002 Some Basics

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```
library(faraway)

## Warning:  package 'faraway' was built under R version 4.2.3
```

Loading the dataset and having a first look at it

```
pima

##     pregnant glucose diastolic triceps insulin  bmi diabetes age test
## 1          6     148        72      35       0 33.6    0.627  50    1
## 2          1      85        66      29       0 26.6    0.351  31    0
## 3          8     183        64       0       0 23.3    0.672  32    1
## 4          1      89        66      23      94 28.1    0.167  21    0
## 5          0     137        40      35     168 43.1    2.288  33    1
## 6          5     116        74       0       0 25.6    0.201  30    0
## 7          3      78        50      32      88 31.0    0.248  26    1
## 8         10     115         0       0       0 35.3    0.134  29    0
## 9          2     197        70      45     543 30.5    0.158  53    1
## 10         8     125        96       0       0  0.0    0.232  54    1
## 11         4     110        92       0       0 37.6    0.191  30    0
## 12        10     168        74       0       0 38.0    0.537  34    1
## 13        10     139        80       0       0 27.1    1.441  57    0
## 14         1     189        60      23     846 30.1    0.398  59    1
## 15         5     166        72      19     175 25.8    0.587  51    1
## 16         7     100         0       0       0 30.0    0.484  32    1
## 17         0     118        84      47     230 45.8    0.551  31    1
## 18         7     107        74       0       0 29.6    0.254  31    1
## 19         1     103        30      38      83 43.3    0.183  33    0
## 20         1     115        70      30      96 34.6    0.529  32    1
## 21         3     126        88      41     235 39.3    0.704  27    0
## 22         8      99        84       0       0 35.4    0.388  50    0
## 23         7     196        90       0       0 39.8    0.451  41    1
## 24         9     119        80      35       0 29.0    0.263  29    1
## 25        11     143        94      33     146 36.6    0.254  51    1
## 26        10     125        70      26     115 31.1    0.205  41    1
## 27         7     147        76       0       0 39.4    0.257  43    1
## 28         1      97        66      15     140 23.2    0.487  22    0
## 29        13     145        82      19     110 22.2    0.245  57    0
## 30         5     117        92       0       0 34.1    0.337  38    0
## 31         5     109        75      26       0 36.0    0.546  60    0
```

```
## 32          3     158          76       36     245 31.6    0.851  28     1
## 33          3      88          58       11      54 24.8    0.267  22     0
## 34          6      92          92        0       0 19.9    0.188  28     0
## 35         10     122          78       31       0 27.6    0.512  45     0
## 36          4     103          60       33     192 24.0    0.966  33     0
## 37         11     138          76        0       0 33.2    0.420  35     0
## 38          9     102          76       37       0 32.9    0.665  46     1
## 39          2      90          68       42       0 38.2    0.503  27     1
## 40          4     111          72       47     207 37.1    1.390  56     1
## 41          3     180          64       25      70 34.0    0.271  26     0
## 42          7     133          84        0       0 40.2    0.696  37     0
## 43          7     106          92       18       0 22.7    0.235  48     0
## 44          9     171         110       24     240 45.4    0.721  54     1
## 45          7     159          64        0       0 27.4    0.294  40     0
## 46          0     180          66       39       0 42.0    1.893  25     1
## 47          1     146          56        0       0 29.7    0.564  29     0
## 48          2      71          70       27       0 28.0    0.586  22     0
## 49          7     103          66       32       0 39.1    0.344  31     1
## 50          7     105           0        0       0  0.0    0.305  24     0
## 51          1     103          80       11      82 19.4    0.491  22     0
## 52          1     101          50       15      36 24.2    0.526  26     0
## 53          5      88          66       21      23 24.4    0.342  30     0
## 54          8     176          90       34     300 33.7    0.467  58     1
## 55          7     150          66       42     342 34.7    0.718  42     0
## 56          1      73          50       10       0 23.0    0.248  21     0
## 57          7     187          68       39     304 37.7    0.254  41     1
## 58          0     100          88       60     110 46.8    0.962  31     0
## 59          0     146          82        0       0 40.5    1.781  44     0
## 60          0     105          64       41     142 41.5    0.173  22     0
## 61          2      84           0        0       0  0.0    0.304  21     0
## 62          8     133          72        0       0 32.9    0.270  39     1
## 63          5      44          62        0       0 25.0    0.587  36     0
## 64          2     141          58       34     128 25.4    0.699  24     0
## 65          7     114          66        0       0 32.8    0.258  42     1
## 66          5      99          74       27       0 29.0    0.203  32     0
## 67          0     109          88       30       0 32.5    0.855  38     1
## 68          2     109          92        0       0 42.7    0.845  54     0
## 69          1      95          66       13      38 19.6    0.334  25     0
## 70          4     146          85       27     100 28.9    0.189  27     0
## 71          2     100          66       20      90 32.9    0.867  28     1
## 72          5     139          64       35     140 28.6    0.411  26     0
## 73         13     126          90        0       0 43.4    0.583  42     1
## 74          4     129          86       20     270 35.1    0.231  23     0
## 75          1      79          75       30       0 32.0    0.396  22     0
## 76          1       0          48       20       0 24.7    0.140  22     0
## 77          7      62          78        0       0 32.6    0.391  41     0
## 78          5      95          72       33       0 37.7    0.370  27     0
## 79          0     131           0        0       0 43.2    0.270  26     1
## 80          2     112          66       22       0 25.0    0.307  24     0
## 81          3     113          44       13       0 22.4    0.140  22     0
## 82          2      74           0        0       0  0.0    0.102  22     0
```

```
## 83          7      83          78          26          71 29.3    0.767  36     0
## 84          0     101          65          28           0 24.6    0.237  22     0
## 85          5     137         108           0           0 48.8    0.227  37     1
## 86          2     110          74          29         125 32.4    0.698  27     0
## 87         13     106          72          54           0 36.6    0.178  45     0
## 88          2     100          68          25          71 38.5    0.324  26     0
## 89         15     136          70          32         110 37.1    0.153  43     1
## 90          1     107          68          19           0 26.5    0.165  24     0
## 91          1      80          55           0           0 19.1    0.258  21     0
## 92          4     123          80          15         176 32.0    0.443  34     0
## 93          7      81          78          40          48 46.7    0.261  42     0
## 94          4     134          72           0           0 23.8    0.277  60     1
## 95          2     142          82          18          64 24.7    0.761  21     0
## 96          6     144          72          27         228 33.9    0.255  40     0
## 97          2      92          62          28           0 31.6    0.130  24     0
## 98          1      71          48          18          76 20.4    0.323  22     0
## 99          6      93          50          30          64 28.7    0.356  23     0
## 100         1     122          90          51         220 49.7    0.325  31     1
## 101         1     163          72           0           0 39.0    1.222  33     1
## 102         1     151          60           0           0 26.1    0.179  22     0
## 103         0     125          96           0           0 22.5    0.262  21     0
## 104         1      81          72          18          40 26.6    0.283  24     0
## 105         2      85          65           0           0 39.6    0.930  27     0
## 106         1     126          56          29         152 28.7    0.801  21     0
## 107         1      96         122           0           0 22.4    0.207  27     0
## 108         4     144          58          28         140 29.5    0.287  37     0
## 109         3      83          58          31          18 34.3    0.336  25     0
## 110         0      95          85          25          36 37.4    0.247  24     1
## 111         3     171          72          33         135 33.3    0.199  24     1
## 112         8     155          62          26         495 34.0    0.543  46     1
## 113         1      89          76          34          37 31.2    0.192  23     0
## 114         4      76          62           0           0 34.0    0.391  25     0
## 115         7     160          54          32         175 30.5    0.588  39     1
## 116         4     146          92           0           0 31.2    0.539  61     1
## 117         5     124          74           0           0 34.0    0.220  38     1
## 118         5      78          48           0           0 33.7    0.654  25     0
## 119         4      97          60          23           0 28.2    0.443  22     0
## 120         4      99          76          15          51 23.2    0.223  21     0
## 121         0     162          76          56         100 53.2    0.759  25     1
## 122         6     111          64          39           0 34.2    0.260  24     0
## 123         2     107          74          30         100 33.6    0.404  23     0
## 124         5     132          80           0           0 26.8    0.186  69     0
## 125         0     113          76           0           0 33.3    0.278  23     1
## 126         1      88          30          42          99 55.0    0.496  26     1
## 127         3     120          70          30         135 42.9    0.452  30     0
## 128         1     118          58          36          94 33.3    0.261  23     0
## 129         1     117          88          24         145 34.5    0.403  40     1
## 130         0     105          84           0           0 27.9    0.741  62     1
## 131         4     173          70          14         168 29.7    0.361  33     1
## 132         9     122          56           0           0 33.3    1.114  33     1
## 133         3     170          64          37         225 34.5    0.356  30     1
```

```
## 134        8      84        74       31       0 38.3    0.457  39    0
## 135        2      96        68       13      49 21.1    0.647  26    0
## 136        2     125        60       20     140 33.8    0.088  31    0
## 137        0     100        70       26      50 30.8    0.597  21    0
## 138        0      93        60       25      92 28.7    0.532  22    0
## 139        0     129        80        0       0 31.2    0.703  29    0
## 140        5     105        72       29     325 36.9    0.159  28    0
## 141        3     128        78        0       0 21.1    0.268  55    0
## 142        5     106        82       30       0 39.5    0.286  38    0
## 143        2     108        52       26      63 32.5    0.318  22    0
## 144       10     108        66        0       0 32.4    0.272  42    1
## 145        4     154        62       31     284 32.8    0.237  23    0
## 146        0     102        75       23       0  0.0    0.572  21    0
## 147        9      57        80       37       0 32.8    0.096  41    0
## 148        2     106        64       35     119 30.5    1.400  34    0
## 149        5     147        78        0       0 33.7    0.218  65    0
## 150        2      90        70       17       0 27.3    0.085  22    0
## 151        1     136        74       50     204 37.4    0.399  24    0
## 152        4     114        65        0       0 21.9    0.432  37    0
## 153        9     156        86       28     155 34.3    1.189  42    1
## 154        1     153        82       42     485 40.6    0.687  23    0
## 155        8     188        78        0       0 47.9    0.137  43    1
## 156        7     152        88       44       0 50.0    0.337  36    1
## 157        2      99        52       15      94 24.6    0.637  21    0
## 158        1     109        56       21     135 25.2    0.833  23    0
## 159        2      88        74       19      53 29.0    0.229  22    0
## 160       17     163        72       41     114 40.9    0.817  47    1
## 161        4     151        90       38       0 29.7    0.294  36    0
## 162        7     102        74       40     105 37.2    0.204  45    0
## 163        0     114        80       34     285 44.2    0.167  27    0
## 164        2     100        64       23       0 29.7    0.368  21    0
## 165        0     131        88        0       0 31.6    0.743  32    1
## 166        6     104        74       18     156 29.9    0.722  41    1
## 167        3     148        66       25       0 32.5    0.256  22    0
## 168        4     120        68        0       0 29.6    0.709  34    0
## 169        4     110        66        0       0 31.9    0.471  29    0
## 170        3     111        90       12      78 28.4    0.495  29    0
## 171        6     102        82        0       0 30.8    0.180  36    1
## 172        6     134        70       23     130 35.4    0.542  29    1
## 173        2      87         0       23       0 28.9    0.773  25    0
## 174        1      79        60       42      48 43.5    0.678  23    0
## 175        2      75        64       24      55 29.7    0.370  33    0
## 176        8     179        72       42     130 32.7    0.719  36    1
## 177        6      85        78        0       0 31.2    0.382  42    0
## 178        0     129       110       46     130 67.1    0.319  26    1
## 179        5     143        78        0       0 45.0    0.190  47    0
## 180        5     130        82        0       0 39.1    0.956  37    1
## 181        6      87        80        0       0 23.2    0.084  32    0
## 182        0     119        64       18      92 34.9    0.725  23    0
## 183        1       0        74       20      23 27.7    0.299  21    0
## 184        5      73        60        0       0 26.8    0.268  27    0
```

```
## 185        4     141        74        0       0 27.6    0.244  40     0
## 186        7     194        68       28       0 35.9    0.745  41     1
## 187        8     181        68       36     495 30.1    0.615  60     1
## 188        1     128        98       41      58 32.0    1.321  33     1
## 189        8     109        76       39     114 27.9    0.640  31     1
## 190        5     139        80       35     160 31.6    0.361  25     1
## 191        3     111        62        0       0 22.6    0.142  21     0
## 192        9     123        70       44      94 33.1    0.374  40     0
## 193        7     159        66        0       0 30.4    0.383  36     1
## 194       11     135         0        0       0 52.3    0.578  40     1
## 195        8      85        55       20       0 24.4    0.136  42     0
## 196        5     158        84       41     210 39.4    0.395  29     1
## 197        1     105        58        0       0 24.3    0.187  21     0
## 198        3     107        62       13      48 22.9    0.678  23     1
## 199        4     109        64       44      99 34.8    0.905  26     1
## 200        4     148        60       27     318 30.9    0.150  29     1
## 201        0     113        80       16       0 31.0    0.874  21     0
## 202        1     138        82        0       0 40.1    0.236  28     0
## 203        0     108        68       20       0 27.3    0.787  32     0
## 204        2      99        70       16      44 20.4    0.235  27     0
## 205        6     103        72       32     190 37.7    0.324  55     0
## 206        5     111        72       28       0 23.9    0.407  27     0
## 207        8     196        76       29     280 37.5    0.605  57     1
## 208        5     162       104        0       0 37.7    0.151  52     1
## 209        1      96        64       27      87 33.2    0.289  21     0
## 210        7     184        84       33       0 35.5    0.355  41     1
## 211        2      81        60       22       0 27.7    0.290  25     0
## 212        0     147        85       54       0 42.8    0.375  24     0
## 213        7     179        95       31       0 34.2    0.164  60     0
## 214        0     140        65       26     130 42.6    0.431  24     1
## 215        9     112        82       32     175 34.2    0.260  36     1
## 216       12     151        70       40     271 41.8    0.742  38     1
## 217        5     109        62       41     129 35.8    0.514  25     1
## 218        6     125        68       30     120 30.0    0.464  32     0
## 219        5      85        74       22       0 29.0    1.224  32     1
## 220        5     112        66        0       0 37.8    0.261  41     1
## 221        0     177        60       29     478 34.6    1.072  21     1
## 222        2     158        90        0       0 31.6    0.805  66     1
## 223        7     119         0        0       0 25.2    0.209  37     0
## 224        7     142        60       33     190 28.8    0.687  61     0
## 225        1     100        66       15      56 23.6    0.666  26     0
## 226        1      87        78       27      32 34.6    0.101  22     0
## 227        0     101        76        0       0 35.7    0.198  26     0
## 228        3     162        52       38       0 37.2    0.652  24     1
## 229        4     197        70       39     744 36.7    2.329  31     0
## 230        0     117        80       31      53 45.2    0.089  24     0
## 231        4     142        86        0       0 44.0    0.645  22     1
## 232        6     134        80       37     370 46.2    0.238  46     1
## 233        1      79        80       25      37 25.4    0.583  22     0
## 234        4     122        68        0       0 35.0    0.394  29     0
## 235        3      74        68       28      45 29.7    0.293  23     0
```

```
## 236         4     171         72         0       0 43.6    0.479  26     1
## 237         7     181         84        21     192 35.9    0.586  51     1
## 238         0     179         90        27       0 44.1    0.686  23     1
## 239         9     164         84        21       0 30.8    0.831  32     1
## 240         0     104         76         0       0 18.4    0.582  27     0
## 241         1      91         64        24       0 29.2    0.192  21     0
## 242         4      91         70        32      88 33.1    0.446  22     0
## 243         3     139         54         0       0 25.6    0.402  22     1
## 244         6     119         50        22     176 27.1    1.318  33     1
## 245         2     146         76        35     194 38.2    0.329  29     0
## 246         9     184         85        15       0 30.0    1.213  49     1
## 247        10     122         68         0       0 31.2    0.258  41     0
## 248         0     165         90        33     680 52.3    0.427  23     0
## 249         9     124         70        33     402 35.4    0.282  34     0
## 250         1     111         86        19       0 30.1    0.143  23     0
## 251         9     106         52         0       0 31.2    0.380  42     0
## 252         2     129         84         0       0 28.0    0.284  27     0
## 253         2      90         80        14      55 24.4    0.249  24     0
## 254         0      86         68        32       0 35.8    0.238  25     0
## 255        12      92         62         7     258 27.6    0.926  44     1
## 256         1     113         64        35       0 33.6    0.543  21     1
## 257         3     111         56        39       0 30.1    0.557  30     0
## 258         2     114         68        22       0 28.7    0.092  25     0
## 259         1     193         50        16     375 25.9    0.655  24     0
## 260        11     155         76        28     150 33.3    1.353  51     1
## 261         3     191         68        15     130 30.9    0.299  34     0
## 262         3     141          0         0       0 30.0    0.761  27     1
## 263         4      95         70        32       0 32.1    0.612  24     0
## 264         3     142         80        15       0 32.4    0.200  63     0
## 265         4     123         62         0       0 32.0    0.226  35     1
## 266         5      96         74        18      67 33.6    0.997  43     0
## 267         0     138          0         0       0 36.3    0.933  25     1
## 268         2     128         64        42       0 40.0    1.101  24     0
## 269         0     102         52         0       0 25.1    0.078  21     0
## 270         2     146          0         0       0 27.5    0.240  28     1
## 271        10     101         86        37       0 45.6    1.136  38     1
## 272         2     108         62        32      56 25.2    0.128  21     0
## 273         3     122         78         0       0 23.0    0.254  40     0
## 274         1      71         78        50      45 33.2    0.422  21     0
## 275        13     106         70         0       0 34.2    0.251  52     0
## 276         2     100         70        52      57 40.5    0.677  25     0
## 277         7     106         60        24       0 26.5    0.296  29     1
## 278         0     104         64        23     116 27.8    0.454  23     0
## 279         5     114         74         0       0 24.9    0.744  57     0
## 280         2     108         62        10     278 25.3    0.881  22     0
## 281         0     146         70         0       0 37.9    0.334  28     1
## 282        10     129         76        28     122 35.9    0.280  39     0
## 283         7     133         88        15     155 32.4    0.262  37     0
## 284         7     161         86         0       0 30.4    0.165  47     1
## 285         2     108         80         0       0 27.0    0.259  52     1
## 286         7     136         74        26     135 26.0    0.647  51     0
```

```
## 287         5     155         84         44      545 38.7    0.619  34     0
## 288         1     119         86         39      220 45.6    0.808  29     1
## 289         4      96         56         17       49 20.8    0.340  26     0
## 290         5     108         72         43       75 36.1    0.263  33     0
## 291         0      78         88         29       40 36.9    0.434  21     0
## 292         0     107         62         30       74 36.6    0.757  25     1
## 293         2     128         78         37      182 43.3    1.224  31     1
## 294         1     128         48         45      194 40.5    0.613  24     1
## 295         0     161         50          0        0 21.9    0.254  65     0
## 296         6     151         62         31      120 35.5    0.692  28     0
## 297         2     146         70         38      360 28.0    0.337  29     1
## 298         0     126         84         29      215 30.7    0.520  24     0
## 299        14     100         78         25      184 36.6    0.412  46     1
## 300         8     112         72          0        0 23.6    0.840  58     0
## 301         0     167          0          0        0 32.3    0.839  30     1
## 302         2     144         58         33      135 31.6    0.422  25     1
## 303         5      77         82         41       42 35.8    0.156  35     0
## 304         5     115         98          0        0 52.9    0.209  28     1
## 305         3     150         76          0        0 21.0    0.207  37     0
## 306         2     120         76         37      105 39.7    0.215  29     0
## 307        10     161         68         23      132 25.5    0.326  47     1
## 308         0     137         68         14      148 24.8    0.143  21     0
## 309         0     128         68         19      180 30.5    1.391  25     1
## 310         2     124         68         28      205 32.9    0.875  30     1
## 311         6      80         66         30        0 26.2    0.313  41     0
## 312         0     106         70         37      148 39.4    0.605  22     0
## 313         2     155         74         17       96 26.6    0.433  27     1
## 314         3     113         50         10       85 29.5    0.626  25     0
## 315         7     109         80         31        0 35.9    1.127  43     1
## 316         2     112         68         22       94 34.1    0.315  26     0
## 317         3      99         80         11       64 19.3    0.284  30     0
## 318         3     182         74          0        0 30.5    0.345  29     1
## 319         3     115         66         39      140 38.1    0.150  28     0
## 320         6     194         78          0        0 23.5    0.129  59     1
## 321         4     129         60         12      231 27.5    0.527  31     0
## 322         3     112         74         30        0 31.6    0.197  25     1
## 323         0     124         70         20        0 27.4    0.254  36     1
## 324        13     152         90         33       29 26.8    0.731  43     1
## 325         2     112         75         32        0 35.7    0.148  21     0
## 326         1     157         72         21      168 25.6    0.123  24     0
## 327         1     122         64         32      156 35.1    0.692  30     1
## 328        10     179         70          0        0 35.1    0.200  37     0
## 329         2     102         86         36      120 45.5    0.127  23     1
## 330         6     105         70         32       68 30.8    0.122  37     0
## 331         8     118         72         19        0 23.1    1.476  46     0
## 332         2      87         58         16       52 32.7    0.166  25     0
## 333         1     180          0          0        0 43.3    0.282  41     1
## 334        12     106         80          0        0 23.6    0.137  44     0
## 335         1      95         60         18       58 23.9    0.260  22     0
## 336         0     165         76         43      255 47.9    0.259  26     0
## 337         0     117          0          0        0 33.8    0.932  44     0
```

```
## 338        5     115        76        0       0 31.2    0.343  44    1
## 339        9     152        78       34     171 34.2    0.893  33    1
## 340        7     178        84        0       0 39.9    0.331  41    1
## 341        1     130        70       13     105 25.9    0.472  22    0
## 342        1      95        74       21      73 25.9    0.673  36    0
## 343        1       0        68       35       0 32.0    0.389  22    0
## 344        5     122        86        0       0 34.7    0.290  33    0
## 345        8      95        72        0       0 36.8    0.485  57    0
## 346        8     126        88       36     108 38.5    0.349  49    0
## 347        1     139        46       19      83 28.7    0.654  22    0
## 348        3     116         0        0       0 23.5    0.187  23    0
## 349        3      99        62       19      74 21.8    0.279  26    0
## 350        5       0        80       32       0 41.0    0.346  37    1
## 351        4      92        80        0       0 42.2    0.237  29    0
## 352        4     137        84        0       0 31.2    0.252  30    0
## 353        3      61        82       28       0 34.4    0.243  46    0
## 354        1      90        62       12      43 27.2    0.580  24    0
## 355        3      90        78        0       0 42.7    0.559  21    0
## 356        9     165        88        0       0 30.4    0.302  49    1
## 357        1     125        50       40     167 33.3    0.962  28    1
## 358       13     129         0       30       0 39.9    0.569  44    1
## 359       12      88        74       40      54 35.3    0.378  48    0
## 360        1     196        76       36     249 36.5    0.875  29    1
## 361        5     189        64       33     325 31.2    0.583  29    1
## 362        5     158        70        0       0 29.8    0.207  63    0
## 363        5     103       108       37       0 39.2    0.305  65    0
## 364        4     146        78        0       0 38.5    0.520  67    1
## 365        4     147        74       25     293 34.9    0.385  30    0
## 366        5      99        54       28      83 34.0    0.499  30    0
## 367        6     124        72        0       0 27.6    0.368  29    1
## 368        0     101        64       17       0 21.0    0.252  21    0
## 369        3      81        86       16      66 27.5    0.306  22    0
## 370        1     133       102       28     140 32.8    0.234  45    1
## 371        3     173        82       48     465 38.4    2.137  25    1
## 372        0     118        64       23      89  0.0    1.731  21    0
## 373        0      84        64       22      66 35.8    0.545  21    0
## 374        2     105        58       40      94 34.9    0.225  25    0
## 375        2     122        52       43     158 36.2    0.816  28    0
## 376       12     140        82       43     325 39.2    0.528  58    1
## 377        0      98        82       15      84 25.2    0.299  22    0
## 378        1      87        60       37      75 37.2    0.509  22    0
## 379        4     156        75        0       0 48.3    0.238  32    1
## 380        0      93       100       39      72 43.4    1.021  35    0
## 381        1     107        72       30      82 30.8    0.821  24    0
## 382        0     105        68       22       0 20.0    0.236  22    0
## 383        1     109        60        8     182 25.4    0.947  21    0
## 384        1      90        62       18      59 25.1    1.268  25    0
## 385        1     125        70       24     110 24.3    0.221  25    0
## 386        1     119        54       13      50 22.3    0.205  24    0
## 387        5     116        74       29       0 32.3    0.660  35    1
## 388        8     105       100       36       0 43.3    0.239  45    1
```

```
## 389        5     144        82       26      285 32.0    0.452  58     1
## 390        3     100        68       23       81 31.6    0.949  28     0
## 391        1     100        66       29      196 32.0    0.444  42     0
## 392        5     166        76        0        0 45.7    0.340  27     1
## 393        1     131        64       14      415 23.7    0.389  21     0
## 394        4     116        72       12       87 22.1    0.463  37     0
## 395        4     158        78        0        0 32.9    0.803  31     1
## 396        2     127        58       24      275 27.7    1.600  25     0
## 397        3      96        56       34      115 24.7    0.944  39     0
## 398        0     131        66       40        0 34.3    0.196  22     1
## 399        3      82        70        0        0 21.1    0.389  25     0
## 400        3     193        70       31        0 34.9    0.241  25     1
## 401        4      95        64        0        0 32.0    0.161  31     1
## 402        6     137        61        0        0 24.2    0.151  55     0
## 403        5     136        84       41       88 35.0    0.286  35     1
## 404        9      72        78       25        0 31.6    0.280  38     0
## 405        5     168        64        0        0 32.9    0.135  41     1
## 406        2     123        48       32      165 42.1    0.520  26     0
## 407        4     115        72        0        0 28.9    0.376  46     1
## 408        0     101        62        0        0 21.9    0.336  25     0
## 409        8     197        74        0        0 25.9    1.191  39     1
## 410        1     172        68       49      579 42.4    0.702  28     1
## 411        6     102        90       39        0 35.7    0.674  28     0
## 412        1     112        72       30      176 34.4    0.528  25     0
## 413        1     143        84       23      310 42.4    1.076  22     0
## 414        1     143        74       22       61 26.2    0.256  21     0
## 415        0     138        60       35      167 34.6    0.534  21     1
## 416        3     173        84       33      474 35.7    0.258  22     1
## 417        1      97        68       21        0 27.2    1.095  22     0
## 418        4     144        82       32        0 38.5    0.554  37     1
## 419        1      83        68        0        0 18.2    0.624  27     0
## 420        3     129        64       29      115 26.4    0.219  28     1
## 421        1     119        88       41      170 45.3    0.507  26     0
## 422        2      94        68       18       76 26.0    0.561  21     0
## 423        0     102        64       46       78 40.6    0.496  21     0
## 424        2     115        64       22        0 30.8    0.421  21     0
## 425        8     151        78       32      210 42.9    0.516  36     1
## 426        4     184        78       39      277 37.0    0.264  31     1
## 427        0      94         0        0        0  0.0    0.256  25     0
## 428        1     181        64       30      180 34.1    0.328  38     1
## 429        0     135        94       46      145 40.6    0.284  26     0
## 430        1      95        82       25      180 35.0    0.233  43     1
## 431        2      99         0        0        0 22.2    0.108  23     0
## 432        3      89        74       16       85 30.4    0.551  38     0
## 433        1      80        74       11       60 30.0    0.527  22     0
## 434        2     139        75        0        0 25.6    0.167  29     0
## 435        1      90        68        8        0 24.5    1.138  36     0
## 436        0     141         0        0        0 42.4    0.205  29     1
## 437       12     140        85       33        0 37.4    0.244  41     0
## 438        5     147        75        0        0 29.9    0.434  28     0
## 439        1      97        70       15        0 18.2    0.147  21     0
```

```
## 440       6     107        88       0       0 36.8    0.727  31     0
## 441       0     189       104      25       0 34.3    0.435  41     1
## 442       2      83        66      23      50 32.2    0.497  22     0
## 443       4     117        64      27     120 33.2    0.230  24     0
## 444       8     108        70       0       0 30.5    0.955  33     1
## 445       4     117        62      12       0 29.7    0.380  30     1
## 446       0     180        78      63      14 59.4    2.420  25     1
## 447       1     100        72      12      70 25.3    0.658  28     0
## 448       0      95        80      45      92 36.5    0.330  26     0
## 449       0     104        64      37      64 33.6    0.510  22     1
## 450       0     120        74      18      63 30.5    0.285  26     0
## 451       1      82        64      13      95 21.2    0.415  23     0
## 452       2     134        70       0       0 28.9    0.542  23     1
## 453       0      91        68      32     210 39.9    0.381  25     0
## 454       2     119         0       0       0 19.6    0.832  72     0
## 455       2     100        54      28     105 37.8    0.498  24     0
## 456      14     175        62      30       0 33.6    0.212  38     1
## 457       1     135        54       0       0 26.7    0.687  62     0
## 458       5      86        68      28      71 30.2    0.364  24     0
## 459      10     148        84      48     237 37.6    1.001  51     1
## 460       9     134        74      33      60 25.9    0.460  81     0
## 461       9     120        72      22      56 20.8    0.733  48     0
## 462       1      71        62       0       0 21.8    0.416  26     0
## 463       8      74        70      40      49 35.3    0.705  39     0
## 464       5      88        78      30       0 27.6    0.258  37     0
## 465      10     115        98       0       0 24.0    1.022  34     0
## 466       0     124        56      13     105 21.8    0.452  21     0
## 467       0      74        52      10      36 27.8    0.269  22     0
## 468       0      97        64      36     100 36.8    0.600  25     0
## 469       8     120         0       0       0 30.0    0.183  38     1
## 470       6     154        78      41     140 46.1    0.571  27     0
## 471       1     144        82      40       0 41.3    0.607  28     0
## 472       0     137        70      38       0 33.2    0.170  22     0
## 473       0     119        66      27       0 38.8    0.259  22     0
## 474       7     136        90       0       0 29.9    0.210  50     0
## 475       4     114        64       0       0 28.9    0.126  24     0
## 476       0     137        84      27       0 27.3    0.231  59     0
## 477       2     105        80      45     191 33.7    0.711  29     1
## 478       7     114        76      17     110 23.8    0.466  31     0
## 479       8     126        74      38      75 25.9    0.162  39     0
## 480       4     132        86      31       0 28.0    0.419  63     0
## 481       3     158        70      30     328 35.5    0.344  35     1
## 482       0     123        88      37       0 35.2    0.197  29     0
## 483       4      85        58      22      49 27.8    0.306  28     0
## 484       0      84        82      31     125 38.2    0.233  23     0
## 485       0     145         0       0       0 44.2    0.630  31     1
## 486       0     135        68      42     250 42.3    0.365  24     1
## 487       1     139        62      41     480 40.7    0.536  21     0
## 488       0     173        78      32     265 46.5    1.159  58     0
## 489       4      99        72      17       0 25.6    0.294  28     0
## 490       8     194        80       0       0 26.1    0.551  67     0
```

```
## 491         2      83         65         28       66 36.8    0.629  24     0
## 492         2      89         90         30        0 33.5    0.292  42     0
## 493         4      99         68         38        0 32.8    0.145  33     0
## 494         4     125         70         18      122 28.9    1.144  45     1
## 495         3      80          0          0        0  0.0    0.174  22     0
## 496         6     166         74          0        0 26.6    0.304  66     0
## 497         5     110         68          0        0 26.0    0.292  30     0
## 498         2      81         72         15       76 30.1    0.547  25     0
## 499         7     195         70         33      145 25.1    0.163  55     1
## 500         6     154         74         32      193 29.3    0.839  39     0
## 501         2     117         90         19       71 25.2    0.313  21     0
## 502         3      84         72         32        0 37.2    0.267  28     0
## 503         6       0         68         41        0 39.0    0.727  41     1
## 504         7      94         64         25       79 33.3    0.738  41     0
## 505         3      96         78         39        0 37.3    0.238  40     0
## 506        10      75         82          0        0 33.3    0.263  38     0
## 507         0     180         90         26       90 36.5    0.314  35     1
## 508         1     130         60         23      170 28.6    0.692  21     0
## 509         2      84         50         23       76 30.4    0.968  21     0
## 510         8     120         78          0        0 25.0    0.409  64     0
## 511        12      84         72         31        0 29.7    0.297  46     1
## 512         0     139         62         17      210 22.1    0.207  21     0
## 513         9      91         68          0        0 24.2    0.200  58     0
## 514         2      91         62          0        0 27.3    0.525  22     0
## 515         3      99         54         19       86 25.6    0.154  24     0
## 516         3     163         70         18      105 31.6    0.268  28     1
## 517         9     145         88         34      165 30.3    0.771  53     1
## 518         7     125         86          0        0 37.6    0.304  51     0
## 519        13      76         60          0        0 32.8    0.180  41     0
## 520         6     129         90          7      326 19.6    0.582  60     0
## 521         2      68         70         32       66 25.0    0.187  25     0
## 522         3     124         80         33      130 33.2    0.305  26     0
## 523         6     114          0          0        0  0.0    0.189  26     0
## 524         9     130         70          0        0 34.2    0.652  45     1
## 525         3     125         58          0        0 31.6    0.151  24     0
## 526         3      87         60         18        0 21.8    0.444  21     0
## 527         1      97         64         19       82 18.2    0.299  21     0
## 528         3     116         74         15      105 26.3    0.107  24     0
## 529         0     117         66         31      188 30.8    0.493  22     0
## 530         0     111         65          0        0 24.6    0.660  31     0
## 531         2     122         60         18      106 29.8    0.717  22     0
## 532         0     107         76          0        0 45.3    0.686  24     0
## 533         1      86         66         52       65 41.3    0.917  29     0
## 534         6      91          0          0        0 29.8    0.501  31     0
## 535         1      77         56         30       56 33.3    1.251  24     0
## 536         4     132          0          0        0 32.9    0.302  23     1
## 537         0     105         90          0        0 29.6    0.197  46     0
## 538         0      57         60          0        0 21.7    0.735  67     0
## 539         0     127         80         37      210 36.3    0.804  23     0
## 540         3     129         92         49      155 36.4    0.968  32     1
## 541         8     100         74         40      215 39.4    0.661  43     1
```

```
## 542         3     128         72         25     190 32.4    0.549  27     1
## 543        10      90         85         32       0 34.9    0.825  56     1
## 544         4      84         90         23      56 39.5    0.159  25     0
## 545         1      88         78         29      76 32.0    0.365  29     0
## 546         8     186         90         35     225 34.5    0.423  37     1
## 547         5     187         76         27     207 43.6    1.034  53     1
## 548         4     131         68         21     166 33.1    0.160  28     0
## 549         1     164         82         43      67 32.8    0.341  50     0
## 550         4     189        110         31       0 28.5    0.680  37     0
## 551         1     116         70         28       0 27.4    0.204  21     0
## 552         3      84         68         30     106 31.9    0.591  25     0
## 553         6     114         88          0       0 27.8    0.247  66     0
## 554         1      88         62         24      44 29.9    0.422  23     0
## 555         1      84         64         23     115 36.9    0.471  28     0
## 556         7     124         70         33     215 25.5    0.161  37     0
## 557         1      97         70         40       0 38.1    0.218  30     0
## 558         8     110         76          0       0 27.8    0.237  58     0
## 559        11     103         68         40       0 46.2    0.126  42     0
## 560        11      85         74          0       0 30.1    0.300  35     0
## 561         6     125         76          0       0 33.8    0.121  54     1
## 562         0     198         66         32     274 41.3    0.502  28     1
## 563         1      87         68         34      77 37.6    0.401  24     0
## 564         6      99         60         19      54 26.9    0.497  32     0
## 565         0      91         80          0       0 32.4    0.601  27     0
## 566         2      95         54         14      88 26.1    0.748  22     0
## 567         1      99         72         30      18 38.6    0.412  21     0
## 568         6      92         62         32     126 32.0    0.085  46     0
## 569         4     154         72         29     126 31.3    0.338  37     0
## 570         0     121         66         30     165 34.3    0.203  33     1
## 571         3      78         70          0       0 32.5    0.270  39     0
## 572         2     130         96          0       0 22.6    0.268  21     0
## 573         3     111         58         31      44 29.5    0.430  22     0
## 574         2      98         60         17     120 34.7    0.198  22     0
## 575         1     143         86         30     330 30.1    0.892  23     0
## 576         1     119         44         47      63 35.5    0.280  25     0
## 577         6     108         44         20     130 24.0    0.813  35     0
## 578         2     118         80          0       0 42.9    0.693  21     1
## 579        10     133         68          0       0 27.0    0.245  36     0
## 580         2     197         70         99       0 34.7    0.575  62     1
## 581         0     151         90         46       0 42.1    0.371  21     1
## 582         6     109         60         27       0 25.0    0.206  27     0
## 583        12     121         78         17       0 26.5    0.259  62     0
## 584         8     100         76          0       0 38.7    0.190  42     0
## 585         8     124         76         24     600 28.7    0.687  52     1
## 586         1      93         56         11       0 22.5    0.417  22     0
## 587         8     143         66          0       0 34.9    0.129  41     1
## 588         6     103         66          0       0 24.3    0.249  29     0
## 589         3     176         86         27     156 33.3    1.154  52     1
## 590         0      73          0          0       0 21.1    0.342  25     0
## 591        11     111         84         40       0 46.8    0.925  45     1
## 592         2     112         78         50     140 39.4    0.175  24     0
```

```
## 593         3     132         80         0       0 34.4    0.402  44     1
## 594         2      82         52        22     115 28.5    1.699  25     0
## 595         6     123         72        45     230 33.6    0.733  34     0
## 596         0     188         82        14     185 32.0    0.682  22     1
## 597         0      67         76         0       0 45.3    0.194  46     0
## 598         1      89         24        19      25 27.8    0.559  21     0
## 599         1     173         74         0       0 36.8    0.088  38     1
## 600         1     109         38        18     120 23.1    0.407  26     0
## 601         1     108         88        19       0 27.1    0.400  24     0
## 602         6      96          0         0       0 23.7    0.190  28     0
## 603         1     124         74        36       0 27.8    0.100  30     0
## 604         7     150         78        29     126 35.2    0.692  54     1
## 605         4     183          0         0       0 28.4    0.212  36     1
## 606         1     124         60        32       0 35.8    0.514  21     0
## 607         1     181         78        42     293 40.0    1.258  22     1
## 608         1      92         62        25      41 19.5    0.482  25     0
## 609         0     152         82        39     272 41.5    0.270  27     0
## 610         1     111         62        13     182 24.0    0.138  23     0
## 611         3     106         54        21     158 30.9    0.292  24     0
## 612         3     174         58        22     194 32.9    0.593  36     1
## 613         7     168         88        42     321 38.2    0.787  40     1
## 614         6     105         80        28       0 32.5    0.878  26     0
## 615        11     138         74        26     144 36.1    0.557  50     1
## 616         3     106         72         0       0 25.8    0.207  27     0
## 617         6     117         96         0       0 28.7    0.157  30     0
## 618         2      68         62        13      15 20.1    0.257  23     0
## 619         9     112         82        24       0 28.2    1.282  50     1
## 620         0     119          0         0       0 32.4    0.141  24     1
## 621         2     112         86        42     160 38.4    0.246  28     0
## 622         2      92         76        20       0 24.2    1.698  28     0
## 623         6     183         94         0       0 40.8    1.461  45     0
## 624         0      94         70        27     115 43.5    0.347  21     0
## 625         2     108         64         0       0 30.8    0.158  21     0
## 626         4      90         88        47      54 37.7    0.362  29     0
## 627         0     125         68         0       0 24.7    0.206  21     0
## 628         0     132         78         0       0 32.4    0.393  21     0
## 629         5     128         80         0       0 34.6    0.144  45     0
## 630         4      94         65        22       0 24.7    0.148  21     0
## 631         7     114         64         0       0 27.4    0.732  34     1
## 632         0     102         78        40      90 34.5    0.238  24     0
## 633         2     111         60         0       0 26.2    0.343  23     0
## 634         1     128         82        17     183 27.5    0.115  22     0
## 635        10      92         62         0       0 25.9    0.167  31     0
## 636        13     104         72         0       0 31.2    0.465  38     1
## 637         5     104         74         0       0 28.8    0.153  48     0
## 638         2      94         76        18      66 31.6    0.649  23     0
## 639         7      97         76        32      91 40.9    0.871  32     1
## 640         1     100         74        12      46 19.5    0.149  28     0
## 641         0     102         86        17     105 29.3    0.695  27     0
## 642         4     128         70         0       0 34.3    0.303  24     0
## 643         6     147         80         0       0 29.5    0.178  50     1
```

```
## 644         4      90          0       0       0 28.0    0.610  31     0
## 645         3     103         72      30     152 27.6    0.730  27     0
## 646         2     157         74      35     440 39.4    0.134  30     0
## 647         1     167         74      17     144 23.4    0.447  33     1
## 648         0     179         50      36     159 37.8    0.455  22     1
## 649        11     136         84      35     130 28.3    0.260  42     1
## 650         0     107         60      25       0 26.4    0.133  23     0
## 651         1      91         54      25     100 25.2    0.234  23     0
## 652         1     117         60      23     106 33.8    0.466  27     0
## 653         5     123         74      40      77 34.1    0.269  28     0
## 654         2     120         54       0       0 26.8    0.455  27     0
## 655         1     106         70      28     135 34.2    0.142  22     0
## 656         2     155         52      27     540 38.7    0.240  25     1
## 657         2     101         58      35      90 21.8    0.155  22     0
## 658         1     120         80      48     200 38.9    1.162  41     0
## 659        11     127        106       0       0 39.0    0.190  51     0
## 660         3      80         82      31      70 34.2    1.292  27     1
## 661        10     162         84       0       0 27.7    0.182  54     0
## 662         1     199         76      43       0 42.9    1.394  22     1
## 663         8     167        106      46     231 37.6    0.165  43     1
## 664         9     145         80      46     130 37.9    0.637  40     1
## 665         6     115         60      39       0 33.7    0.245  40     1
## 666         1     112         80      45     132 34.8    0.217  24     0
## 667         4     145         82      18       0 32.5    0.235  70     1
## 668        10     111         70      27       0 27.5    0.141  40     1
## 669         6      98         58      33     190 34.0    0.430  43     0
## 670         9     154         78      30     100 30.9    0.164  45     0
## 671         6     165         68      26     168 33.6    0.631  49     0
## 672         1      99         58      10       0 25.4    0.551  21     0
## 673        10      68        106      23      49 35.5    0.285  47     0
## 674         3     123        100      35     240 57.3    0.880  22     0
## 675         8      91         82       0       0 35.6    0.587  68     0
## 676         6     195         70       0       0 30.9    0.328  31     1
## 677         9     156         86       0       0 24.8    0.230  53     1
## 678         0      93         60       0       0 35.3    0.263  25     0
## 679         3     121         52       0       0 36.0    0.127  25     1
## 680         2     101         58      17     265 24.2    0.614  23     0
## 681         2      56         56      28      45 24.2    0.332  22     0
## 682         0     162         76      36       0 49.6    0.364  26     1
## 683         0      95         64      39     105 44.6    0.366  22     0
## 684         4     125         80       0       0 32.3    0.536  27     1
## 685         5     136         82       0       0  0.0    0.640  69     0
## 686         2     129         74      26     205 33.2    0.591  25     0
## 687         3     130         64       0       0 23.1    0.314  22     0
## 688         1     107         50      19       0 28.3    0.181  29     0
## 689         1     140         74      26     180 24.1    0.828  23     0
## 690         1     144         82      46     180 46.1    0.335  46     1
## 691         8     107         80       0       0 24.6    0.856  34     0
## 692        13     158        114       0       0 42.3    0.257  44     1
## 693         2     121         70      32      95 39.1    0.886  23     0
## 694         7     129         68      49     125 38.5    0.439  43     1
```

```
## 695        2     90        60       0       0 23.5    0.191  25     0
## 696        7    142        90      24     480 30.4    0.128  43     1
## 697        3    169        74      19     125 29.9    0.268  31     1
## 698        0     99         0       0       0 25.0    0.253  22     0
## 699        4    127        88      11     155 34.5    0.598  28     0
## 700        4    118        70       0       0 44.5    0.904  26     0
## 701        2    122        76      27     200 35.9    0.483  26     0
## 702        6    125        78      31       0 27.6    0.565  49     1
## 703        1    168        88      29       0 35.0    0.905  52     1
## 704        2    129         0       0       0 38.5    0.304  41     0
## 705        4    110        76      20     100 28.4    0.118  27     0
## 706        6     80        80      36       0 39.8    0.177  28     0
## 707       10    115         0       0       0  0.0    0.261  30     1
## 708        2    127        46      21     335 34.4    0.176  22     0
## 709        9    164        78       0       0 32.8    0.148  45     1
## 710        2     93        64      32     160 38.0    0.674  23     1
## 711        3    158        64      13     387 31.2    0.295  24     0
## 712        5    126        78      27      22 29.6    0.439  40     0
## 713       10    129        62      36       0 41.2    0.441  38     1
## 714        0    134        58      20     291 26.4    0.352  21     0
## 715        3    102        74       0       0 29.5    0.121  32     0
## 716        7    187        50      33     392 33.9    0.826  34     1
## 717        3    173        78      39     185 33.8    0.970  31     1
## 718       10     94        72      18       0 23.1    0.595  56     0
## 719        1    108        60      46     178 35.5    0.415  24     0
## 720        5     97        76      27       0 35.6    0.378  52     1
## 721        4     83        86      19       0 29.3    0.317  34     0
## 722        1    114        66      36     200 38.1    0.289  21     0
## 723        1    149        68      29     127 29.3    0.349  42     1
## 724        5    117        86      30     105 39.1    0.251  42     0
## 725        1    111        94       0       0 32.8    0.265  45     0
## 726        4    112        78      40       0 39.4    0.236  38     0
## 727        1    116        78      29     180 36.1    0.496  25     0
## 728        0    141        84      26       0 32.4    0.433  22     0
## 729        2    175        88       0       0 22.9    0.326  22     0
## 730        2     92        52       0       0 30.1    0.141  22     0
## 731        3    130        78      23      79 28.4    0.323  34     1
## 732        8    120        86       0       0 28.4    0.259  22     1
## 733        2    174        88      37     120 44.5    0.646  24     1
## 734        2    106        56      27     165 29.0    0.426  22     0
## 735        2    105        75       0       0 23.3    0.560  53     0
## 736        4     95        60      32       0 35.4    0.284  28     0
## 737        0    126        86      27     120 27.4    0.515  21     0
## 738        8     65        72      23       0 32.0    0.600  42     0
## 739        2     99        60      17     160 36.6    0.453  21     0
## 740        1    102        74       0       0 39.5    0.293  42     1
## 741       11    120        80      37     150 42.3    0.785  48     1
## 742        3    102        44      20      94 30.8    0.400  26     0
## 743        1    109        58      18     116 28.5    0.219  22     0
## 744        9    140        94       0       0 32.7    0.734  45     1
## 745       13    153        88      37     140 40.6    1.174  39     0
```

```
## 746       12     100        84      33     105 30.0    0.488  46    0
## 747        1     147        94      41       0 49.3    0.358  27    1
## 748        1      81        74      41      57 46.3    1.096  32    0
## 749        3     187        70      22     200 36.4    0.408  36    1
## 750        6     162        62       0       0 24.3    0.178  50    1
## 751        4     136        70       0       0 31.2    1.182  22    1
## 752        1     121        78      39      74 39.0    0.261  28    0
## 753        3     108        62      24       0 26.0    0.223  25    0
## 754        0     181        88      44     510 43.3    0.222  26    1
## 755        8     154        78      32       0 32.4    0.443  45    1
## 756        1     128        88      39     110 36.5    1.057  37    1
## 757        7     137        90      41       0 32.0    0.391  39    0
## 758        0     123        72       0       0 36.3    0.258  52    1
## 759        1     106        76       0       0 37.5    0.197  26    0
## 760        6     190        92       0       0 35.5    0.278  66    1
## 761        2      88        58      26      16 28.4    0.766  22    0
## 762        9     170        74      31       0 44.0    0.403  43    1
## 763        9      89        62       0       0 22.5    0.142  33    0
## 764       10     101        76      48     180 32.9    0.171  63    0
## 765        2     122        70      27       0 36.8    0.340  27    0
## 766        5     121        72      23     112 26.2    0.245  30    0
## 767        1     126        60       0       0 30.1    0.349  47    1
## 768        1      93        70      31       0 30.4    0.315  23    0
```

```
dim(pima)

## [1] 768   9
```

```
names(pima)

## [1] "pregnant"  "glucose"   "diastolic" "triceps"   "insulin"   "bmi"
## [7] "diabetes"  "age"       "test"
```

```
head(pima)

##   pregnant glucose diastolic triceps insulin  bmi diabetes age test
## 1        6     148        72      35       0 33.6    0.627  50    1
## 2        1      85        66      29       0 26.6    0.351  31    0
## 3        8     183        64       0       0 23.3    0.672  32    1
## 4        1      89        66      23      94 28.1    0.167  21    0
## 5        0     137        40      35     168 43.1    2.288  33    1
## 6        5     116        74       0       0 25.6    0.201  30    0
```

```
?pima

## starting httpd help server ...  done
```

```
summary(pima)
```

```
##     pregnant         glucose        diastolic         triceps
##  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           diabetes           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
##       test
##  Min.   :0.000
##  1st Qu.:0.000
##  Median :0.000
##  Mean   :0.349
##  3rd Qu.:1.000
##  Max.   :1.000
```

We learn that missing values are replaced by 0 in the variables glucose, diastolic, triceps, insulin, bmi.
We don't want that, so we shall replace 0s by NAs.

```
pima$glucose[pima$glucose == 0] = NA

pima$diastolic[pima$diastolic == 0] = NA

pima$triceps[pima$triceps == 0] = NA

pima$insulin[pima$insulin == 0] = NA

pima$bmi[pima$bmi == 0] = NA
```

We see that the variable "test" takes only two values; 0 and 1. So we shall treat it as a categorical variable (also called factors in R), not a quantitative variable.

```
pima$test = factor(pima$test)
```

We shall use levels for variable "test".

```
levels(pima$test) = c("negative", "positive")
```

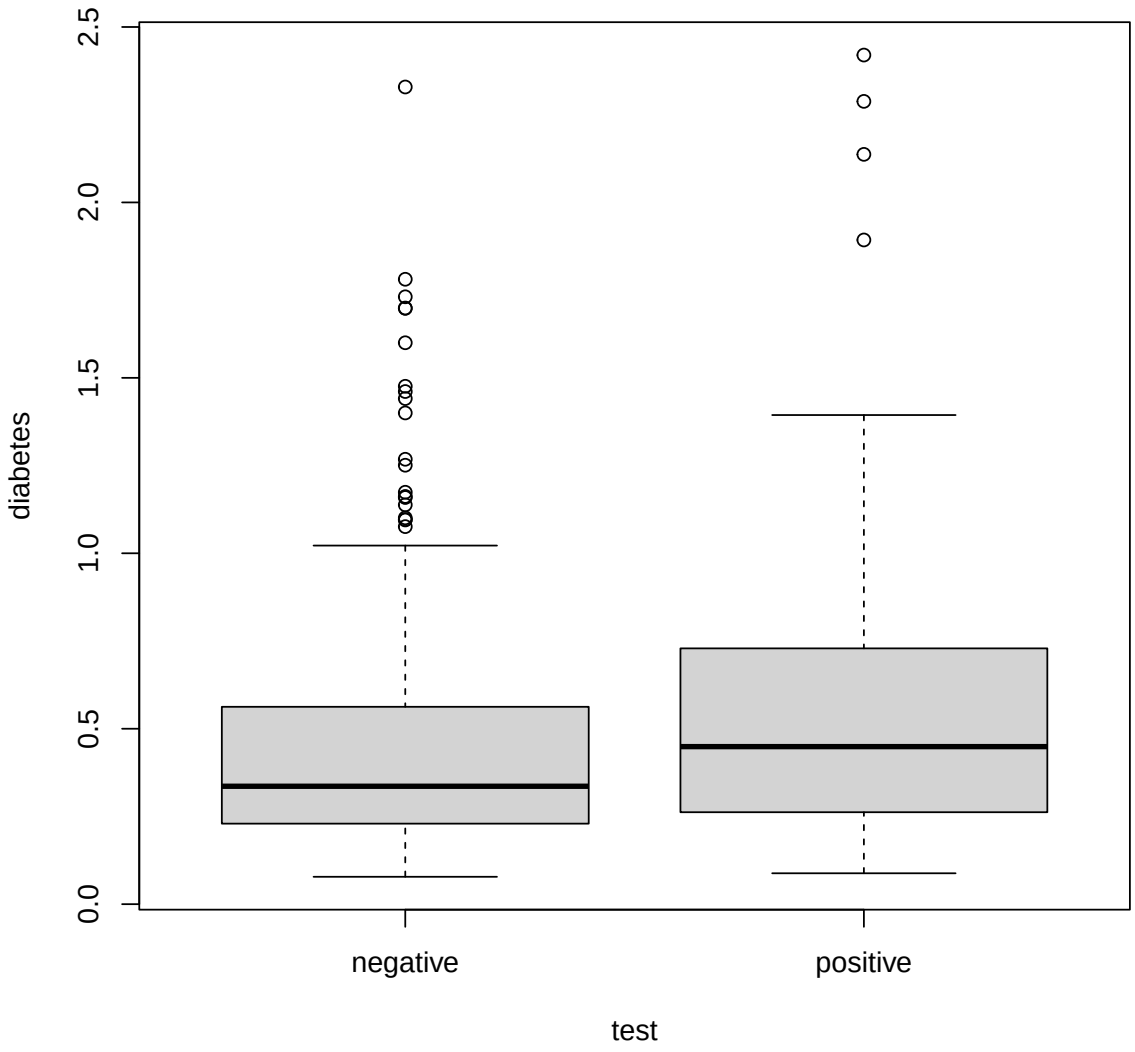
```
summary(pima$test)
```

```
## negative positive
##      500      268
```

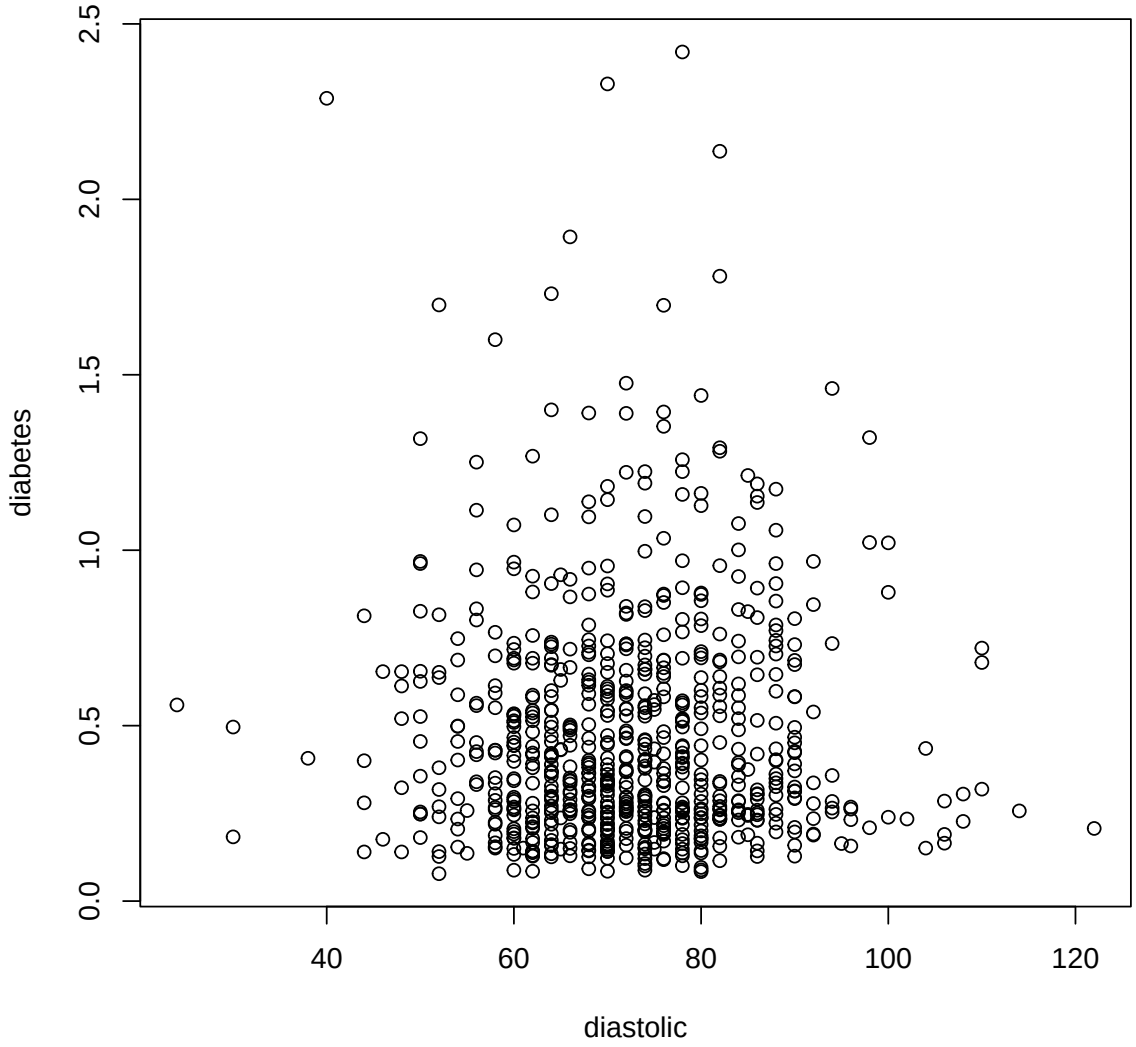
- Observe how the summary of the variable "test" changed.

Visualization

```
plot(diabetes ~ test, pima)
```

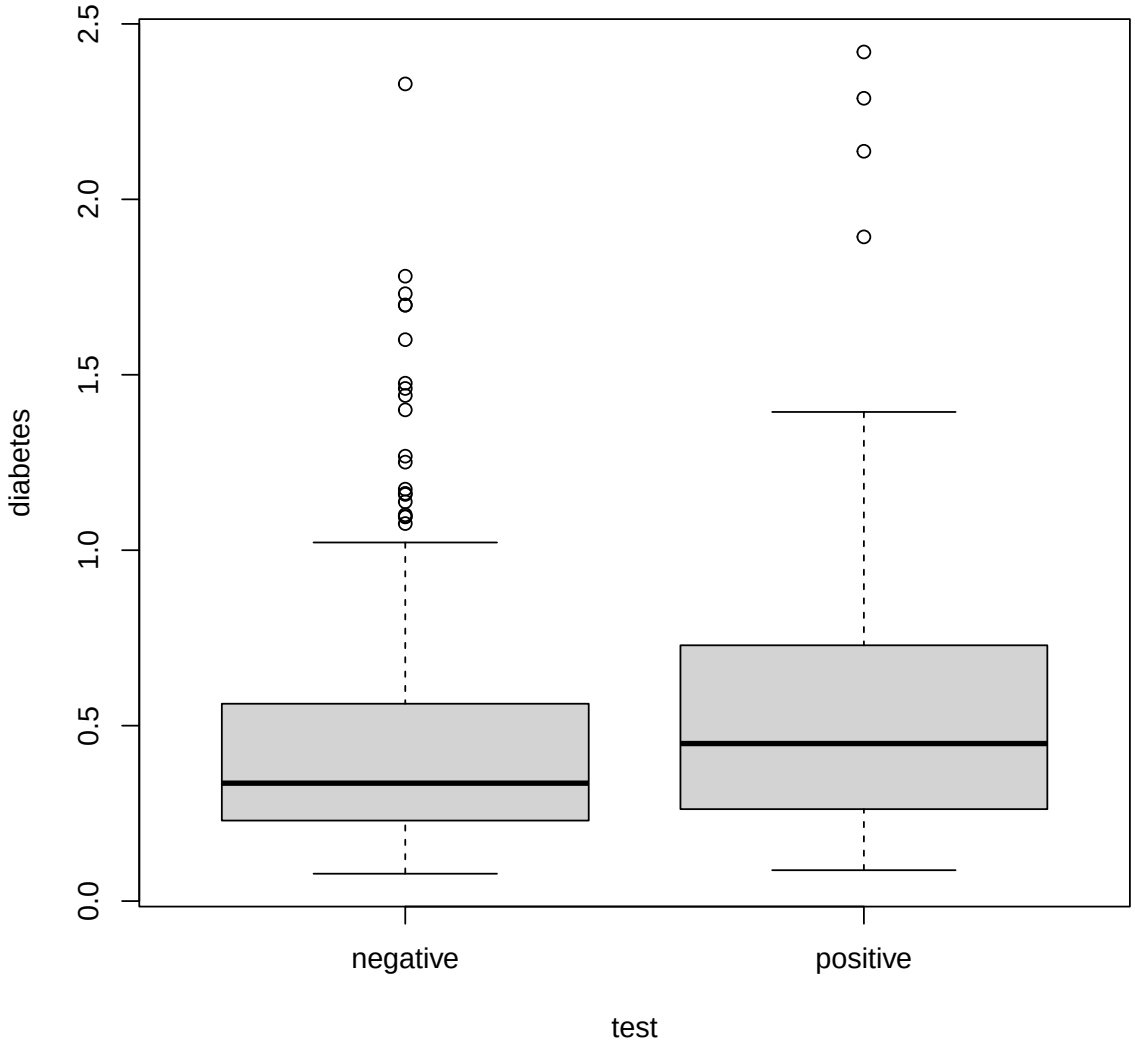



```
plot(diabetes ~ diastolic, pima)
```

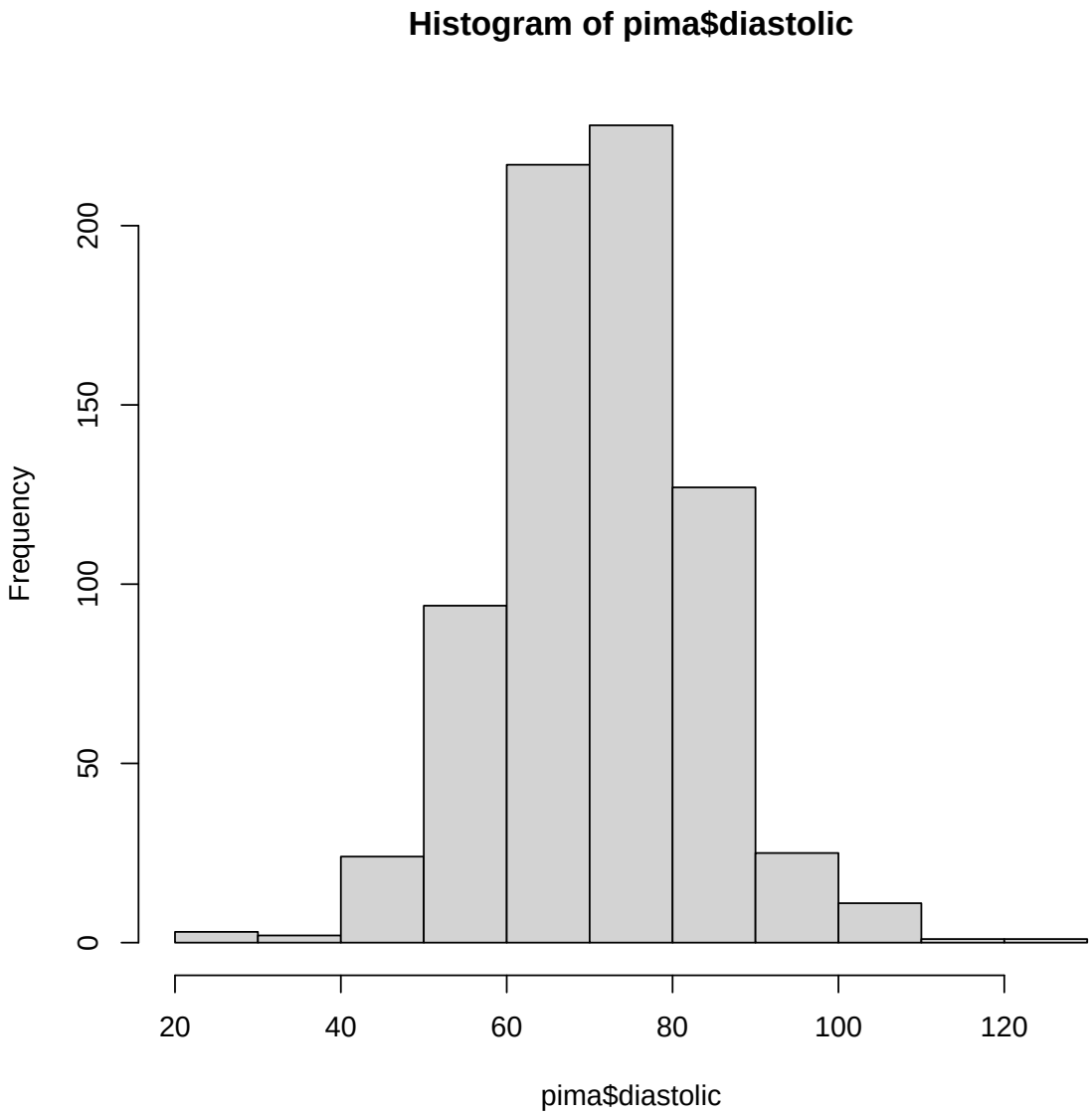



```
# same as plot(pima$diastolic, pima$diabetes)
```

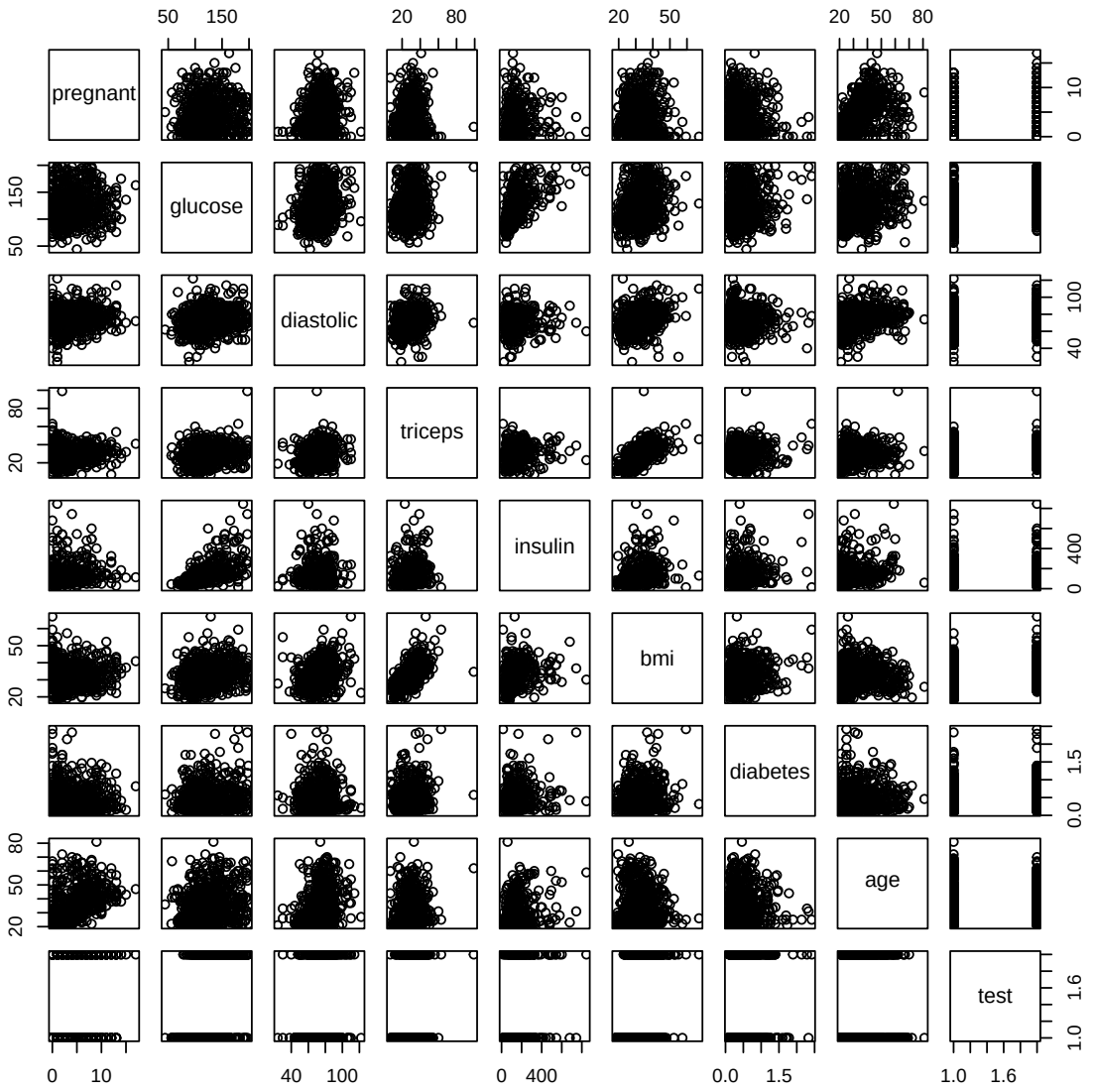
```
plot(diabetes ~ test, pima)
```




```
hist(pima$diastolic)
```


Histogram of pima$diastolic
Frequency
0
50
100
150
200
20
40
60
80
100
120
pima$diastolic

```
pairs(pima)
```


pregnant
glucose
diastolic
triceps
insulin
bmi
diabetes
age
test