 34.3
## 643           6     147            80             0       0 29.5
## 644           4      90             0             0       0 28.0
## 645           3     103            72            30     152 27.6
## 646           2     157            74            35     440 39.4
## 647           1     167            74            17     144 23.4
## 648           0     179            50            36     159 37.8
## 649          11     136            84            35     130 28.3
## 650           0     107            60            25       0 26.4
## 651           1      91            54            25     100 25.2
## 652           1     117            60            23     106 33.8
## 653           5     123            74            40      77 34.1
## 654           2     120            54             0       0 26.8
## 655           1     106            70            28     135 34.2
## 656           2     155            52            27     540 38.7
## 657           2     101            58            35      90 21.8
## 658           1     120            80            48     200 38.9
## 659          11     127           106             0       0 39.0
## 660           3      80            82            31      70 34.2
## 661          10     162            84             0       0 27.7
## 662           1     199            76            43       0 42.9
```

```
## 663           8     167           106            46     231 37.6
## 664           9     145            80            46     130 37.9
## 665           6     115            60            39       0 33.7
## 666           1     112            80            45     132 34.8
## 667           4     145            82            18       0 32.5
## 668          10     111            70            27       0 27.5
## 669           6      98            58            33     190 34.0
## 670           9     154            78            30     100 30.9
## 671           6     165            68            26     168 33.6
## 672           1      99            58            10       0 25.4
## 673          10      68           106            23      49 35.5
## 674           3     123           100            35     240 57.3
## 675           8      91            82             0       0 35.6
## 676           6     195            70             0       0 30.9
## 677           9     156            86             0       0 24.8
## 678           0      93            60             0       0 35.3
## 679           3     121            52             0       0 36.0
## 680           2     101            58            17     265 24.2
## 681           2      56            56            28      45 24.2
## 682           0     162            76            36       0 49.6
## 683           0      95            64            39     105 44.6
## 684           4     125            80             0       0 32.3
## 685           5     136            82             0       0  0.0
## 686           2     129            74            26     205 33.2
## 687           3     130            64             0       0 23.1
## 688           1     107            50            19       0 28.3
## 689           1     140            74            26     180 24.1
## 690           1     144            82            46     180 46.1
## 691           8     107            80             0       0 24.6
## 692          13     158           114             0       0 42.3
## 693           2     121            70            32      95 39.1
## 694           7     129            68            49     125 38.5
## 695           2      90            60             0       0 23.5
## 696           7     142            90            24     480 30.4
## 697           3     169            74            19     125 29.9
## 698           0      99             0             0       0 25.0
## 699           4     127            88            11     155 34.5
## 700           4     118            70             0       0 44.5
## 701           2     122            76            27     200 35.9
## 702           6     125            78            31       0 27.6
## 703           1     168            88            29       0 35.0
## 704           2     129             0             0       0 38.5
## 705           4     110            76            20     100 28.4
## 706           6      80            80            36       0 39.8
## 707          10     115             0             0       0  0.0
## 708           2     127            46            21     335 34.4
## 709           9     164            78             0       0 32.8
## 710           2      93            64            32     160 38.0
## 711           3     158            64            13     387 31.2
## 712           5     126            78            27      22 29.6
## 713          10     129            62            36       0 41.2
## 714           0     134            58            20     291 26.4
## 715           3     102            74             0       0 29.5
## 716           7     187            50            33     392 33.9
## 717           3     173            78            39     185 33.8
## 718          10      94            72            18       0 23.1
## 719           1     108            60            46     178 35.5
## 720           5      97            76            27       0 35.6
## 721           4      83            86            19       0 29.3
## 722           1     114            66            36     200 38.1
## 723           1     149            68            29     127 29.3
## 724           5     117            86            30     105 39.1
## 725           1     111            94             0       0 32.8
## 726           4     112            78            40       0 39.4
## 727           1     116            78            29     180 36.1
## 728           0     141            84            26       0 32.4
## 729           2     175            88             0       0 22.9
## 730           2      92            52             0       0 30.1
## 731           3     130            78            23      79 28.4
## 732           8     120            86             0       0 28.4
## 733           2     174            88            37     120 44.5
## 734           2     106            56            27     165 29.0
## 735           2     105            75             0       0 23.3
```

```
## 735           2     105             75              0       0 23.3
## 736           4      95             60             32       0 35.4
## 737           0     126             86             27     120 27.4
## 738           8      65             72             23       0 32.0
## 739           2      99             60             17     160 36.6
## 740           1     102             74              0       0 39.5
## 741          11     120             80             37     150 42.3
## 742           3     102             44             20      94 30.8
## 743           1     109             58             18     116 28.5
## 744           9     140             94              0       0 32.7
## 745          13     153             88             37     140 40.6
## 746          12     100             84             33     105 30.0
## 747           1     147             94             41       0 49.3
## 748           1      81             74             41      57 46.3
## 749           3     187             70             22     200 36.4
## 750           6     162             62              0       0 24.3
## 751           4     136             70              0       0 31.2
## 752           1     121             78             39      74 39.0
## 753           3     108             62             24       0 26.0
## 754           0     181             88             44     510 43.3
## 755           8     154             78             32       0 32.4
## 756           1     128             88             39     110 36.5
## 757           7     137             90             41       0 32.0
## 758           0     123             72              0       0 36.3
## 759           1     106             76              0       0 37.5
## 760           6     190             92              0       0 35.5
## 761           2      88             58             26      16 28.4
## 762           9     170             74             31       0 44.0
## 763           9      89             62              0       0 22.5
## 764          10     101             76             48     180 32.9
## 765           2     122             70             27       0 36.8
## 766           5     121             72             23     112 26.2
## 767           1     126             60              0       0 30.1
## 768           1      93             70             31       0 30.4
##     DiabetesPedigreeFunction Age Outcome
## 1                      0.627  50       1
## 2                      0.351  31       0
## 3                      0.672  32       1
## 4                      0.167  21       0
## 5                      2.288  33       1
## 6                      0.201  30       0
## 7                      0.248  26       1
## 8                      0.134  29       0
## 9                      0.158  53       1
## 10                     0.232  54       1
## 11                     0.191  30       0
## 12                     0.537  34       1
## 13                     1.441  57       0
## 14                     0.398  59       1
## 15                     0.587  51       1
## 16                     0.484  32       1
## 17                     0.551  31       1
## 18                     0.254  31       1
## 19                     0.183  33       0
## 20                     0.529  32       1
## 21                     0.704  27       0
## 22                     0.388  50       0
## 23                     0.451  41       1
## 24                     0.263  29       1
## 25                     0.254  51       1
## 26                     0.205  41       1
## 27                     0.257  43       1
## 28                     0.487  22       0
## 29                     0.245  57       0
## 30                     0.337  38       0
## 31                     0.546  60       0
## 32                     0.851  28       1
## 33                     0.267  22       0
## 34                     0.188  28       0
## 35                     0.512  45       0
## 36                     0.966  33       0
## 37                     0.420  35       0
## 38                     0.665  46       1
```

```
## 39                  0.503  27       1
## 40                  1.390  56       1
## 41                  0.271  26       0
## 42                  0.696  37       0
## 43                  0.235  48       0
## 44                  0.721  54       1
## 45                  0.294  40       0
## 46                  1.893  25       1
## 47                  0.564  29       0
## 48                  0.586  22       0
## 49                  0.344  31       1
## 50                  0.305  24       0
## 51                  0.491  22       0
## 52                  0.526  26       0
## 53                  0.342  30       0
## 54                  0.467  58       1
## 55                  0.718  42       0
## 56                  0.248  21       0
## 57                  0.254  41       1
## 58                  0.962  31       0
## 59                  1.781  44       0
## 60                  0.173  22       0
## 61                  0.304  21       0
## 62                  0.270  39       1
## 63                  0.587  36       0
## 64                  0.699  24       0
## 65                  0.258  42       1
## 66                  0.203  32       0
## 67                  0.855  38       1
## 68                  0.845  54       0
## 69                  0.334  25       0
## 70                  0.189  27       0
## 71                  0.867  28       1
## 72                  0.411  26       0
## 73                  0.583  42       1
## 74                  0.231  23       0
## 75                  0.396  22       0
## 76                  0.140  22       0
## 77                  0.391  41       0
## 78                  0.370  27       0
## 79                  0.270  26       1
## 80                  0.307  24       0
## 81                  0.140  22       0
## 82                  0.102  22       0
## 83                  0.767  36       0
## 84                  0.237  22       0
## 85                  0.227  37       1
## 86                  0.698  27       0
## 87                  0.178  45       0
## 88                  0.324  26       0
## 89                  0.153  43       1
## 90                  0.165  24       0
## 91                  0.258  21       0
## 92                  0.443  34       0
## 93                  0.261  42       0
## 94                  0.277  60       1
## 95                  0.761  21       0
## 96                  0.255  40       0
## 97                  0.130  24       0
## 98                  0.323  22       0
## 99                  0.356  23       0
## 100                 0.325  31       1
## 101                 1.222  33       1
## 102                 0.179  22       0
## 103                 0.262  21       0
## 104                 0.283  24       0
## 105                 0.930  27       0
## 106                 0.801  21       0
## 107                 0.207  27       0
## 108                 0.287  37       0
## 109                 0.336  25       0
## 110                 0.247  24       1
## 111                 0.199  24       1
```

```
## 112                  0.543  46       1
## 113                  0.192  23       0
## 114                  0.391  25       0
## 115                  0.588  39       1
## 116                  0.539  61       1
## 117                  0.220  38       1
## 118                  0.654  25       0
## 119                  0.443  22       0
## 120                  0.223  21       0
## 121                  0.759  25       1
## 122                  0.260  24       0
## 123                  0.404  23       0
## 124                  0.186  69       0
## 125                  0.278  23       1
## 126                  0.496  26       1
## 127                  0.452  30       0
## 128                  0.261  23       0
## 129                  0.403  40       1
## 130                  0.741  62       1
## 131                  0.361  33       1
## 132                  1.114  33       1
## 133                  0.356  30       1
## 134                  0.457  39       0
## 135                  0.647  26       0
## 136                  0.088  31       0
## 137                  0.597  21       0
## 138                  0.532  22       0
## 139                  0.703  29       0
## 140                  0.159  28       0
## 141                  0.268  55       0
## 142                  0.286  38       0
## 143                  0.318  22       0
## 144                  0.272  42       1
## 145                  0.237  23       0
## 146                  0.572  21       0
## 147                  0.096  41       0
## 148                  1.400  34       0
## 149                  0.218  65       0
## 150                  0.085  22       0
## 151                  0.399  24       0
## 152                  0.432  37       0
## 153                  1.189  42       1
## 154                  0.687  23       0
## 155                  0.137  43       1
## 156                  0.337  36       1
## 157                  0.637  21       0
## 158                  0.833  23       0
## 159                  0.229  22       0
## 160                  0.817  47       1
## 161                  0.294  36       0
## 162                  0.204  45       0
## 163                  0.167  27       0
## 164                  0.368  21       0
## 165                  0.743  32       1
## 166                  0.722  41       1
## 167                  0.256  22       0
## 168                  0.709  34       0
## 169                  0.471  29       0
## 170                  0.495  29       0
## 171                  0.180  36       1
## 172                  0.542  29       1
## 173                  0.773  25       0
## 174                  0.678  23       0
## 175                  0.370  33       0
## 176                  0.719  36       1
## 177                  0.382  42       0
## 178                  0.319  26       1
## 179                  0.190  47       0
## 180                  0.956  37       1
## 181                  0.084  32       0
## 182                  0.725  23       0
## 183                  0.299  21       0
## 184                  0.268  27       0
```

```
## 184                  0.268  27       0
## 185                  0.244  40       0
## 186                  0.745  41       1
## 187                  0.615  60       1
## 188                  1.321  33       1
## 189                  0.640  31       1
## 190                  0.361  25       1
## 191                  0.142  21       0
## 192                  0.374  40       0
## 193                  0.383  36       1
## 194                  0.578  40       1
## 195                  0.136  42       0
## 196                  0.395  29       1
## 197                  0.187  21       0
## 198                  0.678  23       1
## 199                  0.905  26       1
## 200                  0.150  29       1
## 201                  0.874  21       0
## 202                  0.236  28       0
## 203                  0.787  32       0
## 204                  0.235  27       0
## 205                  0.324  55       0
## 206                  0.407  27       0
## 207                  0.605  57       1
## 208                  0.151  52       1
## 209                  0.289  21       0
## 210                  0.355  41       1
## 211                  0.290  25       0
## 212                  0.375  24       0
## 213                  0.164  60       0
## 214                  0.431  24       1
## 215                  0.260  36       1
## 216                  0.742  38       1
## 217                  0.514  25       1
## 218                  0.464  32       0
## 219                  1.224  32       1
## 220                  0.261  41       1
## 221                  1.072  21       1
## 222                  0.805  66       1
## 223                  0.209  37       0
## 224                  0.687  61       0
## 225                  0.666  26       0
## 226                  0.101  22       0
## 227                  0.198  26       0
## 228                  0.652  24       1
## 229                  2.329  31       0
## 230                  0.089  24       0
## 231                  0.645  22       1
## 232                  0.238  46       1
## 233                  0.583  22       0
## 234                  0.394  29       0
## 235                  0.293  23       0
## 236                  0.479  26       1
## 237                  0.586  51       1
## 238                  0.686  23       1
## 239                  0.831  32       1
## 240                  0.582  27       0
## 241                  0.192  21       0
## 242                  0.446  22       0
## 243                  0.402  22       1
## 244                  1.318  33       1
## 245                  0.329  29       0
## 246                  1.213  49       1
## 247                  0.258  41       0
## 248                  0.427  23       0
## 249                  0.282  34       0
## 250                  0.143  23       0
## 251                  0.380  42       0
## 252                  0.284  27       0
## 253                  0.249  24       0
## 254                  0.238  25       0
## 255                  0.926  44       1
## 256                  0.543  21       1
```

```
## 257                  0.557  30       0
## 258                  0.092  25       0
## 259                  0.655  24       0
## 260                  1.353  51       1
## 261                  0.299  34       0
## 262                  0.761  27       1
## 263                  0.612  24       0
## 264                  0.200  63       0
## 265                  0.226  35       1
## 266                  0.997  43       0
## 267                  0.933  25       1
## 268                  1.101  24       0
## 269                  0.078  21       0
## 270                  0.240  28       1
## 271                  1.136  38       1
## 272                  0.128  21       0
## 273                  0.254  40       0
## 274                  0.422  21       0
## 275                  0.251  52       0
## 276                  0.677  25       0
## 277                  0.296  29       1
## 278                  0.454  23       0
## 279                  0.744  57       0
## 280                  0.881  22       0
## 281                  0.334  28       1
## 282                  0.280  39       0
## 283                  0.262  37       0
## 284                  0.165  47       1
## 285                  0.259  52       1
## 286                  0.647  51       0
## 287                  0.619  34       0
## 288                  0.808  29       1
## 289                  0.340  26       0
## 290                  0.263  33       0
## 291                  0.434  21       0
## 292                  0.757  25       1
## 293                  1.224  31       1
## 294                  0.613  24       1
## 295                  0.254  65       0
## 296                  0.692  28       0
## 297                  0.337  29       1
## 298                  0.520  24       0
## 299                  0.412  46       1
## 300                  0.840  58       0
## 301                  0.839  30       1
## 302                  0.422  25       1
## 303                  0.156  35       0
## 304                  0.209  28       1
## 305                  0.207  37       0
## 306                  0.215  29       0
## 307                  0.326  47       1
## 308                  0.143  21       0
## 309                  1.391  25       1
## 310                  0.875  30       1
## 311                  0.313  41       0
## 312                  0.605  22       0
## 313                  0.433  27       1
## 314                  0.626  25       0
## 315                  1.127  43       1
## 316                  0.315  26       0
## 317                  0.284  30       0
## 318                  0.345  29       1
## 319                  0.150  28       0
## 320                  0.129  59       1
## 321                  0.527  31       0
## 322                  0.197  25       1
## 323                  0.254  36       1
## 324                  0.731  43       1
## 325                  0.148  21       0
## 326                  0.123  24       0
## 327                  0.692  30       1
## 328                  0.200  37       0
## 329                  0.127  23       1
```

```
## 330                  0.122  37       0
## 331                  1.476  46       0
## 332                  0.166  25       0
## 333                  0.282  41       1
## 334                  0.137  44       0
## 335                  0.260  22       0
## 336                  0.259  26       0
## 337                  0.932  44       0
## 338                  0.343  44       1
## 339                  0.893  33       1
## 340                  0.331  41       1
## 341                  0.472  22       0
## 342                  0.673  36       0
## 343                  0.389  22       0
## 344                  0.290  33       0
## 345                  0.485  57       0
## 346                  0.349  49       0
## 347                  0.654  22       0
## 348                  0.187  23       0
## 349                  0.279  26       0
## 350                  0.346  37       1
## 351                  0.237  29       0
## 352                  0.252  30       0
## 353                  0.243  46       0
## 354                  0.580  24       0
## 355                  0.559  21       0
## 356                  0.302  49       1
## 357                  0.962  28       1
## 358                  0.569  44       1
## 359                  0.378  48       0
## 360                  0.875  29       1
## 361                  0.583  29       1
## 362                  0.207  63       0
## 363                  0.305  65       0
## 364                  0.520  67       1
## 365                  0.385  30       0
## 366                  0.499  30       0
## 367                  0.368  29       1
## 368                  0.252  21       0
## 369                  0.306  22       0
## 370                  0.234  45       1
## 371                  2.137  25       1
## 372                  1.731  21       0
## 373                  0.545  21       0
## 374                  0.225  25       0
## 375                  0.816  28       0
## 376                  0.528  58       1
## 377                  0.299  22       0
## 378                  0.509  22       0
## 379                  0.238  32       1
## 380                  1.021  35       0
## 381                  0.821  24       0
## 382                  0.236  22       0
## 383                  0.947  21       0
## 384                  1.268  25       0
## 385                  0.221  25       0
## 386                  0.205  24       0
## 387                  0.660  35       1
## 388                  0.239  45       1
## 389                  0.452  58       1
## 390                  0.949  28       0
## 391                  0.444  42       0
## 392                  0.340  27       1
## 393                  0.389  21       0
## 394                  0.463  37       0
## 395                  0.803  31       1
## 396                  1.600  25       0
## 397                  0.944  39       0
## 398                  0.196  22       1
## 399                  0.389  25       0
## 400                  0.241  25       1
## 401                  0.161  31       1
## 402                  0.151  55       0
```

```
## 402                0.151  55       0
## 403                0.286  35       1
## 404                0.280  38       0
## 405                0.135  41       1
## 406                0.520  26       0
## 407                0.376  46       1
## 408                0.336  25       0
## 409                1.191  39       1
## 410                0.702  28       1
## 411                0.674  28       0
## 412                0.528  25       0
## 413                1.076  22       0
## 414                0.256  21       0
## 415                0.534  21       1
## 416                0.258  22       1
## 417                1.095  22       0
## 418                0.554  37       1
## 419                0.624  27       0
## 420                0.219  28       1
## 421                0.507  26       0
## 422                0.561  21       0
## 423                0.496  21       0
## 424                0.421  21       0
## 425                0.516  36       1
## 426                0.264  31       1
## 427                0.256  25       0
## 428                0.328  38       1
## 429                0.284  26       0
## 430                0.233  43       1
## 431                0.108  23       0
## 432                0.551  38       0
## 433                0.527  22       0
## 434                0.167  29       0
## 435                1.138  36       0
## 436                0.205  29       1
## 437                0.244  41       0
## 438                0.434  28       0
## 439                0.147  21       0
## 440                0.727  31       0
## 441                0.435  41       1
## 442                0.497  22       0
## 443                0.230  24       0
## 444                0.955  33       1
## 445                0.380  30       1
## 446                2.420  25       1
## 447                0.658  28       0
## 448                0.330  26       0
## 449                0.510  22       1
## 450                0.285  26       0
## 451                0.415  23       0
## 452                0.542  23       1
## 453                0.381  25       0
## 454                0.832  72       0
## 455                0.498  24       0
## 456                0.212  38       1
## 457                0.687  62       0
## 458                0.364  24       0
## 459                1.001  51       1
## 460                0.460  81       0
## 461                0.733  48       0
## 462                0.416  26       0
## 463                0.705  39       0
## 464                0.258  37       0
## 465                1.022  34       0
## 466                0.452  21       0
## 467                0.269  22       0
## 468                0.600  25       0
## 469                0.183  38       1
## 470                0.571  27       0
## 471                0.607  28       0
## 472                0.170  22       0
## 473                0.259  22       0
## 474                0.210  50       0
```

```
## 475                  0.126  24       0
## 476                  0.231  59       0
## 477                  0.711  29       1
## 478                  0.466  31       0
## 479                  0.162  39       0
## 480                  0.419  63       0
## 481                  0.344  35       1
## 482                  0.197  29       0
## 483                  0.306  28       0
## 484                  0.233  23       0
## 485                  0.630  31       1
## 486                  0.365  24       1
## 487                  0.536  21       0
## 488                  1.159  58       0
## 489                  0.294  28       0
## 490                  0.551  67       0
## 491                  0.629  24       0
## 492                  0.292  42       0
## 493                  0.145  33       0
## 494                  1.144  45       1
## 495                  0.174  22       0
## 496                  0.304  66       0
## 497                  0.292  30       0
## 498                  0.547  25       0
## 499                  0.163  55       1
## 500                  0.839  39       0
## 501                  0.313  21       0
## 502                  0.267  28       0
## 503                  0.727  41       1
## 504                  0.738  41       0
## 505                  0.238  40       0
## 506                  0.263  38       0
## 507                  0.314  35       1
## 508                  0.692  21       0
## 509                  0.968  21       0
## 510                  0.409  64       0
## 511                  0.297  46       1
## 512                  0.207  21       0
## 513                  0.200  58       0
## 514                  0.525  22       0
## 515                  0.154  24       0
## 516                  0.268  28       1
## 517                  0.771  53       1
## 518                  0.304  51       0
## 519                  0.180  41       0
## 520                  0.582  60       0
## 521                  0.187  25       0
## 522                  0.305  26       0
## 523                  0.189  26       0
## 524                  0.652  45       1
## 525                  0.151  24       0
## 526                  0.444  21       0
## 527                  0.299  21       0
## 528                  0.107  24       0
## 529                  0.493  22       0
## 530                  0.660  31       0
## 531                  0.717  22       0
## 532                  0.686  24       0
## 533                  0.917  29       0
## 534                  0.501  31       0
## 535                  1.251  24       0
## 536                  0.302  23       1
## 537                  0.197  46       0
## 538                  0.735  67       0
## 539                  0.804  23       0
## 540                  0.968  32       1
## 541                  0.661  43       1
## 542                  0.549  27       1
## 543                  0.825  56       1
## 544                  0.159  25       0
## 545                  0.365  29       0
## 546                  0.423  37       1
## 547                  1.034  53       1
```

```
## 548                  0.160  28       0
## 549                  0.341  50       0
## 550                  0.680  37       0
## 551                  0.204  21       0
## 552                  0.591  25       0
## 553                  0.247  66       0
## 554                  0.422  23       0
## 555                  0.471  28       0
## 556                  0.161  37       0
## 557                  0.218  30       0
## 558                  0.237  58       0
## 559                  0.126  42       0
## 560                  0.300  35       0
## 561                  0.121  54       1
## 562                  0.502  28       1
## 563                  0.401  24       0
## 564                  0.497  32       0
## 565                  0.601  27       0
## 566                  0.748  22       0
## 567                  0.412  21       0
## 568                  0.085  46       0
## 569                  0.338  37       0
## 570                  0.203  33       1
## 571                  0.270  39       0
## 572                  0.268  21       0
## 573                  0.430  22       0
## 574                  0.198  22       0
## 575                  0.892  23       0
## 576                  0.280  25       0
## 577                  0.813  35       0
## 578                  0.693  21       1
## 579                  0.245  36       0
## 580                  0.575  62       1
## 581                  0.371  21       1
## 582                  0.206  27       0
## 583                  0.259  62       0
## 584                  0.190  42       0
## 585                  0.687  52       1
## 586                  0.417  22       0
## 587                  0.129  41       1
## 588                  0.249  29       0
## 589                  1.154  52       1
## 590                  0.342  25       0
## 591                  0.925  45       1
## 592                  0.175  24       0
## 593                  0.402  44       1
## 594                  1.699  25       0
## 595                  0.733  34       0
## 596                  0.682  22       1
## 597                  0.194  46       0
## 598                  0.559  21       0
## 599                  0.088  38       1
## 600                  0.407  26       0
## 601                  0.400  24       0
## 602                  0.190  28       0
## 603                  0.100  30       0
## 604                  0.692  54       1
## 605                  0.212  36       1
## 606                  0.514  21       0
## 607                  1.258  22       1
## 608                  0.482  25       0
## 609                  0.270  27       0
## 610                  0.138  23       0
## 611                  0.292  24       0
## 612                  0.593  36       1
## 613                  0.787  40       1
## 614                  0.878  26       0
## 615                  0.557  50       1
## 616                  0.207  27       0
## 617                  0.157  30       0
## 618                  0.257  23       0
## 619                  1.282  50       1
## 620                  0.141  24       1
```

```
## 620                    0.141  24       1
## 621                    0.246  28       0
## 622                    1.698  28       0
## 623                    1.461  45       0
## 624                    0.347  21       0
## 625                    0.158  21       0
## 626                    0.362  29       0
## 627                    0.206  21       0
## 628                    0.393  21       0
## 629                    0.144  45       0
## 630                    0.148  21       0
## 631                    0.732  34       1
## 632                    0.238  24       0
## 633                    0.343  23       0
## 634                    0.115  22       0
## 635                    0.167  31       0
## 636                    0.465  38       1
## 637                    0.153  48       0
## 638                    0.649  23       0
## 639                    0.871  32       1
## 640                    0.149  28       0
## 641                    0.695  27       0
## 642                    0.303  24       0
## 643                    0.178  50       1
## 644                    0.610  31       0
## 645                    0.730  27       0
## 646                    0.134  30       0
## 647                    0.447  33       1
## 648                    0.455  22       1
## 649                    0.260  42       1
## 650                    0.133  23       0
## 651                    0.234  23       0
## 652                    0.466  27       0
## 653                    0.269  28       0
## 654                    0.455  27       0
## 655                    0.142  22       0
## 656                    0.240  25       1
## 657                    0.155  22       0
## 658                    1.162  41       0
## 659                    0.190  51       0
## 660                    1.292  27       1
## 661                    0.182  54       0
## 662                    1.394  22       1
## 663                    0.165  43       1
## 664                    0.637  40       1
## 665                    0.245  40       1
## 666                    0.217  24       0
## 667                    0.235  70       1
## 668                    0.141  40       1
## 669                    0.430  43       0
## 670                    0.164  45       0
## 671                    0.631  49       0
## 672                    0.551  21       0
## 673                    0.285  47       0
## 674                    0.880  22       0
## 675                    0.587  68       0
## 676                    0.328  31       1
## 677                    0.230  53       1
## 678                    0.263  25       0
## 679                    0.127  25       1
## 680                    0.614  23       0
## 681                    0.332  22       0
## 682                    0.364  26       1
## 683                    0.366  22       0
## 684                    0.536  27       1
## 685                    0.640  69       0
## 686                    0.591  25       0
## 687                    0.314  22       0
## 688                    0.181  29       0
## 689                    0.828  23       0
## 690                    0.335  46       1
## 691                    0.856  34       0
## 692                    0.257  44       1
```

```
## 693                  0.886  23       0
## 694                  0.439  43       1
## 695                  0.191  25       0
## 696                  0.128  43       1
## 697                  0.268  31       1
## 698                  0.253  22       0
## 699                  0.598  28       0
## 700                  0.904  26       0
## 701                  0.483  26       0
## 702                  0.565  49       1
## 703                  0.905  52       1
## 704                  0.304  41       0
## 705                  0.118  27       0
## 706                  0.177  28       0
## 707                  0.261  30       1
## 708                  0.176  22       0
## 709                  0.148  45       1
## 710                  0.674  23       1
## 711                  0.295  24       0
## 712                  0.439  40       0
## 713                  0.441  38       1
## 714                  0.352  21       0
## 715                  0.121  32       0
## 716                  0.826  34       1
## 717                  0.970  31       1
## 718                  0.595  56       0
## 719                  0.415  24       0
## 720                  0.378  52       1
## 721                  0.317  34       0
## 722                  0.289  21       0
## 723                  0.349  42       1
## 724                  0.251  42       0
## 725                  0.265  45       0
## 726                  0.236  38       0
## 727                  0.496  25       0
## 728                  0.433  22       0
## 729                  0.326  22       0
## 730                  0.141  22       0
## 731                  0.323  34       1
## 732                  0.259  22       1
## 733                  0.646  24       1
## 734                  0.426  22       0
## 735                  0.560  53       0
## 736                  0.284  28       0
## 737                  0.515  21       0
## 738                  0.600  42       0
## 739                  0.453  21       0
## 740                  0.293  42       1
## 741                  0.785  48       1
## 742                  0.400  26       0
## 743                  0.219  22       0
## 744                  0.734  45       1
## 745                  1.174  39       0
## 746                  0.488  46       0
## 747                  0.358  27       1
## 748                  1.096  32       0
## 749                  0.408  36       1
## 750                  0.178  50       1
## 751                  1.182  22       1
## 752                  0.261  28       0
## 753                  0.223  25       0
## 754                  0.222  26       1
## 755                  0.443  45       1
## 756                  1.057  37       1
## 757                  0.391  39       0
## 758                  0.258  52       1
## 759                  0.197  26       0
## 760                  0.278  66       1
## 761                  0.766  22       0
## 762                  0.403  43       1
## 763                  0.142  33       0
## 764                  0.171  63       0
## 765                  0.340  27       0
```

```
## 766                    0.245  30       0
## 767                    0.349  47       1
## 768                    0.315  23       0
```

```
library(Amelia) #This library is used to plot missmap
```

```
## Loading required package: Rcpp
```

```
## ##
## ## Amelia II: Multiple Imputation
## ## (Version 1.7.5, built: 2018-05-07)
## ## Copyright (C) 2005-2019 James Honaker, Gary King and Matthew Blackwell
## ## Refer to http://gking.harvard.edu/amelia/ for more information
## ##
```

```
library(ggplot2)
library(ggcorrplot)
```

```
## Warning: package 'ggcorrplot' was built under R version 3.5.2
```

```
library(GGally)
```

```
## Warning: package 'GGally' was built under R version 3.5.2
```

```
library(PerformanceAnalytics)
```

```
## Warning: package 'PerformanceAnalytics' was built under R version 3.5.2
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
##
## Attaching package: 'PerformanceAnalytics'
```

```
## The following object is masked from 'package:graphics':
##
##     legend
```

```
library(gridExtra)

chooseCRANmirror(graphics=FALSE, ind=1)


#t-test


attach(my_data)

with(data=my_data,t.test(Pregnancies[Outcome==1],Pregnancies[Outcome==0],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  Pregnancies[Outcome == 1] and Pregnancies[Outcome == 0]
## t = 6.2984, df = 766, p-value = 5.065e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  1.079067 2.056276
## sample estimates:
## mean of x mean of y
##  4.865672  3.298000
```

```
with(data=my_data,t.test(Glucose[Outcome==1],Glucose[Outcome==0],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  Glucose[Outcome == 1] and Glucose[Outcome == 0]
## t = 14.6, df = 766, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  27.07202 35.48291
## sample estimates:
## mean of x mean of y
##  141.2575  109.9800
```

```
with(data=my_data,t.test(Insulin[Outcome==1],Insulin[Outcome==0],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  Insulin[Outcome == 1] and Insulin[Outcome == 0]
## t = 3.6443, df = 766, p-value = 0.0002862
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  14.55231 48.53533
## sample estimates:
## mean of x mean of y
##  100.3358   68.7920
```

```
with(data=my_data,t.test(SkinThickness[Outcome==1],SkinThickness[Outcome==0],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  SkinThickness[Outcome == 1] and SkinThickness[Outcome == 0]
## t = 2.0747, df = 766, p-value = 0.03835
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.1345284 4.8658298
## sample estimates:
## mean of x mean of y
##  22.16418  19.66400
```

```
with(data=my_data,t.test(BMI[Outcome==1],BMI[Outcome==0],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  BMI[Outcome == 1] and BMI[Outcome == 0]
## t = 8.4718, df = 766, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3.717214 5.959460
## sample estimates:
## mean of x mean of y
##  35.14254  30.30420
```

```
with(data=my_data,t.test(DiabetesPedigreeFunction[Outcome==0],DiabetesPedigreeFunction[Outcome==1],var.equal
=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  DiabetesPedigreeFunction[Outcome == 0] and DiabetesPedigreeFunction[Outcome == 1]
## t = -4.8858, df = 766, p-value = 1.255e-06
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.16928831 -0.07224369
## sample estimates:
## mean of x mean of y
##  0.429734  0.550500
```

```
with(data=my_data,t.test(Age[Outcome==1],Age[Outcome==0],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  Age[Outcome == 1] and Age[Outcome == 0]
## t = 6.7927, df = 766, p-value = 2.21e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4.178682 7.575646
## sample estimates:
## mean of x mean of y
##  37.06716  31.19000
```

```
with(data=my_data,t.test(BloodPressure[Outcome==1],BloodPressure[Outcome==0],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  BloodPressure[Outcome == 1] and BloodPressure[Outcome == 0]
## t = 1.8047, df = 766, p-value = 0.07151
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2317162  5.5129700
## sample estimates:
## mean of x mean of y
##  70.82463  68.18400
```

```
#Hotelling

install.packages("Hotelling")
```

```
## Installing package into 'C:/Users/Trishala/Documents/R/win-library/3.5'
## (as 'lib' is unspecified)
```

```
## package 'Hotelling' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##  C:\Users\Trishala\AppData\Local\Temp\RtmpwNBUof\downloaded_packages
```

```
library(Hotelling)
```

```
## Warning: package 'Hotelling' was built under R version 3.5.2
```

```
## Loading required package: corpcor
```

```
## Warning: package 'corpcor' was built under R version 3.5.2
```

```
t2testsparr <- hotelling.test(Pregnancies + Glucose + Insulin + SkinThickness + BMI+ DiabetesPedigreeFunctio
n + Age  ~ Outcome, data=my_data)
cat("T2 statistic =",t2testsparr$stat[[1]],"\n")
```

```
## T2 statistic = 321.5672
```

```
print(t2testsparr)
```

```
## Test stat:  45.578
## Numerator df:  7
## Denominator df:  760
## P-value:  0
```

```
#F-test
attach(my_data)
```

```
## The following objects are masked from my_data (pos = 5):
##
##     Age, BloodPressure, BMI, DiabetesPedigreeFunction, Glucose,
##     Insulin, Outcome, Pregnancies, SkinThickness
```

```
var.test(Pregnancies[Outcome==1],Pregnancies[Outcome==0])
```

```
##
##  F test to compare two variances
##
## data:  Pregnancies[Outcome == 1] and Pregnancies[Outcome == 0]
## F = 1.5375, num df = 267, denom df = 499, p-value = 4.246e-05
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.249880 1.904318
## sample estimates:
## ratio of variances
##           1.537543
```

```
var.test(Glucose[Outcome==1],Glucose[Outcome==0])
```

```
##
##  F test to compare two variances
##
## data:  Glucose[Outcome == 1] and Glucose[Outcome == 0]
## F = 1.4928, num df = 267, denom df = 499, p-value = 0.0001392
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.213527 1.848931
## sample estimates:
## ratio of variances
##           1.492824
```

```
var.test(Insulin[Outcome==1],Insulin[Outcome==0])
```

```
##
##  F test to compare two variances
##
## data:  Insulin[Outcome == 1] and Insulin[Outcome == 0]
## F = 1.9679, num df = 267, denom df = 499, p-value = 9.062e-11
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.599699 2.437302
## sample estimates:
## ratio of variances
##           1.967873
```

```
var.test(SkinThickness[Outcome==1],SkinThickness[Outcome==0])
```

```
##
##  F test to compare two variances
##
## data:  SkinThickness[Outcome == 1] and SkinThickness[Outcome == 0]
## F = 1.4098, num df = 267, denom df = 499, p-value = 0.001112
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.146054 1.746129
## sample estimates:
## ratio of variances
##           1.409821
```

```
var.test(BMI[Outcome==1],BMI[Outcome==0])
```

```
##
##  F test to compare two variances
##
## data:  BMI[Outcome == 1] and BMI[Outcome == 0]
## F = 0.89206, num df = 267, denom df = 499, p-value = 0.295
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7251585 1.1048520
## sample estimates:
## ratio of variances
##          0.8920555
```

```
var.test(DiabetesPedigreeFunction[Outcome==1],DiabetesPedigreeFunction[Outcome==0])
```

```
##
##  F test to compare two variances
##
## data:  DiabetesPedigreeFunction[Outcome == 1] and DiabetesPedigreeFunction[Outcome == 0]
## F = 1.55, num df = 267, denom df = 499, p-value = 3.03e-05
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.259981 1.919708
## sample estimates:
## ratio of variances
##           1.549969
```

```
var.test(Age[Outcome==1],Age[Outcome==0])
```

```
##
##  F test to compare two variances
##
## data:  Age[Outcome == 1] and Age[Outcome == 0]
## F = 0.88371, num df = 267, denom df = 499, p-value = 0.2569
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7183712 1.0945108
## sample estimates:
## ratio of variances
##          0.8837061
```

```
var.test(BloodPressure[Outcome==1],BloodPressure[Outcome==0])
```

```
##
##  F test to compare two variances
##
## data:  BloodPressure[Outcome == 1] and BloodPressure[Outcome == 0]
## F = 1.4157, num df = 267, denom df = 499, p-value = 0.0009661
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.150810 1.753375
## sample estimates:
## ratio of variances
##           1.415672
```

```
#levene Test - To test equality of variables

install.packages("car")
```

```
## Installing package into 'C:/Users/Trishala/Documents/R/win-library/3.5'
## (as 'lib' is unspecified)
```

```
## package 'car' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##  C:\Users\Trishala\AppData\Local\Temp\RtmpwNBUof\downloaded_packages
```

```
library(car)
```

```
## Warning: package 'car' was built under R version 3.5.2
```

```
## Loading required package: carData
```

```
#my_data$Outcome <- is.factor(my_data$outcome)
#levels(my_data$Outcome) <- c("Non-Diabetic","Diabetic")
#leveneTest(my_data$Pregnancies, my_data$Outcome,center=mean)

with(my_data,leveneTest(Outcome,Pregnancies))
```

```
## Warning in leveneTest.default(Outcome, Pregnancies): Pregnancies coerced to
## factor.
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value  Pr(>F)
## group  16  1.7726 0.03078 *
##       751
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
with(my_data,leveneTest(Outcome,BMI))
```

```
## Warning in leveneTest.default(Outcome, BMI): BMI coerced to factor.
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group 247   0.726 0.9978
##       520
```

```
with(my_data,leveneTest(Outcome,Insulin))
```

```
## Warning in leveneTest.default(Outcome, Insulin): Insulin coerced to factor.
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group 185  0.6804  0.999
##       582
```

```
with(my_data,leveneTest(Outcome,BloodPressure))
```

```
## Warning in leveneTest.default(Outcome, BloodPressure): BloodPressure
## coerced to factor.
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group  46  1.0258 0.4279
##       721
```

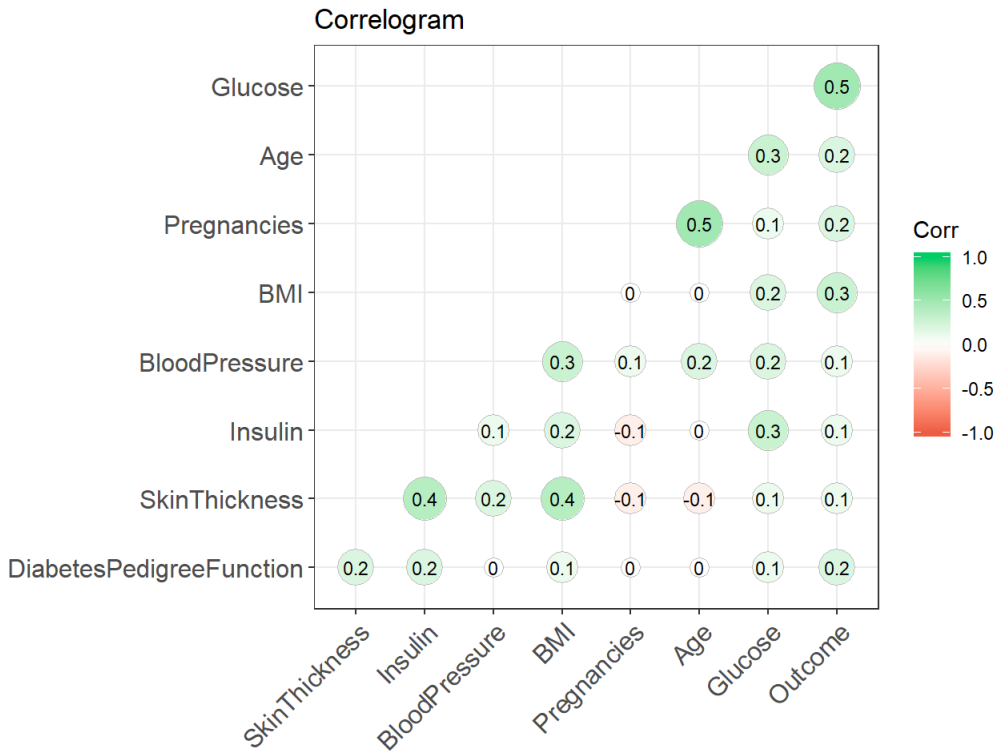
```
with(my_data,leveneTest(Outcome,Age))
```

```
## Warning in leveneTest.default(Outcome, Age): Age coerced to factor.
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group  51  1.2615 0.1094
##       716
```

```
# Correlation matrix
#This plot shows us correlation coeeficents of all the varaibles.

corr <- round(cor(my_data), 1)
# Plot
ggcorrplot(corr, hc.order = TRUE,
           type = "lower",
           lab = TRUE,
           lab_size = 3,
           method="circle",
           colors = c("tomato2", "white", "springgreen3"),
           title="Correlogram",
           ggtheme=theme_bw)
```



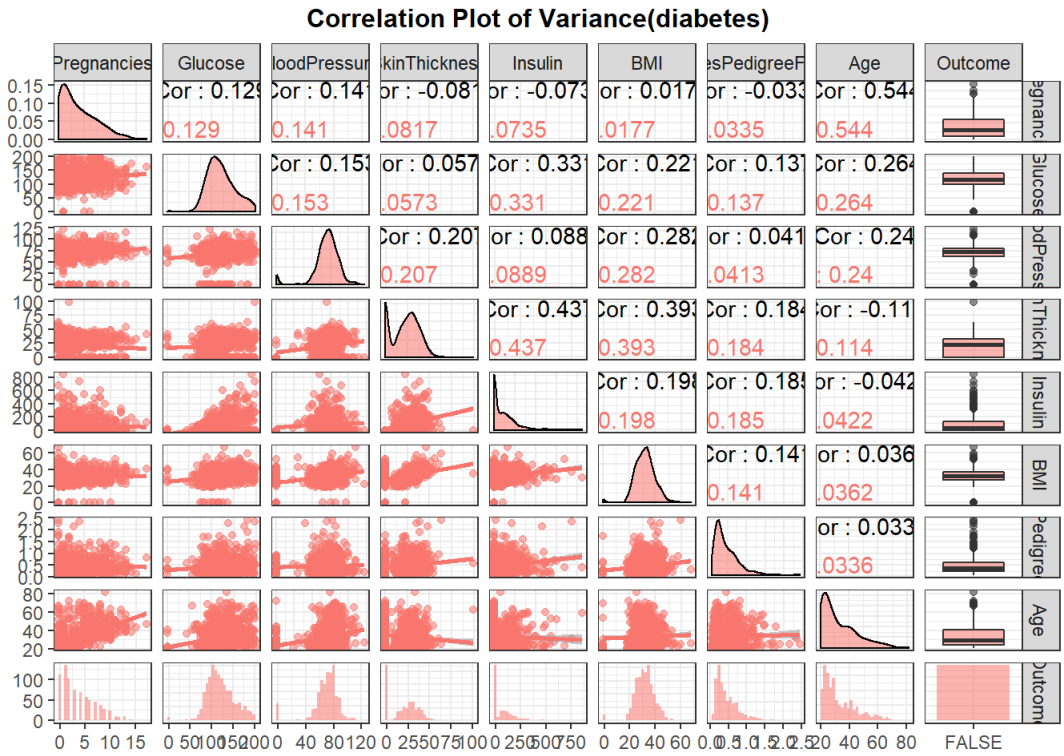

```
# From the plot, we can say that the variable Glucose has a higher impact on the Outcome variable. They are highly Co-rrelated.
#Pregnancies and Age are strongly correlated with coeeficient value 0.54.
#SkinThickness , BMI and Skinthickness and Insulin are positively correlated with coeeficient values 0.4.


#Changing outcome from numerical to categorical varibale.
my_data$Outcome<- is.factor(my_data$Outome)
levels(my_data$Outcome) <- c("No","Yes")


#correlation plot
#This plot shows the relationship between the variables.
ggpairs(my_data, aes(color=Outcome, alpha=0.75), lower=list(continuous="smooth"))+ theme_bw()+
  labs(title="Correlation Plot of Variance(diabetes)")+
  theme(plot.title=element_text(face='bold',color='black',hjust=0.5,size=12))
```

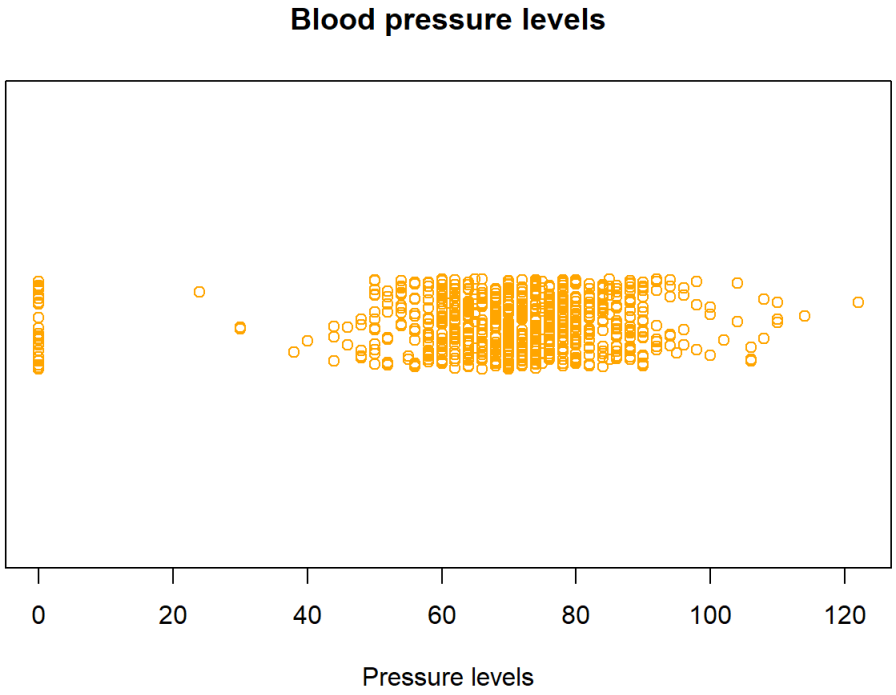
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

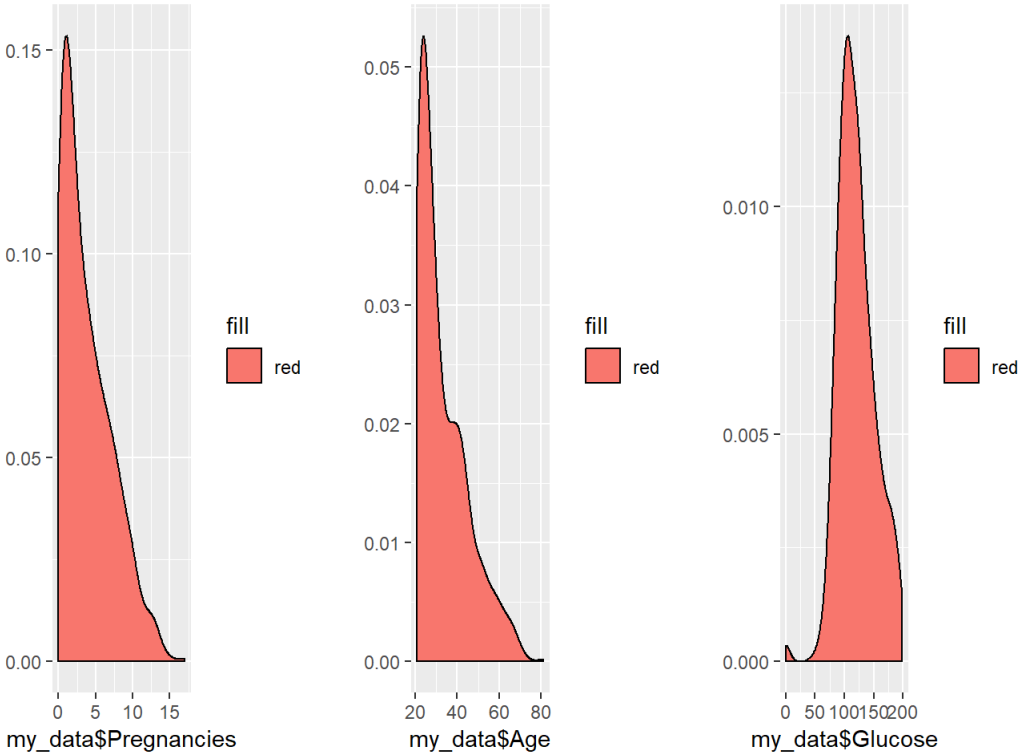



```
#From the box plots in the last segment, we see the variables Insulin, BloodPressure, and the DiabetesPedigr
eefunction
#contain many outliers.

#stripchart is like scatter plots (or dot plots) of the given data.
#It's like an alternative to boxplots when sample sizes are small and are also used to check outliers presen
t in each variables
stripchart(my_data$BloodPressure,
           main="Blood pressure levels",
           xlab="Pressure levels",
           ylab="",
           method="jitter",
           col="orange",
           pch=1)
```



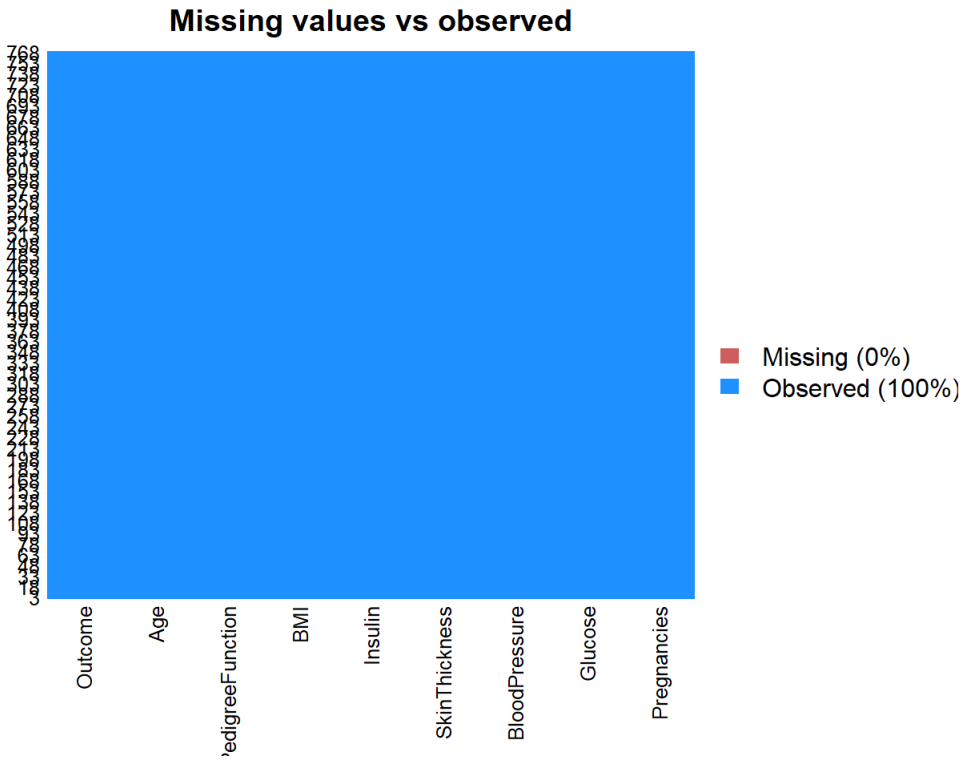
```
#Densityplots
plot1 = qplot(my_data$Pregnancies, data = my_data, geom = "density", fill = "red")
plot2 = qplot(my_data$Age, data = my_data, geom = "density", fill = "red")
plot3 = qplot(my_data$Glucose, data = my_data, geom = "density", fill = "red")
plot4 = qplot(my_data$BloodPressure, data = my_data, geom = "density", fill = "red")
grid.arrange(plot1, plot2, plot3, ncol = 3)
```




```
#The density plot here shows the distribution of the data and if they are positively or negatively skewed.

#Plots a missingness map showing where missingness occurs in the dataset

missmap(my_data, main ="Missing values vs observed")
```



```
#No missing Values occured in our dataset.



#ggplot(my_data,aes(x=Pregnancies,fill=factor(Outcome)))+geom_bar(position="Dodge")+scale_fill_manual(values
=c("red","blue"))+scale_x_continuous(limits=c(0,16))+labs(title="Pregnancies Vs Outcome")
```