Project Proposal

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Read in Dataset

```
fifa<-read.csv("../dataset/players_20_edited.csv",header = T,stringsAsFactors = T)

colnames(fifa)
```

```
##  [1] "short_name"                "long_name"
##  [3] "age"                       "height_cm"
##  [5] "weight_kg"                 "nationality"
##  [7] "club"                      "overall"
##  [9] "potential"                 "value_eur"
## [11] "wage_eur"                  "player_positions"
## [13] "preferred_foot"            "international_reputation"
## [15] "weak_foot"                 "pace"
## [17] "shooting"                  "passing"
## [19] "dribbling"                 "defending"
## [21] "physic"                    "attacking_crossing"
## [23] "attacking_finishing"       "attacking_heading_accuracy"
## [25] "attacking_short_passing"   "attacking_volleys"
## [27] "skill_dribbling"           "skill_curve"
## [29] "skill_fk_accuracy"         "skill_long_passing"
## [31] "skill_ball_control"        "movement_acceleration"
## [33] "movement_sprint_speed"     "movement_agility"
## [35] "movement_reactions"        "movement_balance"
## [37] "power_shot_power"          "power_jumping"
## [39] "power_stamina"             "power_strength"
## [41] "power_long_shots"          "mentality_aggression"
## [43] "mentality_interceptions"   "mentality_positioning"
## [45] "mentality_vision"          "mentality_penalties"
## [47] "mentality_composure"       "defending_marking"
## [49] "defending_standing_tackle" "defending_sliding_tackle"
## [51] "ls"                        "st"
## [53] "rs"                        "lw"
## [55] "lf"                        "cf"
## [57] "rf"                        "rw"
## [59] "lam"                       "cam"
## [61] "ram"                       "lm"
## [63] "lcm"                       "cm"
## [65] "rcm"                       "rm"
## [67] "lwb"                       "ldm"
```

```
## [69] "cdm"                          "rdm"
## [71] "rwb"                          "lb"
## [73] "lcb"                          "cb"
## [75] "rcb"                          "rb"
## [77] "classification"
```

```
set.seed(1) # for part (d), you change the random seed.
train.id=sample(1:nrow(fifa),trunc(0.9*nrow(fifa)))
tr.col=fifa[train.id,] #training data
tst.col=fifa[-train.id,] #test data

est.id=sample(1:nrow(tr.col),trunc(0.9*nrow(tr.col)))
est.col=tr.col[est.id,] #estimation data
val.col=tr.col[-est.id,] #validation data
```

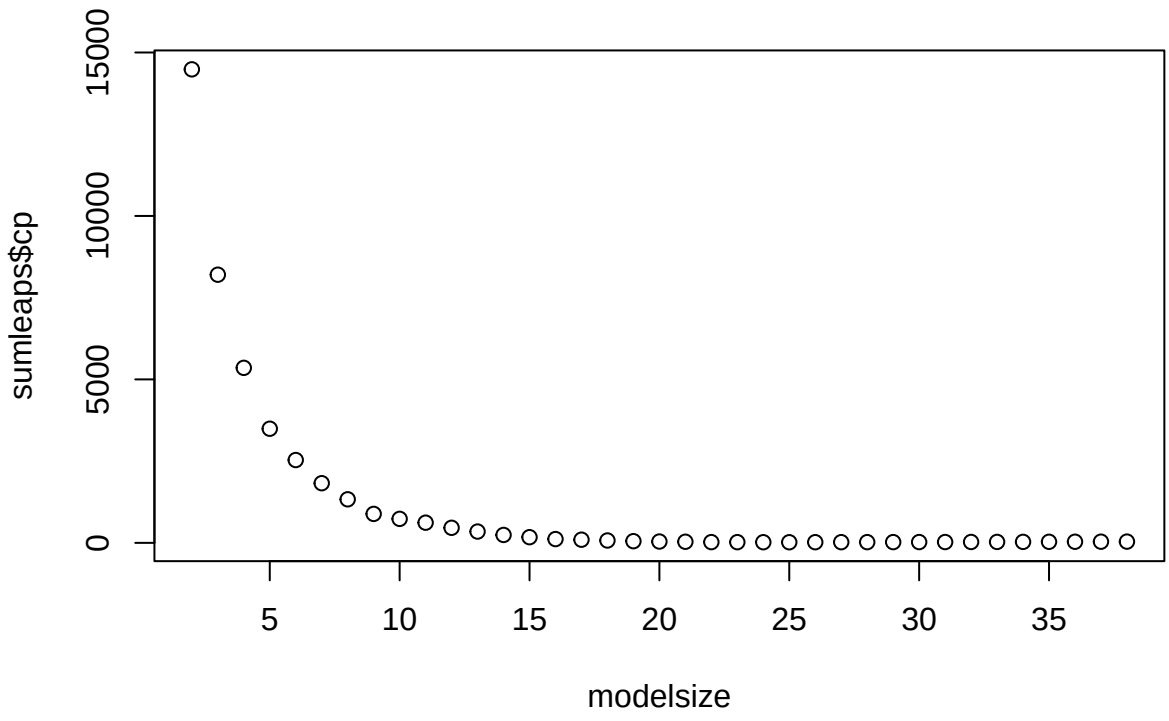
Linear Regression

Perform the best subset selection on the estimation data. Report the model choice based on Cp criteria.

```
RSSleaps=regsubsets(overall ~ age + height_cm + weight_kg +
                    shooting + shooting + passing + dribbling +
                    defending + physic + attacking_crossing +
                    attacking_finishing + attacking_heading_accuracy +
                    attacking_short_passing + attacking_volleys +
                    skill_dribbling + skill_curve + skill_fk_accuracy +
                    skill_long_passing + skill_ball_control +
                    movement_acceleration + movement_sprint_speed +
                    movement_agility + movement_reactions +
                    movement_balance + power_shot_power +
                    power_jumping + power_stamina + power_strength +
                    power_long_shots + mentality_aggression +
                    mentality_interceptions + mentality_positioning +
                    mentality_vision + mentality_penalties +
                    mentality_composure + defending_marking +
                    defending_standing_tackle + defending_sliding_tackle,data=est.col,nvmax=37)

sumleaps=summary(RSSleaps,matrix=T)
modelsize=apply(sumleaps$which,1,sum)

plot(modelsize,sumleaps$cp)
```




```
which.min(sumleaps$cp)
```

```
## [1] 24
```

```
#model choice:
coef(RSSleaps,24)
```

```
##                (Intercept)                        age
##                8.437379104                0.063696980
##                  weight_kg                   shooting
##                0.033629509                0.077603032
##                    passing                  defending
##                0.050784719                0.075026762
##                     physic attacking_heading_accuracy
##                0.058362814                0.071509784
##    attacking_short_passing          skill_fk_accuracy
##                0.096291474                0.003816181
##         skill_long_passing         skill_ball_control
##               -0.025284512                0.168018618
##      movement_acceleration      movement_sprint_speed
##                0.046458864                0.035894649
##           movement_agility         movement_reactions
##               -0.006376695                0.278843422
##           movement_balance           power_long_shots
##               -0.009027995               -0.037178647
```

```
##       mentality_aggression    mentality_interceptions
##                -0.012298629               -0.025578485
##      mentality_positioning           mentality_vision
##                -0.059288849               -0.048335680
##        mentality_composure          defending_marking
##                 0.135907755                0.011637464
##   defending_sliding_tackle
##                -0.021810770
```

Report The model we choose is overall ~ age + weight_kg + shooting + passing + defending + physic + attacking_heading_accuracy + attacking_short_passing + skill_fk_accuracy + skill_long_passing + skill_ball_control + movement_acceleration + movement_sprint_speed + movement_agility + movement_reactions + movement_balance + power_long_shots + mentality_aggression + mentality_interceptions + mentality_positioning + mentality_vision + mentality_composure + defending_marking + defending_sliding_tackle.

Perform the backward selection on the estimation data. Report the model choice based on BIC criteria.

```
lm.fit=lm(overall ~ age + height_cm + weight_kg +
                    shooting + shooting + passing + dribbling +
                    defending + physic + attacking_crossing +
                    attacking_finishing + attacking_heading_accuracy +
                    attacking_short_passing + attacking_volleys +
                    skill_dribbling + skill_curve + skill_fk_accuracy +
                    skill_long_passing + skill_ball_control +
                    movement_acceleration + movement_sprint_speed +
                    movement_agility + movement_reactions +
                    movement_balance + power_shot_power +
                    power_jumping + power_stamina + power_strength +
                    power_long_shots + mentality_aggression +
                    mentality_interceptions + mentality_positioning +
                    mentality_vision + mentality_penalties +
                    mentality_composure + defending_marking +
                    defending_standing_tackle + defending_sliding_tackle,data=est.col)
n=nrow(est.col)
step(lm.fit,direction="backward",k=log(n))
```

```
## Start:  AIC=23057.71
## overall ~ age + height_cm + weight_kg + shooting + shooting +
##     passing + dribbling + defending + physic + attacking_crossing +
##     attacking_finishing + attacking_heading_accuracy + attacking_short_passing +
##     attacking_volleys + skill_dribbling + skill_curve + skill_fk_accuracy +
##     skill_long_passing + skill_ball_control + movement_acceleration +
##     movement_sprint_speed + movement_agility + movement_reactions +
##     movement_balance + power_shot_power + power_jumping + power_stamina +
##     power_strength + power_long_shots + mentality_aggression +
##     mentality_interceptions + mentality_positioning + mentality_vision +
##     mentality_penalties + mentality_composure + defending_marking +
##     defending_standing_tackle + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - defending_standing_tackle   1       0.1 73860 23048
## - physic                      1       0.4 73861 23048
## - mentality_aggression        1       0.7 73861 23048
```

```
## - skill_fk_accuracy           1       0.8 73861 23048
## - shooting                    1       0.8 73861 23048
## - defending_marking           1       0.8 73861 23048
## - height_cm                   1       1.1 73861 23048
## - power_stamina               1       1.1 73861 23048
## - skill_curve                 1       1.4 73862 23048
## - power_strength              1       1.8 73862 23048
## - attacking_crossing          1       2.1 73862 23049
## - power_jumping               1       3.5 73864 23049
## - skill_dribbling             1       6.7 73867 23049
## - attacking_volleys           1       7.2 73868 23050
## - power_long_shots            1       7.5 73868 23050
## - defending                   1       8.0 73868 23050
## - dribbling                   1       8.1 73869 23050
## - passing                     1       9.3 73870 23050
## - mentality_penalties         1       9.5 73870 23050
## - attacking_finishing         1      11.1 73871 23050
## - power_shot_power            1      14.5 73875 23051
## - mentality_interceptions     1      19.2 73880 23052
## - movement_agility            1      20.0 73880 23052
## - movement_balance            1      38.5 73899 23055
## - defending_sliding_tackle    1      40.0 73900 23055
## - skill_long_passing          1      43.6 73904 23056
## <none>                                    73860 23058
## - attacking_short_passing     1      56.7 73917 23058
## - mentality_vision            1      82.9 73943 23063
## - weight_kg                   1     190.6 74051 23082
## - skill_ball_control          1     219.6 74080 23087
## - attacking_heading_accuracy  1     440.6 74301 23126
## - movement_sprint_speed       1     468.4 74329 23131
## - age                         1     623.1 74483 23159
## - movement_acceleration       1     646.3 74507 23163
## - mentality_positioning       1     684.7 74545 23170
## - mentality_composure         1    7500.5 81361 24321
## - movement_reactions          1   12979.3 86840 25178
##
## Step:  AIC=23048.25
## overall ~ age + height_cm + weight_kg + shooting + passing +
##     dribbling + defending + physic + attacking_crossing + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + attacking_volleys +
##     skill_dribbling + skill_curve + skill_fk_accuracy + skill_long_passing +
##     skill_ball_control + movement_acceleration + movement_sprint_speed +
##     movement_agility + movement_reactions + movement_balance +
##     power_shot_power + power_jumping + power_stamina + power_strength +
##     power_long_shots + mentality_aggression + mentality_interceptions +
##     mentality_positioning + mentality_vision + mentality_penalties +
##     mentality_composure + defending_marking + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - physic                      1       0.4 73861 23039
## - mentality_aggression        1       0.7 73861 23039
## - skill_fk_accuracy           1       0.8 73861 23039
## - shooting                    1       0.8 73861 23039
## - height_cm                   1       1.1 73862 23039
```

```
## - power_stamina               1       1.1 73862 23039
## - skill_curve                 1       1.4 73862 23039
## - power_strength              1       1.8 73862 23039
## - attacking_crossing          1       2.1 73863 23039
## - power_jumping               1       3.5 73864 23039
## - skill_dribbling             1       6.7 73867 23040
## - attacking_volleys           1       7.2 73868 23040
## - power_long_shots            1       7.5 73868 23040
## - dribbling                   1       8.2 73869 23040
## - passing                     1       9.3 73870 23040
## - mentality_penalties         1       9.5 73870 23040
## - attacking_finishing         1      11.1 73872 23041
## - power_shot_power            1      14.5 73875 23041
## - movement_agility            1      20.1 73881 23042
## - defending_marking           1      20.2 73881 23042
## - movement_balance            1      38.4 73899 23046
## - skill_long_passing          1      43.5 73904 23046
## <none>                                   73860 23048
## - attacking_short_passing     1      56.7 73917 23049
## - defending_sliding_tackle    1      78.8 73939 23053
## - mentality_vision            1      82.8 73943 23054
## - defending                   1     122.8 73983 23061
## - mentality_interceptions     1     125.0 73986 23061
## - weight_kg                   1     190.6 74051 23073
## - skill_ball_control          1     219.6 74080 23078
## - movement_sprint_speed       1     468.5 74329 23122
## - age                         1     623.4 74484 23149
## - movement_acceleration       1     646.3 74507 23153
## - mentality_positioning       1     684.7 74545 23160
## - attacking_heading_accuracy  1    2431.8 76292 23465
## - mentality_composure         1    7500.5 81361 24311
## - movement_reactions          1   12979.2 86840 25168
##
## Step:  AIC=23038.84
## overall ~ age + height_cm + weight_kg + shooting + passing +
##     dribbling + defending + attacking_crossing + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + attacking_volleys +
##     skill_dribbling + skill_curve + skill_fk_accuracy + skill_long_passing +
##     skill_ball_control + movement_acceleration + movement_sprint_speed +
##     movement_agility + movement_reactions + movement_balance +
##     power_shot_power + power_jumping + power_stamina + power_strength +
##     power_long_shots + mentality_aggression + mentality_interceptions +
##     mentality_positioning + mentality_vision + mentality_penalties +
##     mentality_composure + defending_marking + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - skill_fk_accuracy           1       0.8 73862 23030
## - shooting                    1       0.8 73862 23030
## - height_cm                   1       1.1 73862 23030
## - skill_curve                 1       1.4 73862 23030
## - mentality_aggression        1       1.4 73862 23030
## - attacking_crossing          1       2.1 73863 23030
## - skill_dribbling             1       6.7 73868 23030
## - attacking_volleys           1       7.2 73868 23031
```

```
## - power_long_shots            1       7.5 73868 23031
## - dribbling                   1       8.2 73869 23031
## - passing                     1       9.3 73870 23031
## - mentality_penalties         1       9.5 73870 23031
## - attacking_finishing         1      11.1 73872 23031
## - power_shot_power            1      14.5 73875 23032
## - movement_agility            1      20.1 73881 23033
## - defending_marking           1      20.2 73881 23033
## - power_jumping               1      21.9 73883 23033
## - movement_balance            1      38.5 73899 23036
## - skill_long_passing          1      43.5 73904 23037
## <none>                                    73861 23039
## - attacking_short_passing     1      56.6 73917 23039
## - defending_sliding_tackle    1      78.9 73940 23043
## - mentality_vision            1      82.9 73944 23044
## - defending                   1     123.0 73984 23051
## - mentality_interceptions     1     125.0 73986 23052
## - power_stamina               1     153.2 74014 23057
## - weight_kg                   1     190.4 74051 23063
## - skill_ball_control          1     219.5 74080 23068
## - movement_sprint_speed       1     468.5 74329 23112
## - power_strength              1     510.0 74371 23120
## - age                         1     623.7 74485 23140
## - movement_acceleration       1     646.3 74507 23144
## - mentality_positioning       1     684.6 74546 23151
## - attacking_heading_accuracy  1    2431.4 76292 23455
## - mentality_composure         1    7500.8 81362 24302
## - movement_reactions          1   12978.8 86840 25159
##
## Step:  AIC=23029.49
## overall ~ age + height_cm + weight_kg + shooting + passing +
##     dribbling + defending + attacking_crossing + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + attacking_volleys +
##     skill_dribbling + skill_curve + skill_long_passing + skill_ball_control +
##     movement_acceleration + movement_sprint_speed + movement_agility +
##     movement_reactions + movement_balance + power_shot_power +
##     power_jumping + power_stamina + power_strength + power_long_shots +
##     mentality_aggression + mentality_interceptions + mentality_positioning +
##     mentality_vision + mentality_penalties + mentality_composure +
##     defending_marking + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - shooting                    1       0.9 73863 23020
## - height_cm                   1       1.1 73863 23020
## - mentality_aggression        1       1.4 73863 23020
## - skill_curve                 1       3.4 73865 23021
## - skill_dribbling             1       6.8 73868 23021
## - power_long_shots            1       7.4 73869 23021
## - attacking_volleys           1       7.4 73869 23021
## - dribbling                   1       8.2 73870 23022
## - mentality_penalties         1      10.1 73872 23022
## - attacking_finishing         1      11.2 73873 23022
## - attacking_crossing          1      12.4 73874 23022
## - power_shot_power            1      14.6 73876 23023
```

```
## - defending_marking           1      20.0 73882 23024
## - movement_agility            1      20.2 73882 23024
## - power_jumping               1      21.7 73883 23024
## - movement_balance            1      38.5 73900 23027
## - passing                     1      42.7 73904 23028
## <none>                                    73862 23030
## - defending_sliding_tackle    1      79.0 73941 23034
## - skill_long_passing          1     121.8 73983 23042
## - defending                   1     123.4 73985 23042
## - mentality_interceptions     1     125.2 73987 23042
## - attacking_short_passing     1     127.6 73989 23043
## - power_stamina               1     153.1 74015 23047
## - weight_kg                   1     190.6 74052 23054
## - skill_ball_control          1     219.3 74081 23059
## - mentality_vision            1     247.7 74109 23064
## - movement_sprint_speed       1     467.9 74330 23103
## - power_strength              1     509.5 74371 23110
## - age                         1     626.8 74488 23131
## - movement_acceleration       1     646.4 74508 23135
## - mentality_positioning       1     685.0 74547 23142
## - attacking_heading_accuracy  1    2435.8 76297 23447
## - mentality_composure         1    7500.1 81362 24292
## - movement_reactions          1   12978.2 86840 25149
##
## Step:  AIC=23020.16
## overall ~ age + height_cm + weight_kg + passing + dribbling +
##     defending + attacking_crossing + attacking_finishing + attacking_heading_accuracy +
##     attacking_short_passing + attacking_volleys + skill_dribbling +
##     skill_curve + skill_long_passing + skill_ball_control + movement_acceleration +
##     movement_sprint_speed + movement_agility + movement_reactions +
##     movement_balance + power_shot_power + power_jumping + power_stamina +
##     power_strength + power_long_shots + mentality_aggression +
##     mentality_interceptions + mentality_positioning + mentality_vision +
##     mentality_penalties + mentality_composure + defending_marking +
##     defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - height_cm                   1       1.1 73864 23011
## - mentality_aggression        1       1.4 73864 23011
## - skill_curve                 1       3.4 73866 23011
## - skill_dribbling             1       6.9 73869 23012
## - dribbling                   1       8.3 73871 23012
## - attacking_volleys           1       9.8 73872 23012
## - attacking_crossing          1      12.4 73875 23013
## - mentality_penalties         1      15.3 73878 23013
## - defending_marking           1      20.1 73883 23014
## - movement_agility            1      20.4 73883 23014
## - power_jumping               1      21.7 73884 23014
## - movement_balance            1      38.7 73901 23018
## - passing                     1      42.7 73905 23018
## <none>                                    73863 23020
## - defending_sliding_tackle    1      78.9 73941 23025
## - skill_long_passing          1     121.7 73984 23032
## - defending                   1     123.2 73986 23033
```

```
## - mentality_interceptions     1     124.9 73987 23033
## - attacking_short_passing     1     127.5 73990 23033
## - power_stamina               1     153.1 74016 23038
## - power_shot_power            1     181.8 74044 23043
## - weight_kg                   1     190.5 74053 23045
## - skill_ball_control          1     218.9 74081 23050
## - mentality_vision            1     247.8 74110 23055
## - power_long_shots            1     267.9 74130 23058
## - movement_sprint_speed       1     468.1 74331 23094
## - power_strength              1     509.8 74372 23101
## - attacking_finishing         1     515.2 74378 23102
## - age                         1     626.6 74489 23122
## - movement_acceleration       1     645.9 74508 23125
## - mentality_positioning       1    1581.8 75444 23289
## - attacking_heading_accuracy  1    2436.0 76298 23438
## - mentality_composure         1    7502.8 81365 24283
## - movement_reactions          1   12977.3 86840 25140
##
## Step:  AIC=23010.87
## overall ~ age + weight_kg + passing + dribbling + defending +
##     attacking_crossing + attacking_finishing + attacking_heading_accuracy +
##     attacking_short_passing + attacking_volleys + skill_dribbling +
##     skill_curve + skill_long_passing + skill_ball_control + movement_acceleration +
##     movement_sprint_speed + movement_agility + movement_reactions +
##     movement_balance + power_shot_power + power_jumping + power_stamina +
##     power_strength + power_long_shots + mentality_aggression +
##     mentality_interceptions + mentality_positioning + mentality_vision +
##     mentality_penalties + mentality_composure + defending_marking +
##     defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - mentality_aggression        1       1.5 73865 23002
## - skill_curve                 1       3.3 73867 23002
## - skill_dribbling             1       6.9 73870 23003
## - dribbling                   1       8.4 73872 23003
## - attacking_volleys           1      10.2 73874 23003
## - attacking_crossing          1      12.4 73876 23004
## - mentality_penalties         1      15.0 73879 23004
## - defending_marking           1      20.0 73884 23005
## - movement_agility            1      20.5 73884 23005
## - power_jumping               1      21.3 73885 23005
## - passing                     1      42.6 73906 23009
## - movement_balance            1      46.8 73910 23010
## <none>                                    73864 23011
## - defending_sliding_tackle    1      79.3 73943 23016
## - skill_long_passing          1     121.7 73985 23023
## - defending                   1     123.6 73987 23023
## - mentality_interceptions     1     124.9 73988 23024
## - attacking_short_passing     1     127.6 73991 23024
## - power_stamina               1     154.1 74018 23029
## - power_shot_power            1     181.6 74045 23034
## - skill_ball_control          1     218.9 74082 23040
## - weight_kg                   1     233.3 74097 23043
## - mentality_vision            1     247.0 74111 23045
```

```
## - power_long_shots            1     269.2 74133 23049
## - movement_sprint_speed       1     471.5 74335 23085
## - attacking_finishing         1     515.9 74380 23093
## - power_strength              1     524.2 74388 23094
## - age                         1     639.5 74503 23115
## - movement_acceleration       1     644.9 74508 23116
## - mentality_positioning       1    1587.4 75451 23281
## - attacking_heading_accuracy  1    2474.4 76338 23435
## - mentality_composure         1    7529.4 81393 24278
## - movement_reactions          1   12976.4 86840 25130
##
## Step:  AIC=23001.65
## overall ~ age + weight_kg + passing + dribbling + defending +
##     attacking_crossing + attacking_finishing + attacking_heading_accuracy +
##     attacking_short_passing + attacking_volleys + skill_dribbling +
##     skill_curve + skill_long_passing + skill_ball_control + movement_acceleration +
##     movement_sprint_speed + movement_agility + movement_reactions +
##     movement_balance + power_shot_power + power_jumping + power_stamina +
##     power_strength + power_long_shots + mentality_interceptions +
##     mentality_positioning + mentality_vision + mentality_penalties +
##     mentality_composure + defending_marking + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - skill_curve                 1       3.2 73868 22993
## - skill_dribbling             1       6.9 73872 22993
## - dribbling                   1       8.3 73873 22994
## - attacking_volleys           1      10.0 73875 22994
## - attacking_crossing          1      12.2 73877 22994
## - mentality_penalties         1      15.3 73880 22995
## - movement_agility            1      20.4 73885 22996
## - power_jumping               1      20.5 73886 22996
## - defending_marking           1      20.6 73886 22996
## - passing                     1      42.5 73908 23000
## - movement_balance            1      47.0 73912 23000
## <none>                                   73865 23002
## - defending_sliding_tackle    1      80.0 73945 23006
## - skill_long_passing          1     121.7 73987 23014
## - defending                   1     122.4 73988 23014
## - mentality_interceptions     1     126.0 73991 23015
## - attacking_short_passing     1     127.6 73993 23015
## - power_stamina               1     152.6 74018 23019
## - power_shot_power            1     180.5 74046 23024
## - skill_ball_control          1     219.6 74085 23031
## - weight_kg                   1     233.3 74098 23034
## - mentality_vision            1     247.0 74112 23036
## - power_long_shots            1     268.6 74134 23040
## - movement_sprint_speed       1     472.8 74338 23076
## - attacking_finishing         1     522.1 74387 23085
## - power_strength              1     528.9 74394 23086
## - age                         1     639.5 74505 23106
## - movement_acceleration       1     645.4 74511 23107
## - mentality_positioning       1    1601.8 75467 23274
## - attacking_heading_accuracy  1    2473.7 76339 23426
## - mentality_composure         1    7533.1 81398 24270
```

```
## - movement_reactions          1   12984.6 86850 25122
##
## Step:  AIC=22992.74
## overall ~ age + weight_kg + passing + dribbling + defending +
##     attacking_crossing + attacking_finishing + attacking_heading_accuracy +
##     attacking_short_passing + attacking_volleys + skill_dribbling +
##     skill_long_passing + skill_ball_control + movement_acceleration +
##     movement_sprint_speed + movement_agility + movement_reactions +
##     movement_balance + power_shot_power + power_jumping + power_stamina +
##     power_strength + power_long_shots + mentality_interceptions +
##     mentality_positioning + mentality_vision + mentality_penalties +
##     mentality_composure + defending_marking + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - skill_dribbling             1       6.8 73875 22984
## - dribbling                   1       8.2 73877 22985
## - attacking_volleys           1       9.0 73877 22985
## - attacking_crossing          1       9.3 73878 22985
## - mentality_penalties         1      16.1 73884 22986
## - power_jumping               1      20.4 73889 22987
## - defending_marking           1      20.4 73889 22987
## - movement_agility            1      20.5 73889 22987
## - movement_balance            1      47.0 73915 22992
## <none>                                    73868 22993
## - passing                     1      59.6 73928 22994
## - defending_sliding_tackle    1      80.4 73949 22998
## - defending                   1     122.9 73991 23005
## - mentality_interceptions     1     125.9 73994 23006
## - power_stamina               1     153.4 74022 23010
## - skill_long_passing          1     161.4 74030 23012
## - power_shot_power            1     178.6 74047 23015
## - skill_ball_control          1     219.5 74088 23022
## - weight_kg                   1     232.2 74101 23024
## - power_long_shots            1     267.6 74136 23031
## - attacking_short_passing     1     305.4 74174 23038
## - mentality_vision            1     373.4 74242 23050
## - movement_sprint_speed       1     473.1 74341 23067
## - attacking_finishing         1     524.5 74393 23076
## - power_strength              1     529.5 74398 23077
## - age                         1     642.1 74510 23097
## - movement_acceleration       1     644.2 74513 23098
## - mentality_positioning       1    1608.8 75477 23267
## - attacking_heading_accuracy  1    2473.4 76342 23416
## - mentality_composure         1    7536.1 81404 24261
## - movement_reactions          1   12986.5 86855 25114
##
## Step:  AIC=22984.48
## overall ~ age + weight_kg + passing + dribbling + defending +
##     attacking_crossing + attacking_finishing + attacking_heading_accuracy +
##     attacking_short_passing + attacking_volleys + skill_long_passing +
##     skill_ball_control + movement_acceleration + movement_sprint_speed +
##     movement_agility + movement_reactions + movement_balance +
##     power_shot_power + power_jumping + power_stamina + power_strength +
##     power_long_shots + mentality_interceptions + mentality_positioning +
```

```
##     mentality_vision + mentality_penalties + mentality_composure +
##     defending_marking + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - dribbling                   1       4.7 73880 22976
## - attacking_volleys           1       8.7 73884 22976
## - attacking_crossing          1       9.4 73885 22977
## - mentality_penalties         1      15.8 73891 22978
## - defending_marking           1      20.4 73896 22979
## - power_jumping               1      20.6 73896 22979
## - movement_agility            1      24.4 73900 22979
## <none>                                    73875 22984
## - movement_balance            1      55.3 73930 22985
## - passing                     1      59.6 73935 22986
## - defending_sliding_tackle    1      80.6 73956 22989
## - defending                   1     122.9 73998 22997
## - mentality_interceptions     1     125.5 74001 22997
## - power_stamina               1     154.4 74030 23002
## - skill_long_passing          1     161.4 74037 23004
## - power_shot_power            1     179.4 74055 23007
## - weight_kg                   1     232.9 74108 23016
## - power_long_shots            1     268.4 74144 23023
## - attacking_short_passing     1     306.4 74182 23029
## - mentality_vision            1     374.1 74249 23041
## - movement_sprint_speed       1     471.6 74347 23059
## - attacking_finishing         1     525.4 74401 23068
## - power_strength              1     528.7 74404 23069
## - age                         1     641.5 74517 23089
## - movement_acceleration       1     642.5 74518 23089
## - mentality_positioning       1    1614.1 75489 23259
## - attacking_heading_accuracy  1    2472.2 76347 23408
## - skill_ball_control          1    2620.0 76495 23433
## - mentality_composure         1    7545.0 81420 24254
## - movement_reactions          1   21881.4 95757 26388
##
## Step:  AIC=22975.82
## overall ~ age + weight_kg + passing + defending + attacking_crossing +
##     attacking_finishing + attacking_heading_accuracy + attacking_short_passing +
##     attacking_volleys + skill_long_passing + skill_ball_control +
##     movement_acceleration + movement_sprint_speed + movement_agility +
##     movement_reactions + movement_balance + power_shot_power +
##     power_jumping + power_stamina + power_strength + power_long_shots +
##     mentality_interceptions + mentality_positioning + mentality_vision +
##     mentality_penalties + mentality_composure + defending_marking +
##     defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - attacking_crossing          1       8.2 73888 22968
## - attacking_volleys           1       8.8 73889 22968
## - mentality_penalties         1      15.7 73896 22969
## - power_jumping               1      19.9 73900 22970
## - movement_agility            1      20.2 73900 22970
## - defending_marking           1      20.3 73900 22970
## - movement_balance            1      51.7 73932 22976
```

```
## <none>                                     73880 22976
## - passing                      1      59.1 73939 22977
## - defending_sliding_tackle     1      79.4 73959 22980
## - defending                    1     122.6 74002 22988
## - mentality_interceptions      1     126.9 74007 22989
## - power_stamina                1     152.5 74032 22994
## - skill_long_passing           1     160.4 74040 22995
## - power_shot_power             1     177.6 74057 22998
## - weight_kg                    1     234.7 74115 23008
## - power_long_shots             1     265.1 74145 23014
## - attacking_short_passing      1     306.2 74186 23021
## - mentality_vision             1     370.6 74250 23032
## - movement_sprint_speed        1     477.8 74358 23051
## - power_strength               1     525.7 74406 23060
## - attacking_finishing          1     532.5 74412 23061
## - age                          1     637.1 74517 23079
## - movement_acceleration        1     654.7 74535 23082
## - mentality_positioning        1    1644.9 75525 23256
## - attacking_heading_accuracy   1    2467.5 76347 23398
## - skill_ball_control           1    5768.7 79649 23955
## - mentality_composure          1    7541.0 81421 24245
## - movement_reactions           1   22311.5 96191 26438
##
## Step:  AIC=22967.8
## overall ~ age + weight_kg + passing + defending + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + attacking_volleys +
##     skill_long_passing + skill_ball_control + movement_acceleration +
##     movement_sprint_speed + movement_agility + movement_reactions +
##     movement_balance + power_shot_power + power_jumping + power_stamina +
##     power_strength + power_long_shots + mentality_interceptions +
##     mentality_positioning + mentality_vision + mentality_penalties +
##     mentality_composure + defending_marking + defending_sliding_tackle
##
##                               Df Sum of Sq   RSS   AIC
## - attacking_volleys            1      11.4 73899 22960
## - movement_agility             1      19.1 73907 22962
## - defending_marking            1      19.8 73908 22962
## - power_jumping                1      20.6 73909 22962
## - mentality_penalties          1      20.8 73909 22962
## - movement_balance             1      52.4 73940 22968
## <none>                                     73888 22968
## - defending_sliding_tackle     1      81.2 73969 22973
## - defending                    1     123.3 74011 22980
## - mentality_interceptions      1     126.5 74014 22981
## - power_stamina                1     152.2 74040 22985
## - passing                      1     180.1 74068 22990
## - power_shot_power             1     186.9 74075 22992
## - skill_long_passing           1     215.0 74103 22996
## - weight_kg                    1     236.9 74125 23000
## - power_long_shots             1     257.4 74145 23004
## - movement_sprint_speed        1     471.5 74360 23042
## - power_strength               1     522.6 74411 23051
## - attacking_finishing          1     527.8 74416 23052
## - age                          1     632.4 74520 23070
```

```
## - movement_acceleration       1     650.4 74538 23074
## - mentality_vision            1     756.0 74644 23092
## - attacking_short_passing     1    1088.8 74977 23151
## - mentality_positioning       1    1685.1 75573 23255
## - attacking_heading_accuracy  1    2460.6 76349 23389
## - skill_ball_control          1    5767.5 79656 23947
## - mentality_composure         1    7600.6 81489 24246
## - movement_reactions          1   22316.0 96204 26430
##
## Step:  AIC=22960.34
## overall ~ age + weight_kg + passing + defending + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + skill_long_passing +
##     skill_ball_control + movement_acceleration + movement_sprint_speed +
##     movement_agility + movement_reactions + movement_balance +
##     power_shot_power + power_jumping + power_stamina + power_strength +
##     power_long_shots + mentality_interceptions + mentality_positioning +
##     mentality_vision + mentality_penalties + mentality_composure +
##     defending_marking + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - defending_marking           1      18.6 73918 22954
## - movement_agility            1      18.7 73918 22954
## - power_jumping               1      20.5 73920 22954
## - mentality_penalties         1      27.0 73926 22956
## - movement_balance            1      50.9 73950 22960
## <none>                                    73899 22960
## - defending_sliding_tackle    1      83.6 73983 22966
## - defending                   1     124.9 74024 22973
## - mentality_interceptions     1     128.8 74028 22974
## - power_stamina               1     149.0 74048 22977
## - passing                     1     193.7 74093 22985
## - power_shot_power            1     202.6 74102 22987
## - skill_long_passing          1     223.6 74123 22991
## - weight_kg                   1     242.2 74142 22994
## - power_long_shots            1     247.7 74147 22995
## - movement_sprint_speed       1     469.1 74369 23034
## - power_strength              1     516.9 74416 23043
## - attacking_finishing         1     589.8 74489 23055
## - age                         1     639.5 74539 23064
## - movement_acceleration       1     651.5 74551 23066
## - mentality_vision            1     764.1 74664 23086
## - attacking_short_passing     1    1079.9 74979 23142
## - mentality_positioning       1    1675.6 75575 23246
## - attacking_heading_accuracy  1    2482.2 76382 23386
## - skill_ball_control          1    5759.4 79659 23938
## - mentality_composure         1    7727.7 81627 24259
## - movement_reactions          1   22407.4 96307 26435
##
## Step:  AIC=22954.17
## overall ~ age + weight_kg + passing + defending + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + skill_long_passing +
##     skill_ball_control + movement_acceleration + movement_sprint_speed +
##     movement_agility + movement_reactions + movement_balance +
##     power_shot_power + power_jumping + power_stamina + power_strength +
```

```
##     power_long_shots + mentality_interceptions + mentality_positioning +
##     mentality_vision + mentality_penalties + mentality_composure +
##     defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - movement_agility            1      18.1 73936 22948
## - power_jumping               1      22.0 73940 22949
## - mentality_penalties         1      27.1 73945 22950
## - movement_balance            1      50.6 73969 22954
## <none>                                    73918 22954
## - power_stamina               1     149.0 74067 22971
## - passing                     1     193.5 74112 22979
## - power_shot_power            1     201.9 74120 22981
## - skill_long_passing          1     222.3 74140 22984
## - weight_kg                   1     240.2 74158 22987
## - power_long_shots            1     246.5 74165 22988
## - defending_sliding_tackle    1     251.6 74170 22989
## - mentality_interceptions     1     329.1 74247 23003
## - movement_sprint_speed       1     469.6 74388 23028
## - power_strength              1     512.2 74430 23036
## - attacking_finishing         1     585.0 74503 23048
## - movement_acceleration       1     653.3 74571 23060
## - age                         1     653.6 74572 23060
## - mentality_vision            1     767.6 74686 23081
## - defending                   1    1036.6 74955 23128
## - attacking_short_passing     1    1076.3 74994 23135
## - mentality_positioning       1    1683.2 75601 23241
## - attacking_heading_accuracy  1    2769.0 76687 23428
## - skill_ball_control          1    5775.0 79693 23934
## - mentality_composure         1    7722.7 81641 24252
## - movement_reactions          1   22499.7 96418 26440
##
## Step:  AIC=22947.9
## overall ~ age + weight_kg + passing + defending + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + skill_long_passing +
##     skill_ball_control + movement_acceleration + movement_sprint_speed +
##     movement_reactions + movement_balance + power_shot_power +
##     power_jumping + power_stamina + power_strength + power_long_shots +
##     mentality_interceptions + mentality_positioning + mentality_vision +
##     mentality_penalties + mentality_composure + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - power_jumping               1      17.4 73953 22942
## - mentality_penalties         1      29.6 73966 22944
## <none>                                    73936 22948
## - movement_balance            1      74.8 74011 22952
## - power_stamina               1     140.5 74077 22963
## - passing                     1     187.4 74123 22972
## - power_shot_power            1     209.1 74145 22976
## - skill_long_passing          1     221.9 74158 22978
## - defending_sliding_tackle    1     246.0 74182 22982
## - weight_kg                   1     250.6 74187 22983
## - power_long_shots            1     255.5 74192 22984
## - mentality_interceptions     1     332.0 74268 22997
```

```
## - movement_sprint_speed       1     458.8 74395 23020
## - power_strength              1     525.7 74462 23032
## - attacking_finishing         1     580.3 74516 23041
## - movement_acceleration       1     639.0 74575 23052
## - age                         1     641.6 74578 23052
## - mentality_vision            1     773.2 74709 23075
## - defending                   1    1039.4 74976 23122
## - attacking_short_passing     1    1094.1 75030 23132
## - mentality_positioning       1    1681.0 75617 23234
## - attacking_heading_accuracy  1    2824.4 76761 23432
## - skill_ball_control          1    5784.5 79721 23929
## - mentality_composure         1    7709.7 81646 24243
## - movement_reactions          1   22510.7 96447 26435
##
## Step:  AIC=22941.5
## overall ~ age + weight_kg + passing + defending + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + skill_long_passing +
##     skill_ball_control + movement_acceleration + movement_sprint_speed +
##     movement_reactions + movement_balance + power_shot_power +
##     power_stamina + power_strength + power_long_shots + mentality_interceptions +
##     mentality_positioning + mentality_vision + mentality_penalties +
##     mentality_composure + defending_sliding_tackle
##
##                              Df Sum of Sq   RSS   AIC
## - mentality_penalties         1      28.9 73982 22937
## <none>                                    73953 22942
## - movement_balance            1      62.9 74016 22943
## - power_stamina               1     152.1 74106 22959
## - passing                     1     178.5 74132 22964
## - power_shot_power            1     209.8 74163 22969
## - skill_long_passing          1     220.2 74174 22971
## - defending_sliding_tackle    1     243.7 74197 22975
## - weight_kg                   1     245.5 74199 22976
## - power_long_shots            1     252.2 74206 22977
## - mentality_interceptions     1     327.2 74281 22990
## - movement_sprint_speed       1     462.7 74416 23014
## - power_strength              1     560.2 74514 23031
## - attacking_finishing         1     576.2 74530 23034
## - movement_acceleration       1     656.8 74610 23048
## - age                         1     663.3 74617 23050
## - mentality_vision            1     767.9 74721 23068
## - defending                   1    1034.7 74988 23115
## - attacking_short_passing     1    1103.5 75057 23127
## - mentality_positioning       1    1690.7 75644 23229
## - attacking_heading_accuracy  1    3194.6 77148 23488
## - skill_ball_control          1    5771.7 79725 23921
## - mentality_composure         1    7728.2 81682 24240
## - movement_reactions          1   22540.7 96494 26432
##
## Step:  AIC=22937.16
## overall ~ age + weight_kg + passing + defending + attacking_finishing +
##     attacking_heading_accuracy + attacking_short_passing + skill_long_passing +
##     skill_ball_control + movement_acceleration + movement_sprint_speed +
##     movement_reactions + movement_balance + power_shot_power +
```

```
##     power_stamina + power_strength + power_long_shots + mentality_interceptions +
##     mentality_positioning + mentality_vision + mentality_composure +
##     defending_sliding_tackle
##
##                               Df Sum of Sq   RSS   AIC
## <none>                                     73982 22937
## - movement_balance             1      60.7 74043 22938
## - power_stamina                1     147.7 74130 22954
## - passing                      1     206.3 74189 22964
## - power_shot_power             1     228.8 74211 22968
## - skill_long_passing           1     236.4 74219 22970
## - power_long_shots             1     243.6 74226 22971
## - weight_kg                    1     245.1 74227 22971
## - defending_sliding_tackle     1     247.7 74230 22972
## - mentality_interceptions      1     332.2 74315 22987
## - movement_sprint_speed        1     449.2 74432 23007
## - power_strength               1     553.9 74536 23026
## - movement_acceleration        1     654.5 74637 23044
## - attacking_finishing          1     668.8 74651 23046
## - age                          1     683.6 74666 23049
## - mentality_vision             1     777.4 74760 23065
## - defending                    1    1024.4 75007 23109
## - attacking_short_passing      1    1081.4 75064 23119
## - mentality_positioning        1    1696.9 75679 23226
## - attacking_heading_accuracy   1    3373.1 77355 23514
## - skill_ball_control           1    5761.1 79743 23914
## - mentality_composure          1    7819.8 81802 24249
## - movement_reactions           1   22593.8 96576 26434
```

```
##
## Call:
## lm(formula = overall ~ age + weight_kg + passing + defending +
##     attacking_finishing + attacking_heading_accuracy + attacking_short_passing +
##     skill_long_passing + skill_ball_control + movement_acceleration +
##     movement_sprint_speed + movement_reactions + movement_balance +
##     power_shot_power + power_stamina + power_strength + power_long_shots +
##     mentality_interceptions + mentality_positioning + mentality_vision +
##     mentality_composure + defending_sliding_tackle, data = est.col)
##
## Coefficients:
##                (Intercept)                         age
##                   8.488543                    0.065058
##                  weight_kg                     passing
##                   0.033148                    0.061694
##                  defending          attacking_finishing
##                   0.102233                    0.035774
## attacking_heading_accuracy     attacking_short_passing
##                   0.070712                    0.092345
##         skill_long_passing           skill_ball_control
##                  -0.027441                    0.165781
##      movement_acceleration        movement_sprint_speed
##                   0.045161                    0.034528
##         movement_reactions             movement_balance
##                   0.279918                   -0.009257
```

```
##           power_shot_power                power_stamina
##                   0.019687                    0.012476
##             power_strength             power_long_shots
##                   0.030442                   -0.020940
##    mentality_interceptions       mentality_positioning
##                  -0.032205                   -0.055425
##           mentality_vision         mentality_composure
##                  -0.050037                    0.136502
##   defending_sliding_tackle
##                  -0.029548
```

Report The model we choose is overall ~ age + weight_kg + passing + defending + attacking_finishing + attacking_heading_accuracy + attacking_short_passing + skill_long_passing + skill_ball_control + movement_acceleration + movement_sprint_speed + movement_reactions + movement_balance + power_shot_power + power_stamina + power_strength + power_long_shots + mentality_interceptions + mentality_positioning + mentality_vision + mentality_composure + defending_sliding_tackle.

Which model gives lowest validation error?

```
lm.fit.a <- lm(overall ~ age + weight_kg + shooting + passing + defending + physic + attacking_heading_a

lm.fit.b <- lm(overall ~ age + weight_kg + passing + defending + attacking_finishing + attacking_heading

val.pred.a=predict(lm.fit.a,val.col)
val.pred.b=predict(lm.fit.b,val.col)
mean((val.pred.a-val.col$overall)^2)
```

```
## [1] 5.641129
```

```
mean((val.pred.b-val.col$overall)^2)
```

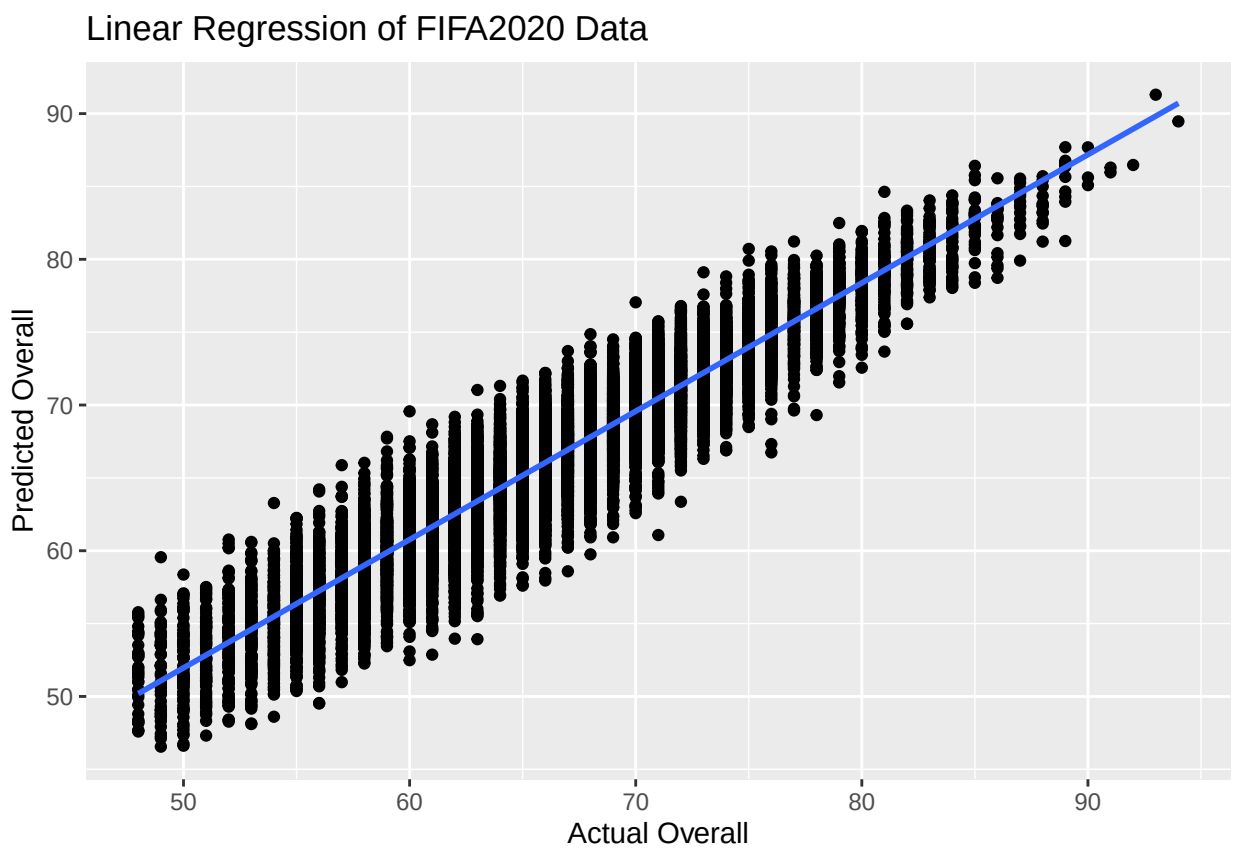
```
## [1] 5.637853
```

Report We choose the second model.

```
lm.fit=lm(overall ~ age + height_cm + weight_kg +
                    shooting + shooting + passing + dribbling +
                    defending + physic + attacking_crossing +
                    attacking_finishing + attacking_heading_accuracy +
                    attacking_short_passing + attacking_volleys +
                    skill_dribbling + skill_curve + skill_fk_accuracy +
                    skill_long_passing + skill_ball_control +
                    movement_acceleration + movement_sprint_speed +
                    movement_agility + movement_reactions +
                    movement_balance + power_shot_power +
                    power_jumping + power_stamina + power_strength +
                    power_long_shots + mentality_aggression +
                    mentality_interceptions + mentality_positioning +
                    mentality_vision + mentality_penalties +
                    mentality_composure + defending_marking +
                    defending_standing_tackle + defending_sliding_tackle,data=fifa)
ggplot(fifa, aes(x = overall, y = predict(lm.fit))) +
```

```
  geom_point() +
  geom_smooth(method = "lm") +
  labs(x = "Actual Overall", y = "Predicted Overall") +
  ggtitle("Linear Regression of FIFA2020 Data")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```




```
#training MSE
final.model=lm(overall ~ age + height_cm + weight_kg +
                    shooting + shooting + passing + dribbling +
                    defending + physic + attacking_crossing +
                    attacking_finishing + attacking_heading_accuracy +
                    attacking_short_passing + attacking_volleys +
                    skill_dribbling + skill_curve + skill_fk_accuracy +
                    skill_long_passing + skill_ball_control +
                    movement_acceleration + movement_sprint_speed +
                    movement_agility + movement_reactions +
                    movement_balance + power_shot_power +
                    power_jumping + power_stamina + power_strength +
                    power_long_shots + mentality_aggression +
                    mentality_interceptions + mentality_positioning +
                    mentality_vision + mentality_penalties +
                    mentality_composure + defending_marking +
                    defending_standing_tackle + defending_sliding_tackle,data=tr.col)
```

```
train.pred=predict(final.model,tr.col)
mean((train.pred-tr.col$overall)^2)
```

```
## [1] 5.615927
```

```
#test MSE
test.pred=predict(final.model,tst.col)
mean((test.pred-tst.col$overall)^2)
```

```
## [1] 5.330194
```

Logistic Regression

First, we will bin the player values and name the new column as Value Brackets with the labels: 0–10M, 10–20M, 20–30M, 30–40M, 40–50M, 50–60M, 60–70M, 70–80M, 80–90M, 90–100M, 100M+.

```
# Create value brackets
value_breaks <- c(0, 10000000, 20000000, 30000000, 40000000, 50000000, 60000000, 70000000, 80000000, 90
value_labels <- c("0-10M", "10-20M", "20-30M", "30-40M", "40-50M","50-60M", "60-70M", "70-80M", "80-90M

`Value Brackets` <- cut(x=fifa$value_eur, breaks=value_breaks,
                        labels=value_labels,
                        include.lowest = TRUE)

fifa <- mutate(fifa, `Value Brackets`)
```

We see that the high valuations are dominated by players of overall rating 85+ and age between 23 to 33 years.

```
g_age_overall <- ggplot(fifa, aes(age, overall))
g_age_overall +
  geom_point(aes(color = `Value Brackets`)) +
  geom_smooth(color = "darkblue") +
  ggtitle("Distribution between Age and Overall Rating of players based on Value bracket") +
  theme_minimal()
```

```
## `geom_smooth()` using method = 'gam' and formula = 'y ~ s(x, bs = "cs")'
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '10-20M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <93>

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## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '90-100M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <80>
```

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## conversion failure on '0-10M' in 'mbcsToSbcs': dot substituted for <93>

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## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

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## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '20-30M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>
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## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

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## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

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## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

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## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '30-40M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>
```

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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>
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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <e2>

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## conversion failure on '40-50M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

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## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '50-60M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '60-70M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '70-80M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <80>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <93>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
## conversion failure on '80-90M' in 'mbcsToSbcs': dot substituted for <e2>

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
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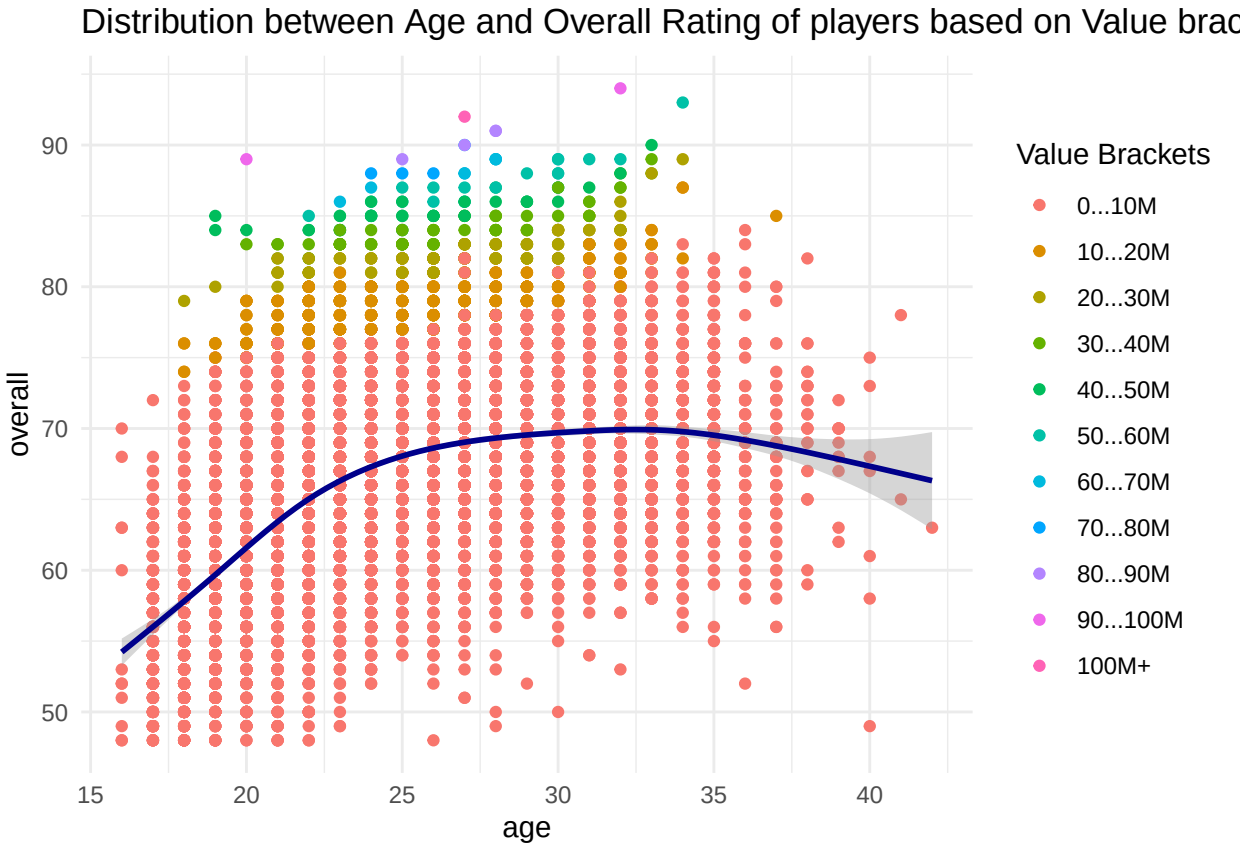

Now, we will perform logistic regression analysis to find the relationship between Overall and Age.

```
fifa$good_player <- ifelse(fifa$overall >= 75, 1, 0)
model <- glm(good_player ~ age, data=fifa, family="binomial")

summary(model)
```

```
##
## Call:
## glm(formula = good_player ~ age, family = "binomial", data = fifa)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.1134  -0.5256  -0.4211  -0.3555   2.4554
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -5.072800   0.146688  -34.58   <2e-16 ***
## age          0.117151   0.005357   21.87   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 11755  on 16241  degrees of freedom
## Residual deviance: 11265  on 16240  degrees of freedom
```

```
## AIC: 11269
##
## Number of Fisher Scoring iterations: 5
```

Plot the logistic regression graph.

```
ggplot(fifa, aes(x=age, y=good_player)) +
  geom_point() +
  stat_smooth(method="glm", method.args=list(family="binomial"), se=FALSE, color="red") +
  ggtitle("Logistic Regression Curve for Age vs Good Player")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```