

# PML - Courser Project

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*21/11/2018*

## Summary

The goal of your project is to predict the manner in which they did the exercise. This is the “classe” variable in the training set. You may use any of the other variables to predict with. You should create a report describing how you built your model, how you used cross validation, what you think the expected out of sample error is, and why you made the choices you did. You will also use your prediction model to predict 20 different test cases.

## Missing Values

We can notice a lot of missing on a few variables of the **testing set** thus, we will remove those variables, from **training** and **testing sets** so we can build our model.

VarName	NACount	NAPercentage
max_roll_belt	19216	97.93089
max_pitch_belt	19216	97.93089
min_roll_belt	19216	97.93089
min_pitch_belt	19216	97.93089
amplitude_roll_belt	19216	97.93089
amplitude_pitch_belt	19216	97.93089
var_total_accel_belt	19216	97.93089
avg_roll_belt	19216	97.93089
stddev_roll_belt	19216	97.93089
var_roll_belt	19216	97.93089
avg_pitch_belt	19216	97.93089
stddev_pitch_belt	19216	97.93089
var_pitch_belt	19216	97.93089
avg_yaw_belt	19216	97.93089
stddev_yaw_belt	19216	97.93089
var_yaw_belt	19216	97.93089
var_accel_arm	19216	97.93089
avg_roll_arm	19216	97.93089
stddev_roll_arm	19216	97.93089
var_roll_arm	19216	97.93089
avg_pitch_arm	19216	97.93089
stddev_pitch_arm	19216	97.93089
var_pitch_arm	19216	97.93089
avg_yaw_arm	19216	97.93089
stddev_yaw_arm	19216	97.93089
var_yaw_arm	19216	97.93089
max_roll_arm	19216	97.93089
max_pitch_arm	19216	97.93089
max_yaw_arm	19216	97.93089
min_roll_arm	19216	97.93089
min_pitch_arm	19216	97.93089

VarName	NACount	NAPercentage
min_yaw_arm	19216	97.93089
amplitude_roll_arm	19216	97.93089
amplitude_pitch_arm	19216	97.93089
amplitude_yaw_arm	19216	97.93089
max_roll_dumbbell	19216	97.93089
max_picth_dumbbell	19216	97.93089
min_roll_dumbbell	19216	97.93089
min_pitch_dumbbell	19216	97.93089
amplitude_roll_dumbbell	19216	97.93089
amplitude_pitch_dumbbell	19216	97.93089
var_accel_dumbbell	19216	97.93089
avg_roll_dumbbell	19216	97.93089
stddev_roll_dumbbell	19216	97.93089
var_roll_dumbbell	19216	97.93089
avg_pitch_dumbbell	19216	97.93089
stddev_pitch_dumbbell	19216	97.93089
var_pitch_dumbbell	19216	97.93089
avg_yaw_dumbbell	19216	97.93089
stddev_yaw_dumbbell	19216	97.93089
var_yaw_dumbbell	19216	97.93089
max_roll_forearm	19216	97.93089
max_picth_forearm	19216	97.93089
min_roll_forearm	19216	97.93089
min_pitch_forearm	19216	97.93089
amplitude_roll_forearm	19216	97.93089
amplitude_pitch_forearm	19216	97.93089
var_accel_forearm	19216	97.93089
avg_roll_forearm	19216	97.93089
stddev_roll_forearm	19216	97.93089
var_roll_forearm	19216	97.93089
avg_pitch_forearm	19216	97.93089
stddev_pitch_forearm	19216	97.93089
var_pitch_forearm	19216	97.93089
avg_yaw_forearm	19216	97.93089
stddev_yaw_forearm	19216	97.93089
var_yaw_forearm	19216	97.93089

After Removing those variables we check for NAs on the **testing set**. A few more variables are completely missing, so, we will also remove those from both **training** and **testing sets**

VarName	NACount	NAPercentage
kurtosis_roll_belt	20	100
kurtosis_picth_belt	20	100
kurtosis_yaw_belt	20	100
skewness_roll_belt	20	100
skewness_roll_belt.1	20	100
skewness_yaw_belt	20	100
max_yaw_belt	20	100
min_yaw_belt	20	100
amplitude_yaw_belt	20	100
kurtosis_roll_arm	20	100

VarName	NACount	NAPercentage
kurtosis_pitch_arm	20	100
kurtosis_yaw_arm	20	100
skewness_roll_arm	20	100
skewness_pitch_arm	20	100
skewness_yaw_arm	20	100
kurtosis_roll_dumbbell	20	100
kurtosis_pitch_dumbbell	20	100
kurtosis_yaw_dumbbell	20	100
skewness_roll_dumbbell	20	100
skewness_pitch_dumbbell	20	100
skewness_yaw_dumbbell	20	100
max_yaw_dumbbell	20	100
min_yaw_dumbbell	20	100
amplitude_yaw_dumbbell	20	100
kurtosis_roll_forearm	20	100
kurtosis_pitch_forearm	20	100
kurtosis_yaw_forearm	20	100
skewness_roll_forearm	20	100
skewness_pitch_forearm	20	100
skewness_yaw_forearm	20	100
max_yaw_forearm	20	100
min_yaw_forearm	20	100
amplitude_yaw_forearm	20	100

## Useless data

Some of the variables on the data set don't contribute to the model and will also be removed. Those are:

Useless Variables
X
user_name
raw_timestamp_part_1
raw_timestamp_part_2
cvtd_timestamp
new_window
num_window

## Models

### Cross Validation

To perform some cross validation we will split the training data into **training (80%)** and **test (20%)** sub-sets in **tree** different ways so we can average the accuracy of each model over tree different splits.

### Selected Models

We will build four different models to compare them

ModelName	ModelCode
SVM Linear	svmLinear
Neural Network	nnet
Support Vector Machines with Radial Basis Function Kernel	svmRadial
Quadratic Discriminant Analysis	qda

```
## [1] "svmLinear"
## [1] 1
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Support Vector Machines with Linear Kernel
##
## 15698 samples
##    52 predictor
##    5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results:
##
##   Accuracy   Kappa
## 0.5674553 0.4505688
##
## Tuning parameter 'C' was held constant at a value of 1
## [1] 2
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Support Vector Machines with Linear Kernel
##
## 15698 samples
##    52 predictor
##    5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results:
##
##   Accuracy   Kappa
## 0.5701009 0.454652
##
## Tuning parameter 'C' was held constant at a value of 1
## [1] 3
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Support Vector Machines with Linear Kernel
##
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## 15698 samples
## 52 predictor
## 5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results:
##
## Accuracy Kappa
## 0.569082 0.4532375
##
## Tuning parameter 'C' was held constant at a value of 1
## [1] "nnet"
## [1] 1
## # weights: 37
## initial value 26413.504307
## iter 10 value 24407.801813
## iter 20 value 23295.531765
## iter 30 value 22845.826946
## iter 40 value 22496.294522
## iter 50 value 22185.593611
## iter 60 value 22141.592498
## iter 70 value 22038.867500
## iter 80 value 21970.542090
## iter 90 value 21935.472737
## iter 100 value 21924.035200
## final value 21924.035200
## stopped after 100 iterations
## # weights: 101
## initial value 27927.344288
## iter 10 value 22515.733228
## iter 20 value 20365.321873
## iter 30 value 20028.569553
## iter 40 value 19686.276431
## iter 50 value 19395.209204
## iter 60 value 19253.846345
## iter 70 value 19157.314228
## iter 80 value 19071.651062
## iter 90 value 18993.646441
## iter 100 value 18957.903823
## final value 18957.903823
## stopped after 100 iterations
## # weights: 165
## initial value 28524.350476
## iter 10 value 22246.794002
## iter 20 value 19481.201925
## iter 30 value 18439.451290
## iter 40 value 18065.126556
## iter 50 value 17600.963686
## iter 60 value 17139.148860
## iter 70 value 16794.358155
## iter 80 value 16550.405955

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## iter 90 value 16391.006643
## iter 100 value 16293.696163
## final value 16293.696163
## stopped after 100 iterations
## # weights: 37
## initial value 26024.347395
## iter 10 value 24305.995864
## iter 20 value 24120.718164
## iter 30 value 22858.446893
## iter 40 value 22088.611517
## iter 50 value 21653.248158
## iter 60 value 21490.093770
## iter 70 value 21465.882906
## iter 80 value 21433.306779
## iter 90 value 21417.880900
## iter 100 value 21401.392162
## final value 21401.392162
## stopped after 100 iterations
## # weights: 101
## initial value 31319.522029
## iter 10 value 23572.057754
## iter 20 value 20926.423653
## iter 30 value 20295.745491
## iter 40 value 19888.019142
## iter 50 value 19636.291551
## iter 60 value 19444.220003
## iter 70 value 19282.355279
## iter 80 value 19145.856311
## iter 90 value 18964.124371
## iter 100 value 18801.045396
## final value 18801.045396
## stopped after 100 iterations
## # weights: 165
## initial value 27134.689266
## iter 10 value 20848.749909
## iter 20 value 18318.027862
## iter 30 value 17641.955729
## iter 40 value 17280.174380
## iter 50 value 17029.459618
## iter 60 value 16648.479294
## iter 70 value 16289.454681
## iter 80 value 15932.250384
## iter 90 value 15685.790329
## iter 100 value 15474.816023
## final value 15474.816023
## stopped after 100 iterations
## # weights: 37
## initial value 26133.398289
## iter 10 value 22842.277680
## iter 20 value 22255.973614
## iter 30 value 21982.479099
## iter 40 value 21835.628071
## iter 50 value 21699.054041
## iter 60 value 21572.235193

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## iter 70 value 21470.546783
## iter 80 value 21406.401715
## iter 90 value 21390.972960
## iter 100 value 21380.971400
## final value 21380.971400
## stopped after 100 iterations
## # weights: 101
## initial value 27311.754911
## iter 10 value 21609.919462
## iter 20 value 19780.003128
## iter 30 value 19324.388624
## iter 40 value 18866.530238
## iter 50 value 18565.445892
## iter 60 value 18401.984287
## iter 70 value 18301.882703
## iter 80 value 18177.033851
## iter 90 value 18104.619742
## iter 100 value 18046.714058
## final value 18046.714058
## stopped after 100 iterations
## # weights: 165
## initial value 27640.580715
## iter 10 value 21891.775738
## iter 20 value 19019.760286
## iter 30 value 18455.847868
## iter 40 value 18099.322704
## iter 50 value 17808.489268
## iter 60 value 17441.785162
## iter 70 value 17155.237535
## iter 80 value 16929.034141
## iter 90 value 16715.175730
## iter 100 value 16507.021788
## final value 16507.021788
## stopped after 100 iterations
## # weights: 37
## initial value 27635.978679
## iter 10 value 24622.633654
## iter 20 value 23888.071160
## iter 30 value 22955.409696
## iter 40 value 22431.939450
## iter 50 value 22049.790777
## iter 60 value 21781.948207
## iter 70 value 21699.144885
## iter 80 value 21587.264826
## iter 90 value 21541.410808
## iter 100 value 21506.740963
## final value 21506.740963
## stopped after 100 iterations
## # weights: 101
## initial value 25973.802350
## iter 10 value 21987.924614
## iter 20 value 20409.345926
## iter 30 value 19904.926246
## iter 40 value 19500.867421

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## iter 50 value 19191.351585
## iter 60 value 18786.454951
## iter 70 value 18490.203191
## iter 80 value 18356.004273
## iter 90 value 18185.211562
## iter 100 value 17946.102482
## final value 17946.102482
## stopped after 100 iterations
## # weights: 165
## initial value 27762.690896
## iter 10 value 20967.875932
## iter 20 value 18380.245806
## iter 30 value 17634.447982
## iter 40 value 17109.813658
## iter 50 value 16627.010187
## iter 60 value 16301.819786
## iter 70 value 16096.751701
## iter 80 value 15944.058251
## iter 90 value 15863.877444
## iter 100 value 15827.045904
## final value 15827.045904
## stopped after 100 iterations
## # weights: 37
## initial value 27873.771342
## iter 10 value 23544.564681
## iter 20 value 23293.638926
## iter 30 value 22632.949304
## iter 40 value 22435.566456
## iter 50 value 22224.906099
## iter 60 value 22121.115979
## iter 70 value 21842.304286
## iter 80 value 21658.843707
## iter 90 value 21558.350662
## iter 100 value 21543.618769
## final value 21543.618769
## stopped after 100 iterations
## # weights: 101
## initial value 29647.168128
## iter 10 value 23332.658901
## iter 20 value 20925.955646
## iter 30 value 20606.071660
## iter 40 value 20350.038111
## iter 50 value 20168.945487
## iter 60 value 20017.949430
## iter 70 value 19735.973913
## iter 80 value 19402.004236
## iter 90 value 19231.869048
## iter 100 value 19069.429768
## final value 19069.429768
## stopped after 100 iterations
## # weights: 165
## initial value 29886.196428
## iter 10 value 21165.421193
## iter 20 value 19133.279472

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## iter 30 value 18627.136435
## iter 40 value 18217.058621
## iter 50 value 17857.277673
## iter 60 value 17434.758092
## iter 70 value 17177.435728
## iter 80 value 17049.685644
## iter 90 value 16915.049850
## iter 100 value 16838.939397
## final value 16838.939397
## stopped after 100 iterations
## # weights: 37
## initial value 26578.921467
## iter 10 value 24593.341032
## iter 20 value 24228.094972
## iter 30 value 23372.959846
## iter 40 value 22837.097551
## iter 50 value 22358.335152
## iter 60 value 22204.651782
## iter 70 value 22172.608701
## iter 80 value 22147.511259
## iter 90 value 22090.700160
## iter 100 value 21906.350135
## final value 21906.350135
## stopped after 100 iterations
## # weights: 101
## initial value 30722.192690
## iter 10 value 22650.147741
## iter 20 value 20674.813564
## iter 30 value 20163.188301
## iter 40 value 19766.379631
## iter 50 value 19448.002761
## iter 60 value 19196.332374
## iter 70 value 18952.857213
## iter 80 value 18752.437388
## iter 90 value 18627.728237
## iter 100 value 18560.330731
## final value 18560.330731
## stopped after 100 iterations
## # weights: 165
## initial value 28093.974034
## iter 10 value 22451.690121
## iter 20 value 19296.676577
## iter 30 value 18103.880053
## iter 40 value 17741.142803
## iter 50 value 17529.621614
## iter 60 value 17262.533874
## iter 70 value 16835.912072
## iter 80 value 16548.779289
## iter 90 value 16332.957173
## iter 100 value 16149.850366
## final value 16149.850366
## stopped after 100 iterations
## # weights: 35
## initial value 27317.338980

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## iter 10 value 23442.522490
## iter 20 value 23025.988058
## iter 30 value 22749.619204
## iter 40 value 22553.381083
## iter 50 value 22409.277345
## iter 60 value 22280.711976
## iter 70 value 22230.622562
## iter 80 value 22105.042591
## iter 90 value 22082.868625
## iter 100 value 22040.250811
## final value 22040.250811
## stopped after 100 iterations
## # weights: 95
## initial value 26642.714537
## iter 10 value 23214.881363
## iter 20 value 20947.085804
## iter 30 value 20520.189033
## iter 40 value 20135.814788
## iter 50 value 19763.173967
## iter 60 value 19459.630722
## iter 70 value 19339.958615
## iter 80 value 19236.130839
## iter 90 value 19143.805498
## iter 100 value 19076.504951
## final value 19076.504951
## stopped after 100 iterations
## # weights: 155
## initial value 29101.192481
## iter 10 value 22342.134873
## iter 20 value 19190.854494
## iter 30 value 18285.239496
## iter 40 value 17807.504623
## iter 50 value 17335.383675
## iter 60 value 16880.362121
## iter 70 value 16686.254596
## iter 80 value 16519.816393
## iter 90 value 16393.238943
## iter 100 value 16250.415570
## final value 16250.415570
## stopped after 100 iterations
## # weights: 35
## initial value 26870.670159
## iter 10 value 23571.401492
## iter 20 value 23256.926992
## iter 30 value 22920.443981
## iter 40 value 22473.556505
## iter 50 value 21929.551297
## iter 60 value 21809.162561
## iter 70 value 21738.207821
## iter 80 value 21713.694987
## iter 90 value 21688.356943
## iter 100 value 21635.653278
## final value 21635.653278
## stopped after 100 iterations

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## # weights: 95
## initial value 26877.073061
## iter 10 value 21393.546057
## iter 20 value 20056.339769
## iter 30 value 19811.494627
## iter 40 value 19676.092141
## iter 50 value 19439.254129
## iter 60 value 19308.410519
## iter 70 value 19141.721018
## iter 80 value 18901.701232
## iter 90 value 18648.813151
## iter 100 value 18354.616310
## final value 18354.616310
## stopped after 100 iterations
## # weights: 155
## initial value 28021.045141
## iter 10 value 20622.106452
## iter 20 value 18610.459137
## iter 30 value 17832.095733
## iter 40 value 17655.777797
## iter 50 value 17414.419607
## iter 60 value 17123.952351
## iter 70 value 16857.020373
## iter 80 value 16612.821664
## iter 90 value 16448.480383
## iter 100 value 16304.281812
## final value 16304.281812
## stopped after 100 iterations
## # weights: 35
## initial value 26730.416045
## iter 10 value 24060.591248
## iter 20 value 23881.970043
## iter 30 value 23196.018028
## iter 40 value 22438.163484
## iter 50 value 22053.536636
## iter 60 value 21818.256079
## iter 70 value 21745.747274
## iter 80 value 21739.998174
## iter 90 value 21719.953269
## iter 100 value 21701.449328
## final value 21701.449328
## stopped after 100 iterations
## # weights: 95
## initial value 28154.218936
## iter 10 value 23238.676724
## iter 20 value 21112.172025
## iter 30 value 20323.609586
## iter 40 value 19804.559022
## iter 50 value 19523.028077
## iter 60 value 19290.604333
## iter 70 value 18974.447831
## iter 80 value 18778.826808
## iter 90 value 18534.065534
## iter 100 value 18175.808912

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## final value 18175.808912
## stopped after 100 iterations
## # weights: 155
## initial value 34006.239493
## iter 10 value 22493.060689
## iter 20 value 18516.277878
## iter 30 value 17556.525613
## iter 40 value 17211.620639
## iter 50 value 16979.814689
## iter 60 value 16867.222371
## iter 70 value 16738.558190
## iter 80 value 16434.040982
## iter 90 value 16172.347616
## iter 100 value 16004.192299
## final value 16004.192299
## stopped after 100 iterations
## # weights: 37
## initial value 26095.900053
## iter 10 value 23981.809452
## iter 20 value 23593.352011
## iter 30 value 22545.251739
## iter 40 value 22106.549576
## iter 50 value 21928.746729
## iter 60 value 21745.190493
## iter 70 value 21679.606816
## iter 80 value 21650.251033
## iter 90 value 21644.733232
## iter 100 value 21631.007185
## final value 21631.007185
## stopped after 100 iterations
## # weights: 101
## initial value 27300.624792
## iter 10 value 22168.136431
## iter 20 value 20131.381972
## iter 30 value 19713.638901
## iter 40 value 19418.945204
## iter 50 value 19158.370489
## iter 60 value 18982.312148
## iter 70 value 18798.657449
## iter 80 value 18646.194595
## iter 90 value 18574.887562
## iter 100 value 18490.144550
## final value 18490.144550
## stopped after 100 iterations
## # weights: 165
## initial value 27170.778040
## iter 10 value 20833.238410
## iter 20 value 18817.538756
## iter 30 value 17924.422336
## iter 40 value 17468.170441
## iter 50 value 17058.277600
## iter 60 value 16782.852002
## iter 70 value 16596.399403
## iter 80 value 16492.407244

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## iter 90 value 16414.174868
## iter 100 value 16367.506333
## final value 16367.506333
## stopped after 100 iterations
## # weights: 37
## initial value 26665.074721
## iter 10 value 23166.961132
## iter 20 value 22601.166916
## iter 30 value 22321.905749
## iter 40 value 22095.240377
## iter 50 value 21981.110231
## iter 60 value 21918.663725
## iter 70 value 21864.113417
## iter 80 value 21834.089086
## iter 90 value 21819.913875
## iter 100 value 21797.516837
## final value 21797.516837
## stopped after 100 iterations
## # weights: 101
## initial value 26125.304040
## iter 10 value 21786.417374
## iter 20 value 20161.190398
## iter 30 value 19851.058097
## iter 40 value 19518.953844
## iter 50 value 19269.817047
## iter 60 value 19143.020766
## iter 70 value 18960.560653
## iter 80 value 18695.862260
## iter 90 value 18522.921089
## iter 100 value 18421.642657
## final value 18421.642657
## stopped after 100 iterations
## # weights: 165
## initial value 25770.233848
## iter 10 value 20263.939354
## iter 20 value 17468.156342
## iter 30 value 16649.438642
## iter 40 value 16393.740490
## iter 50 value 16210.998188
## iter 60 value 16011.787776
## iter 70 value 15835.201746
## iter 80 value 15735.785740
## iter 90 value 15615.312179
## iter 100 value 15490.248969
## final value 15490.248969
## stopped after 100 iterations
## # weights: 37
## initial value 28524.092968
## iter 10 value 23572.040579
## iter 20 value 23173.273936
## iter 30 value 22370.057645
## iter 40 value 22092.392419
## iter 50 value 21901.681867
## iter 60 value 21795.721783

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## iter 70 value 21762.779403
## iter 80 value 21677.837253
## iter 90 value 21660.158092
## iter 100 value 21641.135433
## final value 21641.135433
## stopped after 100 iterations
## # weights: 101
## initial value 28954.547915
## iter 10 value 20847.978504
## iter 20 value 19505.215162
## iter 30 value 19114.966040
## iter 40 value 18987.399976
## iter 50 value 18722.037806
## iter 60 value 18596.226020
## iter 70 value 18500.117691
## iter 80 value 18432.111750
## iter 90 value 18203.728484
## iter 100 value 17957.945850
## final value 17957.945850
## stopped after 100 iterations
## # weights: 165
## initial value 25674.361372
## iter 10 value 21095.332184
## iter 20 value 18733.345671
## iter 30 value 17629.691956
## iter 40 value 17149.370992
## iter 50 value 16804.340078
## iter 60 value 16457.007845
## iter 70 value 15984.348683
## iter 80 value 15557.779610
## iter 90 value 15110.523143
## iter 100 value 14779.211564
## final value 14779.211564
## stopped after 100 iterations
## # weights: 35
## initial value 27435.750766
## iter 10 value 24841.793453
## iter 20 value 23445.388448
## iter 30 value 22426.286909
## iter 40 value 22118.769928
## iter 50 value 21984.697120
## iter 60 value 21945.876102
## iter 70 value 21926.015374
## iter 80 value 21920.776451
## iter 90 value 21918.547786
## iter 100 value 21913.338441
## final value 21913.338441
## stopped after 100 iterations
## # weights: 95
## initial value 28119.716927
## iter 10 value 21728.391001
## iter 20 value 19941.762239
## iter 30 value 19432.119548
## iter 40 value 19171.065056

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```

## iter 50 value 18669.530033
## iter 60 value 18377.210324
## iter 70 value 18134.396150
## iter 80 value 17988.417751
## iter 90 value 17909.013698
## iter 100 value 17882.881911
## final value 17882.881911
## stopped after 100 iterations
## # weights: 155
## initial value 29306.552543
## iter 10 value 20743.393598
## iter 20 value 18187.854276
## iter 30 value 17629.128265
## iter 40 value 17280.392846
## iter 50 value 16822.940463
## iter 60 value 16368.980444
## iter 70 value 16106.900611
## iter 80 value 15873.039001
## iter 90 value 15725.835115
## iter 100 value 15614.215460
## final value 15614.215460
## stopped after 100 iterations
## # weights: 35
## initial value 29939.115841
## iter 10 value 24040.530336
## iter 20 value 23636.202324
## iter 30 value 22898.665645
## iter 40 value 22566.990673
## iter 50 value 22320.390724
## iter 60 value 22047.384368
## iter 70 value 21893.007294
## iter 80 value 21858.913784
## iter 90 value 21825.608305
## iter 100 value 21778.004856
## final value 21778.004856
## stopped after 100 iterations
## # weights: 95
## initial value 25699.916529
## iter 10 value 21385.755123
## iter 20 value 20275.149181
## iter 30 value 19718.291248
## iter 40 value 19494.624658
## iter 50 value 19307.322433
## iter 60 value 19121.006959
## iter 70 value 18987.087659
## iter 80 value 18860.846499
## iter 90 value 18783.753898
## iter 100 value 18710.156560
## final value 18710.156560
## stopped after 100 iterations
## # weights: 155
## initial value 27307.805881
## iter 10 value 19777.015485
## iter 20 value 17370.985833

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## iter 30 value 16563.366358
## iter 40 value 16290.252111
## iter 50 value 16159.631125
## iter 60 value 15998.043989
## iter 70 value 15860.845087
## iter 80 value 15780.714337
## iter 90 value 15735.468479
## iter 100 value 15697.016774
## final value 15697.016774
## stopped after 100 iterations
## # weights: 35
## initial value 27303.283487
## iter 10 value 23091.415136
## iter 20 value 22646.922457
## iter 30 value 22405.081132
## iter 40 value 22021.715418
## iter 50 value 21912.268457
## iter 60 value 21874.038663
## iter 70 value 21781.975149
## iter 80 value 21724.685611
## iter 90 value 21694.176030
## iter 100 value 21661.436728
## final value 21661.436728
## stopped after 100 iterations
## # weights: 95
## initial value 25520.735537
## iter 10 value 21562.761005
## iter 20 value 20152.709453
## iter 30 value 19519.025831
## iter 40 value 19226.325732
## iter 50 value 19018.178565
## iter 60 value 18853.796339
## iter 70 value 18649.216079
## iter 80 value 18576.460341
## iter 90 value 18535.383598
## iter 100 value 18304.277848
## final value 18304.277848
## stopped after 100 iterations
## # weights: 155
## initial value 25684.116995
## iter 10 value 20707.910668
## iter 20 value 18341.982531
## iter 30 value 17132.049469
## iter 40 value 16718.248890
## iter 50 value 16176.657331
## iter 60 value 15825.498988
## iter 70 value 15648.655518
## iter 80 value 15482.901612
## iter 90 value 15373.206134
## iter 100 value 15287.592151
## final value 15287.592151
## stopped after 100 iterations
## # weights: 35
## initial value 26107.093035

```



```

## iter 10 value 23617.767036
## iter 20 value 23307.812180
## iter 30 value 22453.177744
## iter 40 value 21866.675244
## iter 50 value 21628.604286
## iter 60 value 21548.530271
## iter 70 value 21473.555746
## iter 80 value 21464.298216
## iter 90 value 21460.577990
## iter 100 value 21451.234318
## final value 21451.234318
## stopped after 100 iterations
## # weights: 95
## initial value 27344.925386
## iter 10 value 22947.560788
## iter 20 value 21103.085991
## iter 30 value 20363.662979
## iter 40 value 19883.651623
## iter 50 value 19304.351743
## iter 60 value 18968.126474
## iter 70 value 18656.570148
## iter 80 value 18409.972850
## iter 90 value 18300.024824
## iter 100 value 18212.758431
## final value 18212.758431
## stopped after 100 iterations
## # weights: 155
## initial value 28316.988891
## iter 10 value 19933.608332
## iter 20 value 17787.572640
## iter 30 value 17194.175025
## iter 40 value 16980.737045
## iter 50 value 16817.179125
## iter 60 value 16598.903556
## iter 70 value 16422.793696
## iter 80 value 16264.907671
## iter 90 value 16191.452230
## iter 100 value 16133.170922
## final value 16133.170922
## stopped after 100 iterations
## # weights: 35
## initial value 29292.674274
## iter 10 value 23848.078562
## iter 20 value 23653.061060
## iter 30 value 22676.918259
## iter 40 value 22078.694034
## iter 50 value 21893.079355
## iter 60 value 21713.131901
## iter 70 value 21630.154511
## iter 80 value 21621.234668
## iter 90 value 21600.823415
## iter 100 value 21589.382632
## final value 21589.382632
## stopped after 100 iterations

```

```

## # weights: 95
## initial value 25721.047390
## iter 10 value 22121.512261
## iter 20 value 20814.372686
## iter 30 value 20463.521677
## iter 40 value 20340.673120
## iter 50 value 20024.574369
## iter 60 value 19706.569922
## iter 70 value 19391.527901
## iter 80 value 19085.851810
## iter 90 value 18795.655102
## iter 100 value 18685.306771
## final value 18685.306771
## stopped after 100 iterations
## # weights: 155
## initial value 31604.348392
## iter 10 value 21079.257897
## iter 20 value 18709.731916
## iter 30 value 17722.364777
## iter 40 value 17328.039066
## iter 50 value 17187.334471
## iter 60 value 16958.152350
## iter 70 value 16697.742792
## iter 80 value 16485.608667
## iter 90 value 16347.645846
## iter 100 value 16257.180482
## final value 16257.180482
## stopped after 100 iterations
## # weights: 35
## initial value 27449.938494
## iter 10 value 24249.289691
## iter 20 value 23740.436730
## iter 30 value 23237.574932
## iter 40 value 22215.934544
## iter 50 value 21698.453580
## iter 60 value 21616.789448
## iter 70 value 21530.742151
## iter 80 value 21506.786160
## iter 90 value 21482.094018
## iter 100 value 21471.245125
## final value 21471.245125
## stopped after 100 iterations
## # weights: 95
## initial value 25207.806468
## iter 10 value 21483.183835
## iter 20 value 19918.820101
## iter 30 value 19584.816158
## iter 40 value 19392.242651
## iter 50 value 19077.511417
## iter 60 value 18920.720617
## iter 70 value 18812.666678
## iter 80 value 18691.664932
## iter 90 value 18616.057740
## iter 100 value 18540.645956

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## final value 18540.645956
## stopped after 100 iterations
## # weights: 155
## initial value 27692.732288
## iter 10 value 21187.005459
## iter 20 value 18884.995212
## iter 30 value 18106.410696
## iter 40 value 17828.967593
## iter 50 value 17413.032334
## iter 60 value 16939.599836
## iter 70 value 16579.093877
## iter 80 value 16392.428621
## iter 90 value 16243.672043
## iter 100 value 16022.452355
## final value 16022.452355
## stopped after 100 iterations
## # weights: 37
## initial value 29417.747126
## iter 10 value 23581.213444
## iter 20 value 23192.273582
## iter 30 value 23016.713280
## iter 40 value 22194.420865
## iter 50 value 21613.857116
## iter 60 value 21552.801661
## iter 70 value 21498.498083
## iter 80 value 21484.335592
## iter 90 value 21477.659402
## iter 100 value 21468.386965
## final value 21468.386965
## stopped after 100 iterations
## # weights: 101
## initial value 26054.157845
## iter 10 value 21250.507027
## iter 20 value 19917.142803
## iter 30 value 19614.694284
## iter 40 value 19411.633717
## iter 50 value 19064.109556
## iter 60 value 18781.625678
## iter 70 value 18535.232005
## iter 80 value 18465.220423
## iter 90 value 18432.572003
## iter 100 value 18411.270248
## final value 18411.270248
## stopped after 100 iterations
## # weights: 165
## initial value 29538.571108
## iter 10 value 22810.556431
## iter 20 value 19173.904568
## iter 30 value 18467.205434
## iter 40 value 17692.842966
## iter 50 value 16969.730836
## iter 60 value 16530.844222
## iter 70 value 16322.279649
## iter 80 value 16088.489372

```

```

## iter 90 value 15922.822895
## iter 100 value 15619.881180
## final value 15619.881180
## stopped after 100 iterations
## # weights: 37
## initial value 25529.432190
## iter 10 value 23500.707355
## iter 20 value 23183.359185
## iter 30 value 22911.719469
## iter 40 value 22645.933136
## iter 50 value 22213.138670
## iter 60 value 22087.514142
## iter 70 value 22051.542636
## iter 80 value 22032.461824
## iter 90 value 22029.373367
## iter 100 value 22021.101078
## final value 22021.101078
## stopped after 100 iterations
## # weights: 101
## initial value 26598.028573
## iter 10 value 22242.069209
## iter 20 value 20112.456370
## iter 30 value 19563.213947
## iter 40 value 19290.019372
## iter 50 value 19118.793052
## iter 60 value 18994.146717
## iter 70 value 18883.778286
## iter 80 value 18756.929839
## iter 90 value 18565.818988
## iter 100 value 18356.768312
## final value 18356.768312
## stopped after 100 iterations
## # weights: 165
## initial value 27466.315916
## iter 10 value 23057.822349
## iter 20 value 20086.941244
## iter 30 value 18906.692466
## iter 40 value 18310.513429
## iter 50 value 18038.518287
## iter 60 value 17630.098597
## iter 70 value 17344.752268
## iter 80 value 17095.926593
## iter 90 value 16784.743329
## iter 100 value 16554.572388
## final value 16554.572388
## stopped after 100 iterations
## # weights: 37
## initial value 27415.662794
## iter 10 value 23533.086741
## iter 20 value 22785.587091
## iter 30 value 22213.299659
## iter 40 value 21901.180846
## iter 50 value 21726.186337
## iter 60 value 21709.110306

```

```

## iter 70 value 21696.041936
## iter 80 value 21676.721207
## iter 90 value 21662.949883
## iter 100 value 21638.026830
## final value 21638.026830
## stopped after 100 iterations
## # weights: 101
## initial value 27182.264405
## iter 10 value 21744.480505
## iter 20 value 20753.939882
## iter 30 value 19987.172785
## iter 40 value 19519.650837
## iter 50 value 19138.740173
## iter 60 value 18812.869468
## iter 70 value 18570.255615
## iter 80 value 18387.660054
## iter 90 value 18300.564704
## iter 100 value 18141.139665
## final value 18141.139665
## stopped after 100 iterations
## # weights: 165
## initial value 26010.312965
## iter 10 value 21770.318204
## iter 20 value 19189.136127
## iter 30 value 18556.755851
## iter 40 value 18055.321865
## iter 50 value 17478.957083
## iter 60 value 17138.517521
## iter 70 value 16831.739914
## iter 80 value 16417.896829
## iter 90 value 16098.860943
## iter 100 value 15884.759165
## final value 15884.759165
## stopped after 100 iterations
## # weights: 35
## initial value 26407.892186
## iter 10 value 23600.781974
## iter 20 value 23293.037814
## iter 30 value 22922.863803
## iter 40 value 22357.230896
## iter 50 value 22205.495379
## iter 60 value 22098.613742
## iter 70 value 21988.283181
## iter 80 value 21934.343292
## iter 90 value 21894.890470
## iter 100 value 21886.839014
## final value 21886.839014
## stopped after 100 iterations
## # weights: 95
## initial value 27526.249448
## iter 10 value 21505.008401
## iter 20 value 19912.619760
## iter 30 value 19461.251652
## iter 40 value 18985.579143

```

```

## iter 50 value 18663.230415
## iter 60 value 18506.835577
## iter 70 value 18391.501023
## iter 80 value 18267.974344
## iter 90 value 18136.645275
## iter 100 value 18016.177276
## final value 18016.177276
## stopped after 100 iterations
## # weights: 155
## initial value 28741.929632
## iter 10 value 20001.198300
## iter 20 value 17981.161184
## iter 30 value 17472.706170
## iter 40 value 17311.046964
## iter 50 value 17171.857388
## iter 60 value 16949.318778
## iter 70 value 16767.487978
## iter 80 value 16507.227012
## iter 90 value 16320.410474
## iter 100 value 16203.866019
## final value 16203.866019
## stopped after 100 iterations
## # weights: 35
## initial value 26690.320269
## iter 10 value 24285.041813
## iter 20 value 23766.459771
## iter 30 value 23030.037476
## iter 40 value 22128.030648
## iter 50 value 21786.792982
## iter 60 value 21671.765876
## iter 70 value 21619.772648
## iter 80 value 21608.745307
## iter 90 value 21581.962958
## iter 100 value 21575.940253
## final value 21575.940253
## stopped after 100 iterations
## # weights: 95
## initial value 27953.095335
## iter 10 value 23908.250816
## iter 20 value 22374.915013
## iter 30 value 21422.901717
## iter 40 value 20910.701575
## iter 50 value 20410.463509
## iter 60 value 20009.927230
## iter 70 value 19696.955044
## iter 80 value 19471.389021
## iter 90 value 19315.412121
## iter 100 value 19154.226530
## final value 19154.226530
## stopped after 100 iterations
## # weights: 155
## initial value 28100.052901
## iter 10 value 21637.330618
## iter 20 value 19461.039239

```

```

## iter 30 value 18460.957963
## iter 40 value 18092.912236
## iter 50 value 17611.034725
## iter 60 value 17201.745337
## iter 70 value 16954.577011
## iter 80 value 16714.859033
## iter 90 value 16435.531466
## iter 100 value 16100.680975
## final value 16100.680975
## stopped after 100 iterations
## # weights: 35
## initial value 26441.154753
## iter 10 value 23447.393211
## iter 20 value 22757.784943
## iter 30 value 22516.135604
## iter 40 value 22386.180669
## iter 50 value 22111.244692
## iter 60 value 21816.232463
## iter 70 value 21734.393521
## iter 80 value 21627.255678
## iter 90 value 21582.143601
## iter 100 value 21571.957795
## final value 21571.957795
## stopped after 100 iterations
## # weights: 95
## initial value 24671.679898
## iter 10 value 21702.954707
## iter 20 value 20408.487729
## iter 30 value 19963.725581
## iter 40 value 19547.398324
## iter 50 value 19321.151723
## iter 60 value 19065.514997
## iter 70 value 18961.176673
## iter 80 value 18808.044941
## iter 90 value 18699.009704
## iter 100 value 18606.306554
## final value 18606.306554
## stopped after 100 iterations
## # weights: 155
## initial value 25793.195142
## iter 10 value 21063.988112
## iter 20 value 18800.128246
## iter 30 value 18272.590861
## iter 40 value 17895.982188
## iter 50 value 17490.387936
## iter 60 value 17174.948075
## iter 70 value 16733.914245
## iter 80 value 16477.781599
## iter 90 value 16301.377957
## iter 100 value 16144.177230
## final value 16144.177230
## stopped after 100 iterations
## # weights: 37
## initial value 27550.947187

```

```

## iter 10 value 24368.879192
## iter 20 value 23146.504565
## iter 30 value 22435.293986
## iter 40 value 22120.853688
## iter 50 value 21970.416394
## iter 60 value 21918.358447
## iter 70 value 21875.660773
## iter 80 value 21813.368387
## iter 90 value 21730.077636
## iter 100 value 21711.471774
## final value 21711.471774
## stopped after 100 iterations
## # weights: 101
## initial value 25922.035293
## iter 10 value 22224.901218
## iter 20 value 20593.847751
## iter 30 value 20117.851561
## iter 40 value 19593.076354
## iter 50 value 19274.516032
## iter 60 value 19068.770856
## iter 70 value 18915.239657
## iter 80 value 18637.421988
## iter 90 value 18492.438854
## iter 100 value 18431.494819
## final value 18431.494819
## stopped after 100 iterations
## # weights: 165
## initial value 26348.416324
## iter 10 value 21670.909086
## iter 20 value 20172.193185
## iter 30 value 18841.555887
## iter 40 value 18256.631592
## iter 50 value 17909.598070
## iter 60 value 17611.910465
## iter 70 value 17232.971580
## iter 80 value 16900.780022
## iter 90 value 16695.018805
## iter 100 value 16502.906951
## final value 16502.906951
## stopped after 100 iterations
## # weights: 37
## initial value 27062.644444
## iter 10 value 24131.724366
## iter 20 value 23719.505570
## iter 30 value 23458.580234
## iter 40 value 23322.976039
## iter 50 value 22583.753877
## iter 60 value 22305.920565
## iter 70 value 22163.266227
## iter 80 value 22052.385427
## iter 90 value 22006.687841
## iter 100 value 21974.761249
## final value 21974.761249
## stopped after 100 iterations

```



```

## # weights: 101
## initial value 28861.654568
## iter 10 value 23019.385180
## iter 20 value 20942.906881
## iter 30 value 20333.795525
## iter 40 value 19911.013970
## iter 50 value 19489.944399
## iter 60 value 19277.994406
## iter 70 value 19074.037954
## iter 80 value 18478.997031
## iter 90 value 17971.715360
## iter 100 value 17628.230221
## final value 17628.230221
## stopped after 100 iterations
## # weights: 165
## initial value 31388.805368
## iter 10 value 21511.649661
## iter 20 value 19284.077952
## iter 30 value 18186.171914
## iter 40 value 17891.073395
## iter 50 value 17674.794556
## iter 60 value 17422.991198
## iter 70 value 17055.136027
## iter 80 value 16729.457464
## iter 90 value 16407.918784
## iter 100 value 16127.770498
## final value 16127.770498
## stopped after 100 iterations
## # weights: 37
## initial value 25135.518986
## iter 10 value 23988.722666
## iter 20 value 23650.919791
## iter 30 value 23058.040219
## iter 40 value 22713.778943
## iter 50 value 22534.688589
## iter 60 value 22494.330421
## iter 70 value 22446.608416
## iter 80 value 22435.653466
## iter 90 value 22434.540012
## iter 100 value 22433.876441
## final value 22433.876441
## stopped after 100 iterations
## # weights: 101
## initial value 31647.777233
## iter 10 value 23579.438372
## iter 20 value 20708.848826
## iter 30 value 19834.689546
## iter 40 value 19340.628976
## iter 50 value 18877.082413
## iter 60 value 18619.446062
## iter 70 value 18424.800378
## iter 80 value 18268.451975
## iter 90 value 18209.555101
## iter 100 value 18090.528046

```

```

## final value 18090.528046
## stopped after 100 iterations
## # weights: 165
## initial value 26245.806893
## iter 10 value 20961.360494
## iter 20 value 18481.996054
## iter 30 value 17739.047239
## iter 40 value 17016.214811
## iter 50 value 16475.187786
## iter 60 value 16134.644711
## iter 70 value 15963.162862
## iter 80 value 15866.494490
## iter 90 value 15792.197621
## iter 100 value 15717.224980
## final value 15717.224980
## stopped after 100 iterations
## # weights: 37
## initial value 27270.608443
## iter 10 value 24610.918769
## iter 20 value 24319.599109
## iter 30 value 23856.046892
## iter 40 value 23293.233720
## iter 50 value 22442.822365
## iter 60 value 22204.076082
## iter 70 value 22139.681646
## iter 80 value 22130.076770
## iter 90 value 22129.044697
## iter 100 value 22128.577064
## final value 22128.577064
## stopped after 100 iterations
## # weights: 101
## initial value 26760.842305
## iter 10 value 22552.084714
## iter 20 value 20117.497559
## iter 30 value 19578.009751
## iter 40 value 19328.981876
## iter 50 value 18897.722417
## iter 60 value 18640.885699
## iter 70 value 18355.614986
## iter 80 value 18199.460983
## iter 90 value 18028.219730
## iter 100 value 17862.720336
## final value 17862.720336
## stopped after 100 iterations
## # weights: 165
## initial value 26935.597746
## iter 10 value 21485.660170
## iter 20 value 18605.787643
## iter 30 value 17562.958370
## iter 40 value 17121.298871
## iter 50 value 16912.626343
## iter 60 value 16778.523623
## iter 70 value 16672.774943
## iter 80 value 16583.117292

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```

## iter 90 value 16482.609330
## iter 100 value 16393.247976
## final value 16393.247976
## stopped after 100 iterations
## # weights: 37
## initial value 28676.379034
## iter 10 value 23543.166319
## iter 20 value 23130.353577
## iter 30 value 22684.846173
## iter 40 value 22463.995681
## iter 50 value 22177.210721
## iter 60 value 21825.557526
## iter 70 value 21635.997887
## iter 80 value 21568.021644
## iter 90 value 21543.783977
## iter 100 value 21532.946156
## final value 21532.946156
## stopped after 100 iterations
## # weights: 101
## initial value 27139.962669
## iter 10 value 21812.912682
## iter 20 value 20190.251202
## iter 30 value 19859.198748
## iter 40 value 19620.392909
## iter 50 value 19361.472773
## iter 60 value 19041.973430
## iter 70 value 18885.147439
## iter 80 value 18767.529957
## iter 90 value 18686.189713
## iter 100 value 18613.318804
## final value 18613.318804
## stopped after 100 iterations
## # weights: 165
## initial value 26634.063276
## iter 10 value 21089.197757
## iter 20 value 18352.740746
## iter 30 value 17587.250174
## iter 40 value 17280.353967
## iter 50 value 16902.209976
## iter 60 value 16596.322870
## iter 70 value 16323.759402
## iter 80 value 16169.467480
## iter 90 value 16080.905883
## iter 100 value 16011.765354
## final value 16011.765354
## stopped after 100 iterations
## # weights: 37
## initial value 26867.698062
## iter 10 value 24273.254325
## iter 20 value 23899.572016
## iter 30 value 23623.792779
## iter 40 value 23289.086974
## iter 50 value 22598.989642
## iter 60 value 22312.483321

```

```

## iter 70 value 22252.528525
## iter 80 value 22001.447519
## iter 90 value 21879.487763
## iter 100 value 21846.229298
## final value 21846.229298
## stopped after 100 iterations
## # weights: 101
## initial value 27191.442264
## iter 10 value 22384.223121
## iter 20 value 20307.856368
## iter 30 value 19599.009461
## iter 40 value 18958.126530
## iter 50 value 18530.900510
## iter 60 value 18278.729755
## iter 70 value 18045.958009
## iter 80 value 17880.864084
## iter 90 value 17833.552954
## iter 100 value 17767.253592
## final value 17767.253592
## stopped after 100 iterations
## # weights: 165
## initial value 28221.026953
## iter 10 value 21775.421581
## iter 20 value 18399.807467
## iter 30 value 17814.746763
## iter 40 value 17648.866784
## iter 50 value 17377.472534
## iter 60 value 17123.033842
## iter 70 value 16935.930982
## iter 80 value 16774.584627
## iter 90 value 16532.732066
## iter 100 value 16330.403097
## final value 16330.403097
## stopped after 100 iterations
## # weights: 36
## initial value 25858.361674
## iter 10 value 23708.347791
## iter 20 value 23075.385978
## iter 30 value 22470.161443
## iter 40 value 22092.838134
## iter 50 value 21853.978155
## iter 60 value 21736.940964
## iter 70 value 21644.907572
## iter 80 value 21578.968556
## iter 90 value 21567.404101
## iter 100 value 21552.403576
## final value 21552.403576
## stopped after 100 iterations
## # weights: 98
## initial value 26385.590851
## iter 10 value 22440.638171
## iter 20 value 20690.067277
## iter 30 value 20321.460167
## iter 40 value 19879.089652

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## iter 50 value 19409.105418
## iter 60 value 19113.344324
## iter 70 value 18924.935590
## iter 80 value 18830.835036
## iter 90 value 18707.706603
## iter 100 value 18464.335843
## final value 18464.335843
## stopped after 100 iterations
## # weights: 160
## initial value 27297.029048
## iter 10 value 21263.538331
## iter 20 value 18941.060732
## iter 30 value 17904.776622
## iter 40 value 17501.039065
## iter 50 value 17312.735952
## iter 60 value 17095.744440
## iter 70 value 16653.263722
## iter 80 value 16320.030466
## iter 90 value 16059.584943
## iter 100 value 15869.704291
## final value 15869.704291
## stopped after 100 iterations
## # weights: 36
## initial value 25665.172551
## iter 10 value 23240.780241
## iter 20 value 22666.046768
## iter 30 value 22426.969522
## iter 40 value 22214.459314
## iter 50 value 22082.669501
## iter 60 value 22040.796835
## iter 70 value 21947.583660
## iter 80 value 21835.936476
## iter 90 value 21798.121364
## iter 100 value 21769.459978
## final value 21769.459978
## stopped after 100 iterations
## # weights: 98
## initial value 28127.908721
## iter 10 value 23455.742152
## iter 20 value 22121.934244
## iter 30 value 21260.042641
## iter 40 value 20423.348562
## iter 50 value 19848.210546
## iter 60 value 19440.269866
## iter 70 value 18915.159726
## iter 80 value 18431.769349
## iter 90 value 18152.396497
## iter 100 value 18014.857550
## final value 18014.857550
## stopped after 100 iterations
## # weights: 160
## initial value 28230.229186
## iter 10 value 21785.143060
## iter 20 value 18160.799189

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## iter 30 value 16879.062641
## iter 40 value 16458.327165
## iter 50 value 16221.883114
## iter 60 value 16016.521257
## iter 70 value 15631.704136
## iter 80 value 15453.744668
## iter 90 value 15255.657615
## iter 100 value 15159.407237
## final value 15159.407237
## stopped after 100 iterations
## # weights: 36
## initial value 26436.481273
## iter 10 value 23005.688272
## iter 20 value 22679.362466
## iter 30 value 22432.845423
## iter 40 value 22250.398587
## iter 50 value 21884.942361
## iter 60 value 21821.323692
## iter 70 value 21772.537469
## iter 80 value 21742.146429
## iter 90 value 21702.620973
## iter 100 value 21676.789055
## final value 21676.789055
## stopped after 100 iterations
## # weights: 98
## initial value 28190.438762
## iter 10 value 21892.113676
## iter 20 value 20539.405875
## iter 30 value 20054.170933
## iter 40 value 19654.310578
## iter 50 value 19374.968466
## iter 60 value 19107.187521
## iter 70 value 18728.508578
## iter 80 value 18528.071081
## iter 90 value 18369.195635
## iter 100 value 18282.659725
## final value 18282.659725
## stopped after 100 iterations
## # weights: 160
## initial value 26922.058266
## iter 10 value 20887.731152
## iter 20 value 18305.694671
## iter 30 value 17873.386060
## iter 40 value 17564.548646
## iter 50 value 17170.530066
## iter 60 value 16668.781870
## iter 70 value 16218.907735
## iter 80 value 15801.119469
## iter 90 value 15537.933359
## iter 100 value 15379.068449
## final value 15379.068449
## stopped after 100 iterations
## # weights: 37
## initial value 25972.473393

```

```

## iter 10 value 23226.602114
## iter 20 value 23004.997017
## iter 30 value 22490.104461
## iter 40 value 21914.785902
## iter 50 value 21743.266851
## iter 60 value 21557.108136
## iter 70 value 21441.431341
## iter 80 value 21407.668347
## iter 90 value 21401.658399
## iter 100 value 21399.572140
## final value 21399.572140
## stopped after 100 iterations
## # weights: 101
## initial value 26380.750241
## iter 10 value 22109.939522
## iter 20 value 20503.479697
## iter 30 value 20101.205865
## iter 40 value 19950.674797
## iter 50 value 19788.073710
## iter 60 value 19668.948501
## iter 70 value 19582.900418
## iter 80 value 19477.244167
## iter 90 value 19398.949694
## iter 100 value 19265.161553
## final value 19265.161553
## stopped after 100 iterations
## # weights: 165
## initial value 30449.058012
## iter 10 value 21556.309239
## iter 20 value 19325.973081
## iter 30 value 18533.519323
## iter 40 value 18006.704642
## iter 50 value 17550.337018
## iter 60 value 17258.161570
## iter 70 value 17065.026381
## iter 80 value 16990.845154
## iter 90 value 16936.653849
## iter 100 value 16881.586797
## final value 16881.586797
## stopped after 100 iterations
## # weights: 37
## initial value 27382.293481
## iter 10 value 23365.091701
## iter 20 value 23105.268030
## iter 30 value 22599.867656
## iter 40 value 22202.576769
## iter 50 value 21934.564166
## iter 60 value 21720.274185
## iter 70 value 21584.130744
## iter 80 value 21531.956758
## iter 90 value 21526.053547
## iter 100 value 21512.204590
## final value 21512.204590
## stopped after 100 iterations

```

```

## # weights: 101
## initial value 29119.683424
## iter 10 value 23388.072646
## iter 20 value 21269.346864
## iter 30 value 20695.178528
## iter 40 value 20256.553086
## iter 50 value 19895.973975
## iter 60 value 19567.172977
## iter 70 value 19385.074990
## iter 80 value 19192.332325
## iter 90 value 18907.526689
## iter 100 value 18581.302445
## final value 18581.302445
## stopped after 100 iterations
## # weights: 165
## initial value 27100.767220
## iter 10 value 21413.585653
## iter 20 value 18547.427134
## iter 30 value 17880.515208
## iter 40 value 17584.335151
## iter 50 value 17199.654303
## iter 60 value 16806.565039
## iter 70 value 16458.407331
## iter 80 value 16221.128764
## iter 90 value 16065.238482
## iter 100 value 15921.589386
## final value 15921.589386
## stopped after 100 iterations
## # weights: 37
## initial value 26248.248251
## iter 10 value 23712.304494
## iter 20 value 23450.138974
## iter 30 value 23074.590438
## iter 40 value 22328.611295
## iter 50 value 21791.782671
## iter 60 value 21604.362206
## iter 70 value 21481.370727
## iter 80 value 21405.934004
## iter 90 value 21404.398060
## iter 100 value 21402.216620
## final value 21402.216620
## stopped after 100 iterations
## # weights: 101
## initial value 26778.561593
## iter 10 value 23314.503230
## iter 20 value 20579.795075
## iter 30 value 19883.379097
## iter 40 value 19366.222276
## iter 50 value 19067.548688
## iter 60 value 18931.828372
## iter 70 value 18737.273912
## iter 80 value 18634.340573
## iter 90 value 18569.139479
## iter 100 value 18505.448094

```



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## final value 18505.448094
## stopped after 100 iterations
## # weights: 165
## initial value 27136.653769
## iter 10 value 21682.757648
## iter 20 value 19272.629022
## iter 30 value 18400.964075
## iter 40 value 17756.758334
## iter 50 value 17225.071442
## iter 60 value 16922.887096
## iter 70 value 16706.674826
## iter 80 value 16495.335642
## iter 90 value 16347.602041
## iter 100 value 16171.014521
## final value 16171.014521
## stopped after 100 iterations
## # weights: 36
## initial value 29058.590740
## iter 10 value 23775.860592
## iter 20 value 23072.620180
## iter 30 value 22651.241468
## iter 40 value 22345.007714
## iter 50 value 21991.466804
## iter 60 value 21911.856644
## iter 70 value 21798.640367
## iter 80 value 21754.523786
## iter 90 value 21734.051363
## iter 100 value 21721.467646
## final value 21721.467646
## stopped after 100 iterations
## # weights: 98
## initial value 26334.346760
## iter 10 value 21844.750247
## iter 20 value 19706.114361
## iter 30 value 19133.171081
## iter 40 value 18680.336566
## iter 50 value 18363.934990
## iter 60 value 18174.739958
## iter 70 value 17885.983380
## iter 80 value 17749.050023
## iter 90 value 17572.686330
## iter 100 value 17353.483966
## final value 17353.483966
## stopped after 100 iterations
## # weights: 160
## initial value 26055.872587
## iter 10 value 20745.904734
## iter 20 value 18666.360265
## iter 30 value 17444.415058
## iter 40 value 17173.601163
## iter 50 value 16762.767295
## iter 60 value 16453.153172
## iter 70 value 16266.473960
## iter 80 value 16061.760152

```

```

## iter 90 value 15952.152078
## iter 100 value 15852.943762
## final value 15852.943762
## stopped after 100 iterations
## # weights: 36
## initial value 26556.227020
## iter 10 value 24259.755124
## iter 20 value 23970.903823
## iter 30 value 22742.636426
## iter 40 value 22362.296886
## iter 50 value 22127.512088
## iter 60 value 21963.518549
## iter 70 value 21852.421686
## iter 80 value 21817.471862
## iter 90 value 21804.032335
## iter 100 value 21800.288102
## final value 21800.288102
## stopped after 100 iterations
## # weights: 98
## initial value 29080.180744
## iter 10 value 23201.190171
## iter 20 value 21224.667410
## iter 30 value 20648.099297
## iter 40 value 20246.816883
## iter 50 value 20089.724496
## iter 60 value 19972.099859
## iter 70 value 19848.004573
## iter 80 value 19765.513842
## iter 90 value 19638.398325
## iter 100 value 19460.062049
## final value 19460.062049
## stopped after 100 iterations
## # weights: 160
## initial value 26177.283450
## iter 10 value 21454.191826
## iter 20 value 19955.390759
## iter 30 value 19242.847892
## iter 40 value 18709.941269
## iter 50 value 18474.558605
## iter 60 value 18379.067489
## iter 70 value 18042.884376
## iter 80 value 17585.284276
## iter 90 value 17211.659602
## iter 100 value 16903.940958
## final value 16903.940958
## stopped after 100 iterations
## # weights: 36
## initial value 26014.266681
## iter 10 value 24593.533586
## iter 20 value 24392.573010
## iter 30 value 23744.526404
## iter 40 value 22788.149985
## iter 50 value 22087.937779
## iter 60 value 21944.036042

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## iter 70 value 21907.002561
## iter 80 value 21892.123615
## iter 90 value 21883.413602
## iter 100 value 21844.356659
## final value 21844.356659
## stopped after 100 iterations
## # weights: 98
## initial value 27331.033370
## iter 10 value 22247.523767
## iter 20 value 20266.889833
## iter 30 value 19659.216966
## iter 40 value 18923.783020
## iter 50 value 18621.590325
## iter 60 value 18414.922948
## iter 70 value 18229.678731
## iter 80 value 18140.016756
## iter 90 value 18096.449672
## iter 100 value 17966.528214
## final value 17966.528214
## stopped after 100 iterations
## # weights: 160
## initial value 25933.444463
## iter 10 value 21192.930091
## iter 20 value 18939.781130
## iter 30 value 17818.191171
## iter 40 value 17329.543383
## iter 50 value 17021.637166
## iter 60 value 16659.436768
## iter 70 value 16362.175047
## iter 80 value 16210.603279
## iter 90 value 16099.991392
## iter 100 value 16023.810693
## final value 16023.810693
## stopped after 100 iterations
## # weights: 37
## initial value 25828.528442
## iter 10 value 24024.622125
## iter 20 value 23683.846054
## iter 30 value 22361.604874
## iter 40 value 21850.703840
## iter 50 value 21677.583613
## iter 60 value 21540.218021
## iter 70 value 21478.141286
## iter 80 value 21435.887586
## iter 90 value 21434.854364
## iter 100 value 21427.821007
## final value 21427.821007
## stopped after 100 iterations
## # weights: 101
## initial value 25969.539524
## iter 10 value 21447.520908
## iter 20 value 19935.378116
## iter 30 value 19651.991773
## iter 40 value 19451.643796

```

```

## iter 50 value 19214.430943
## iter 60 value 18961.936800
## iter 70 value 18811.335569
## iter 80 value 18696.841332
## iter 90 value 18541.052058
## iter 100 value 18407.795199
## final value 18407.795199
## stopped after 100 iterations
## # weights: 165
## initial value 28667.372750
## iter 10 value 21365.904874
## iter 20 value 19114.158479
## iter 30 value 18155.573659
## iter 40 value 17731.212391
## iter 50 value 17533.733285
## iter 60 value 17155.471099
## iter 70 value 16880.981425
## iter 80 value 16574.772566
## iter 90 value 16366.942927
## iter 100 value 16221.978084
## final value 16221.978084
## stopped after 100 iterations
## # weights: 37
## initial value 25575.286719
## iter 10 value 23564.197323
## iter 20 value 22927.367926
## iter 30 value 22408.964536
## iter 40 value 22304.152779
## iter 50 value 22149.324828
## iter 60 value 22085.968513
## iter 70 value 21913.481667
## iter 80 value 21778.899323
## iter 90 value 21671.444973
## iter 100 value 21663.388667
## final value 21663.388667
## stopped after 100 iterations
## # weights: 101
## initial value 26702.246283
## iter 10 value 21770.137967
## iter 20 value 20398.770954
## iter 30 value 20056.512719
## iter 40 value 19719.575970
## iter 50 value 19417.272361
## iter 60 value 18978.303597
## iter 70 value 18723.029434
## iter 80 value 18416.336180
## iter 90 value 18212.419509
## iter 100 value 18023.382807
## final value 18023.382807
## stopped after 100 iterations
## # weights: 165
## initial value 29720.989297
## iter 10 value 21758.015063
## iter 20 value 19487.219802

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## iter 30 value 18700.251968
## iter 40 value 18132.507029
## iter 50 value 17678.857222
## iter 60 value 17165.786582
## iter 70 value 16803.889920
## iter 80 value 16553.883486
## iter 90 value 16371.527622
## iter 100 value 16223.687523
## final value 16223.687523
## stopped after 100 iterations
## # weights: 37
## initial value 25255.528716
## iter 10 value 23481.179009
## iter 20 value 22943.456746
## iter 30 value 22332.915236
## iter 40 value 22148.702155
## iter 50 value 22022.146870
## iter 60 value 22005.627751
## iter 70 value 21993.540968
## iter 80 value 21992.025902
## final value 21992.015093
## converged
## # weights: 101
## initial value 31420.630525
## iter 10 value 22105.282260
## iter 20 value 20859.546882
## iter 30 value 20294.309895
## iter 40 value 20113.751022
## iter 50 value 19780.044638
## iter 60 value 19550.714314
## iter 70 value 19354.088474
## iter 80 value 19193.040343
## iter 90 value 19076.254239
## iter 100 value 18981.144540
## final value 18981.144540
## stopped after 100 iterations
## # weights: 165
## initial value 27095.960411
## iter 10 value 21400.173514
## iter 20 value 17825.242462
## iter 30 value 17235.797410
## iter 40 value 16939.912672
## iter 50 value 16656.377605
## iter 60 value 16405.965573
## iter 70 value 16247.206655
## iter 80 value 16116.658141
## iter 90 value 16035.302320
## iter 100 value 15975.701168
## final value 15975.701168
## stopped after 100 iterations
## # weights: 37
## initial value 26374.823319
## iter 10 value 24281.376918
## iter 20 value 23969.219785

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```

## iter 30 value 23356.407192
## iter 40 value 23185.383299
## iter 50 value 22987.808257
## iter 60 value 22960.942494
## iter 70 value 22955.168934
## iter 80 value 22953.211412
## iter 90 value 22951.075863
## iter 100 value 22933.245575
## final value 22933.245575
## stopped after 100 iterations
## # weights: 101
## initial value 27094.276084
## iter 10 value 21244.711550
## iter 20 value 20145.839107
## iter 30 value 19796.773800
## iter 40 value 19479.597592
## iter 50 value 19158.115448
## iter 60 value 18950.285457
## iter 70 value 18774.341779
## iter 80 value 18694.309338
## iter 90 value 18651.563222
## iter 100 value 18586.058838
## final value 18586.058838
## stopped after 100 iterations
## # weights: 165
## initial value 28511.521234
## iter 10 value 22311.637624
## iter 20 value 19113.985387
## iter 30 value 18395.377494
## iter 40 value 18086.463174
## iter 50 value 17927.040792
## iter 60 value 17649.746831
## iter 70 value 17518.901045
## iter 80 value 17450.860799
## iter 90 value 17411.222314
## iter 100 value 17384.384789
## final value 17384.384789
## stopped after 100 iterations
## # weights: 37
## initial value 25946.714129
## iter 10 value 23367.846926
## iter 20 value 23248.915834
## iter 30 value 22451.993302
## iter 40 value 21901.128691
## iter 50 value 21510.081435
## iter 60 value 21407.034156
## iter 70 value 21383.075121
## iter 80 value 21379.287668
## iter 90 value 21378.083511
## iter 100 value 21377.188459
## final value 21377.188459
## stopped after 100 iterations
## # weights: 101
## initial value 27717.091571

```

```

## iter 10 value 22950.198149
## iter 20 value 21080.948538
## iter 30 value 20444.087154
## iter 40 value 20039.320336
## iter 50 value 19624.593090
## iter 60 value 19121.519570
## iter 70 value 18787.525283
## iter 80 value 18573.814248
## iter 90 value 18408.661807
## iter 100 value 18225.427858
## final value 18225.427858
## stopped after 100 iterations
## # weights: 165
## initial value 26571.780179
## iter 10 value 20685.713593
## iter 20 value 18934.389767
## iter 30 value 18095.057663
## iter 40 value 17803.706823
## iter 50 value 17613.522999
## iter 60 value 17483.419881
## iter 70 value 17379.950699
## iter 80 value 17278.135420
## iter 90 value 17200.822637
## iter 100 value 17107.934460
## final value 17107.934460
## stopped after 100 iterations
## # weights: 37
## initial value 27319.591344
## iter 10 value 24389.281010
## iter 20 value 24009.054167
## iter 30 value 23235.716093
## iter 40 value 22932.152238
## iter 50 value 22770.959633
## iter 60 value 22528.255445
## iter 70 value 22288.922326
## iter 80 value 22202.628557
## iter 90 value 22077.630017
## iter 100 value 21978.993437
## final value 21978.993437
## stopped after 100 iterations
## # weights: 101
## initial value 27030.656136
## iter 10 value 22297.753809
## iter 20 value 20553.013886
## iter 30 value 20278.107920
## iter 40 value 19962.459639
## iter 50 value 19588.477192
## iter 60 value 19270.926111
## iter 70 value 19044.348968
## iter 80 value 18889.790152
## iter 90 value 18614.095202
## iter 100 value 18431.692426
## final value 18431.692426
## stopped after 100 iterations

```

```

## # weights: 165
## initial value 27273.918367
## iter 10 value 22878.608278
## iter 20 value 20122.847001
## iter 30 value 19191.124031
## iter 40 value 18331.018820
## iter 50 value 17647.720643
## iter 60 value 17386.837303
## iter 70 value 17232.753355
## iter 80 value 16938.837092
## iter 90 value 16611.066239
## iter 100 value 16394.297379
## final value 16394.297379
## stopped after 100 iterations
## # weights: 37
## initial value 26492.714498
## iter 10 value 24114.450998
## iter 20 value 23956.684532
## iter 30 value 22605.801642
## iter 40 value 22251.166009
## iter 50 value 22010.329617
## iter 60 value 21852.426020
## iter 70 value 21807.745721
## iter 80 value 21791.735523
## iter 90 value 21786.337314
## iter 100 value 21772.593734
## final value 21772.593734
## stopped after 100 iterations
## # weights: 101
## initial value 25409.687794
## iter 10 value 22569.791145
## iter 20 value 20637.865372
## iter 30 value 19952.333681
## iter 40 value 19729.283232
## iter 50 value 19584.743858
## iter 60 value 19385.539210
## iter 70 value 19186.777011
## iter 80 value 19027.983900
## iter 90 value 18959.642935
## iter 100 value 18935.688696
## final value 18935.688696
## stopped after 100 iterations
## # weights: 165
## initial value 29024.719939
## iter 10 value 20815.009098
## iter 20 value 18992.563680
## iter 30 value 18131.809169
## iter 40 value 17839.158927
## iter 50 value 17462.228946
## iter 60 value 17139.119846
## iter 70 value 16799.416601
## iter 80 value 16429.671547
## iter 90 value 16205.981899
## iter 100 value 15983.002936

```



```

## final value 15983.002936
## stopped after 100 iterations
## # weights: 37
## initial value 27148.268454
## iter 10 value 22258.392119
## iter 20 value 22171.715822
## iter 30 value 22071.612025
## iter 40 value 21867.227642
## iter 50 value 21723.205808
## iter 60 value 21647.218964
## iter 70 value 21630.010290
## iter 80 value 21624.065302
## iter 90 value 21623.354129
## iter 100 value 21622.444215
## final value 21622.444215
## stopped after 100 iterations
## # weights: 101
## initial value 26133.025107
## iter 10 value 22182.091443
## iter 20 value 20797.545187
## iter 30 value 20188.460543
## iter 40 value 19693.242180
## iter 50 value 19181.943780
## iter 60 value 18924.035995
## iter 70 value 18704.741134
## iter 80 value 18490.229333
## iter 90 value 18289.699412
## iter 100 value 18125.503246
## final value 18125.503246
## stopped after 100 iterations
## # weights: 165
## initial value 28729.560464
## iter 10 value 21344.439998
## iter 20 value 18467.670462
## iter 30 value 17925.927868
## iter 40 value 17612.016758
## iter 50 value 17270.785643
## iter 60 value 17020.062225
## iter 70 value 16793.546351
## iter 80 value 16644.865368
## iter 90 value 16537.083595
## iter 100 value 16459.332061
## final value 16459.332061
## stopped after 100 iterations
## # weights: 37
## initial value 26115.607449
## iter 10 value 23082.317022
## iter 20 value 22443.027975
## iter 30 value 22235.199191
## iter 40 value 22014.133676
## iter 50 value 21816.717161
## iter 60 value 21796.653320
## iter 70 value 21774.644402
## iter 80 value 21751.197759

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```

## iter 90 value 21700.207104
## iter 100 value 21666.121110
## final value 21666.121110
## stopped after 100 iterations
## # weights: 101
## initial value 27950.474783
## iter 10 value 21829.929658
## iter 20 value 20390.976873
## iter 30 value 20155.853841
## iter 40 value 19951.777050
## iter 50 value 19844.681705
## iter 60 value 19625.524519
## iter 70 value 19458.409892
## iter 80 value 19339.573369
## iter 90 value 19263.347087
## iter 100 value 19175.306053
## final value 19175.306053
## stopped after 100 iterations
## # weights: 165
## initial value 31712.273047
## iter 10 value 21019.964625
## iter 20 value 19063.726399
## iter 30 value 18102.738353
## iter 40 value 17533.083157
## iter 50 value 17075.678344
## iter 60 value 16792.467777
## iter 70 value 16616.607495
## iter 80 value 16454.949452
## iter 90 value 16341.763913
## iter 100 value 16223.152017
## final value 16223.152017
## stopped after 100 iterations
## # weights: 36
## initial value 28118.757940
## iter 10 value 24524.059163
## iter 20 value 23786.262328
## iter 30 value 23493.913310
## iter 40 value 23150.118126
## iter 50 value 22771.045431
## iter 60 value 22619.124577
## iter 70 value 22574.872216
## iter 80 value 22541.099373
## iter 90 value 22522.770170
## iter 100 value 22507.399366
## final value 22507.399366
## stopped after 100 iterations
## # weights: 98
## initial value 26074.745681
## iter 10 value 22070.250871
## iter 20 value 20461.209159
## iter 30 value 20245.688384
## iter 40 value 20114.738815
## iter 50 value 19991.811649
## iter 60 value 19771.346447

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## iter 70 value 19385.096110
## iter 80 value 19082.799061
## iter 90 value 18932.438743
## iter 100 value 18784.797618
## final value 18784.797618
## stopped after 100 iterations
## # weights: 160
## initial value 28127.902643
## iter 10 value 22468.391402
## iter 20 value 20893.874871
## iter 30 value 19860.363144
## iter 40 value 19189.212586
## iter 50 value 18720.521840
## iter 60 value 18012.484314
## iter 70 value 17569.551368
## iter 80 value 17329.354142
## iter 90 value 17013.919676
## iter 100 value 16862.074644
## final value 16862.074644
## stopped after 100 iterations
## # weights: 36
## initial value 25928.003062
## iter 10 value 24734.730484
## iter 20 value 24274.358212
## iter 30 value 23530.863998
## iter 40 value 23195.511227
## iter 50 value 22568.352235
## iter 60 value 22388.629534
## iter 70 value 22232.192550
## iter 80 value 22202.972143
## iter 90 value 22143.600295
## iter 100 value 22085.970959
## final value 22085.970959
## stopped after 100 iterations
## # weights: 98
## initial value 28381.449964
## iter 10 value 21734.012866
## iter 20 value 20124.111746
## iter 30 value 19691.738886
## iter 40 value 19353.230249
## iter 50 value 19060.397482
## iter 60 value 18867.077880
## iter 70 value 18649.377931
## iter 80 value 18356.811173
## iter 90 value 18177.544157
## iter 100 value 17967.842896
## final value 17967.842896
## stopped after 100 iterations
## # weights: 160
## initial value 29106.550206
## iter 10 value 21187.560607
## iter 20 value 18866.582722
## iter 30 value 17447.840490
## iter 40 value 16936.928590

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## iter 50 value 16824.324671
## iter 60 value 16662.263661
## iter 70 value 16481.326405
## iter 80 value 16269.197648
## iter 90 value 16131.887730
## iter 100 value 16038.768677
## final value 16038.768677
## stopped after 100 iterations
## # weights: 36
## initial value 25785.055573
## iter 10 value 24394.633738
## iter 20 value 24057.162981
## iter 30 value 23511.527639
## iter 40 value 23095.494553
## iter 50 value 22932.781230
## iter 60 value 22565.532166
## iter 70 value 22389.684055
## iter 80 value 22380.709189
## iter 90 value 22374.253263
## iter 100 value 22365.880597
## final value 22365.880597
## stopped after 100 iterations
## # weights: 98
## initial value 28355.688038
## iter 10 value 22265.962748
## iter 20 value 20614.649891
## iter 30 value 19986.802490
## iter 40 value 19526.818952
## iter 50 value 19114.906966
## iter 60 value 18857.544697
## iter 70 value 18651.745041
## iter 80 value 18483.736672
## iter 90 value 18411.058226
## iter 100 value 18326.879352
## final value 18326.879352
## stopped after 100 iterations
## # weights: 160
## initial value 32306.177317
## iter 10 value 22035.327117
## iter 20 value 19293.488316
## iter 30 value 18359.597059
## iter 40 value 18014.809496
## iter 50 value 17691.680348
## iter 60 value 17334.448322
## iter 70 value 17101.709644
## iter 80 value 16975.289693
## iter 90 value 16766.748478
## iter 100 value 16540.662558
## final value 16540.662558
## stopped after 100 iterations
## # weights: 37
## initial value 25355.229186
## iter 10 value 23714.838777
## iter 20 value 23372.338635

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## iter 30 value 22704.351214
## iter 40 value 22324.486931
## iter 50 value 22146.064131
## iter 60 value 22071.279646
## iter 70 value 21934.936099
## iter 80 value 21817.172849
## iter 90 value 21730.353220
## iter 100 value 21547.001407
## final value 21547.001407
## stopped after 100 iterations
## # weights: 101
## initial value 27859.068006
## iter 10 value 21911.715943
## iter 20 value 20883.606595
## iter 30 value 20494.240994
## iter 40 value 20127.648742
## iter 50 value 19748.312842
## iter 60 value 19502.151959
## iter 70 value 19319.028107
## iter 80 value 19115.969272
## iter 90 value 18980.129705
## iter 100 value 18822.031875
## final value 18822.031875
## stopped after 100 iterations
## # weights: 165
## initial value 27427.157366
## iter 10 value 21564.623305
## iter 20 value 19322.381979
## iter 30 value 18887.890265
## iter 40 value 18342.032392
## iter 50 value 17924.328075
## iter 60 value 17612.113052
## iter 70 value 17425.456607
## iter 80 value 17343.110985
## iter 90 value 17147.270150
## iter 100 value 16898.857382
## final value 16898.857382
## stopped after 100 iterations
## # weights: 37
## initial value 26343.413121
## iter 10 value 23415.068618
## iter 20 value 23232.631233
## iter 30 value 22595.704046
## iter 40 value 21995.346872
## iter 50 value 21797.431676
## iter 60 value 21640.174877
## iter 70 value 21606.324270
## iter 80 value 21594.557005
## iter 90 value 21587.555618
## iter 100 value 21576.432344
## final value 21576.432344
## stopped after 100 iterations
## # weights: 101
## initial value 26396.953692

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## iter 10 value 24243.781311
## iter 20 value 22461.465580
## iter 30 value 21432.995915
## iter 40 value 20808.808795
## iter 50 value 20174.512256
## iter 60 value 19760.030648
## iter 70 value 19470.219746
## iter 80 value 19235.256864
## iter 90 value 19084.482736
## iter 100 value 19005.012130
## final value 19005.012130
## stopped after 100 iterations
## # weights: 165
## initial value 27190.289718
## iter 10 value 20614.156463
## iter 20 value 18511.734234
## iter 30 value 17592.516858
## iter 40 value 17349.410255
## iter 50 value 17103.786496
## iter 60 value 16775.569663
## iter 70 value 16401.215264
## iter 80 value 16130.889294
## iter 90 value 15945.469502
## iter 100 value 15808.608872
## final value 15808.608872
## stopped after 100 iterations
## # weights: 37
## initial value 26996.593797
## iter 10 value 24230.132332
## iter 20 value 23945.359505
## iter 30 value 22991.516090
## iter 40 value 22268.578925
## iter 50 value 21871.882682
## iter 60 value 21619.862131
## iter 70 value 21557.241633
## iter 80 value 21534.844561
## iter 90 value 21522.212109
## iter 100 value 21501.700180
## final value 21501.700180
## stopped after 100 iterations
## # weights: 101
## initial value 25652.465185
## iter 10 value 20957.639654
## iter 20 value 19900.278688
## iter 30 value 19378.348397
## iter 40 value 19220.787758
## iter 50 value 18789.841296
## iter 60 value 18477.287373
## iter 70 value 18302.122589
## iter 80 value 18197.605204
## iter 90 value 18144.216253
## iter 100 value 18102.506435
## final value 18102.506435
## stopped after 100 iterations

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## # weights: 165
## initial value 25672.544210
## iter 10 value 20757.439120
## iter 20 value 18815.918612
## iter 30 value 17563.241535
## iter 40 value 17251.467536
## iter 50 value 17011.931435
## iter 60 value 16566.102400
## iter 70 value 16217.019404
## iter 80 value 16001.588883
## iter 90 value 15855.996174
## iter 100 value 15787.704455
## final value 15787.704455
## stopped after 100 iterations
## # weights: 36
## initial value 26288.725711
## iter 10 value 22666.790952
## iter 20 value 22523.148992
## iter 30 value 22287.117408
## iter 40 value 22141.601426
## iter 50 value 21665.422426
## iter 60 value 21547.951606
## iter 70 value 21501.718898
## iter 80 value 21466.397478
## iter 90 value 21442.847108
## iter 100 value 21436.744280
## final value 21436.744280
## stopped after 100 iterations
## # weights: 98
## initial value 26640.536570
## iter 10 value 22426.934172
## iter 20 value 21005.318806
## iter 30 value 20492.794556
## iter 40 value 19853.730037
## iter 50 value 19436.419752
## iter 60 value 19235.736712
## iter 70 value 18972.426377
## iter 80 value 18813.393306
## iter 90 value 18702.986493
## iter 100 value 18609.477878
## final value 18609.477878
## stopped after 100 iterations
## # weights: 160
## initial value 28793.869822
## iter 10 value 21583.879699
## iter 20 value 19268.150174
## iter 30 value 18453.636936
## iter 40 value 17868.090877
## iter 50 value 17532.047572
## iter 60 value 17275.029932
## iter 70 value 17151.745670
## iter 80 value 16977.951227
## iter 90 value 16851.369009
## iter 100 value 16778.014807

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## final value 16778.014807
## stopped after 100 iterations
## # weights: 36
## initial value 27279.256601
## iter 10 value 23454.088653
## iter 20 value 22953.763207
## iter 30 value 22420.661263
## iter 40 value 22199.603053
## iter 50 value 22103.384383
## iter 60 value 22074.769584
## iter 70 value 21973.230190
## iter 80 value 21886.879167
## iter 90 value 21826.111698
## iter 100 value 21751.222190
## final value 21751.222190
## stopped after 100 iterations
## # weights: 98
## initial value 28665.912349
## iter 10 value 23476.062359
## iter 20 value 21765.363218
## iter 30 value 21072.642265
## iter 40 value 20632.424031
## iter 50 value 20192.960266
## iter 60 value 19773.337137
## iter 70 value 19520.824800
## iter 80 value 19264.197341
## iter 90 value 18998.273677
## iter 100 value 18630.240692
## final value 18630.240692
## stopped after 100 iterations
## # weights: 160
## initial value 28647.346478
## iter 10 value 21800.997376
## iter 20 value 20021.541831
## iter 30 value 18604.531444
## iter 40 value 18063.922526
## iter 50 value 17835.920787
## iter 60 value 17697.996956
## iter 70 value 17471.240100
## iter 80 value 17158.668042
## iter 90 value 16790.189762
## iter 100 value 16448.665477
## final value 16448.665477
## stopped after 100 iterations
## # weights: 36
## initial value 26927.402668
## iter 10 value 23582.548922
## iter 20 value 23160.812057
## iter 30 value 22797.472765
## iter 40 value 22323.016087
## iter 50 value 21968.195908
## iter 60 value 21725.529466
## iter 70 value 21584.114808
## iter 80 value 21532.233753

```



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## iter 90 value 21502.762763
## iter 100 value 21489.112847
## final value 21489.112847
## stopped after 100 iterations
## # weights: 98
## initial value 25792.932676
## iter 10 value 22256.665951
## iter 20 value 21057.988769
## iter 30 value 20316.791953
## iter 40 value 20062.473921
## iter 50 value 19691.101425
## iter 60 value 19461.990904
## iter 70 value 19297.932193
## iter 80 value 19146.117368
## iter 90 value 18978.642781
## iter 100 value 18895.897942
## final value 18895.897942
## stopped after 100 iterations
## # weights: 160
## initial value 30886.392342
## iter 10 value 21316.749326
## iter 20 value 18446.584380
## iter 30 value 17963.004435
## iter 40 value 17634.304581
## iter 50 value 17291.207780
## iter 60 value 16941.310240
## iter 70 value 16584.721894
## iter 80 value 16338.907679
## iter 90 value 16172.110322
## iter 100 value 16049.581541
## final value 16049.581541
## stopped after 100 iterations
## # weights: 37
## initial value 26206.378899
## iter 10 value 23649.179021
## iter 20 value 23313.301468
## iter 30 value 22928.189697
## iter 40 value 22519.299221
## iter 50 value 21965.733089
## iter 60 value 21700.560148
## iter 70 value 21598.784250
## iter 80 value 21507.207620
## iter 90 value 21482.660355
## iter 100 value 21463.608544
## final value 21463.608544
## stopped after 100 iterations
## # weights: 101
## initial value 26817.935995
## iter 10 value 22270.341371
## iter 20 value 20760.066603
## iter 30 value 20183.587565
## iter 40 value 19754.009827
## iter 50 value 19459.353300
## iter 60 value 19290.927557

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## iter 70 value 19135.651363
## iter 80 value 19020.902753
## iter 90 value 18928.764609
## iter 100 value 18860.485559
## final value 18860.485559
## stopped after 100 iterations
## # weights: 165
## initial value 27794.145852
## iter 10 value 20927.494616
## iter 20 value 18398.339765
## iter 30 value 17542.861068
## iter 40 value 17108.179285
## iter 50 value 16869.733772
## iter 60 value 16607.641945
## iter 70 value 16389.621613
## iter 80 value 16204.555387
## iter 90 value 16105.310195
## iter 100 value 16025.147521
## final value 16025.147521
## stopped after 100 iterations
## # weights: 37
## initial value 25901.115206
## iter 10 value 23089.887035
## iter 20 value 22839.683998
## iter 30 value 22452.412469
## iter 40 value 22306.755437
## iter 50 value 22018.545195
## iter 60 value 21855.694253
## iter 70 value 21730.835470
## iter 80 value 21682.890863
## iter 90 value 21657.500002
## iter 100 value 21642.282109
## final value 21642.282109
## stopped after 100 iterations
## # weights: 101
## initial value 26042.036892
## iter 10 value 22195.104661
## iter 20 value 19797.597719
## iter 30 value 19335.664722
## iter 40 value 18963.215915
## iter 50 value 18767.994708
## iter 60 value 18544.929897
## iter 70 value 18430.071531
## iter 80 value 18340.347903
## iter 90 value 18244.409367
## iter 100 value 18195.013661
## final value 18195.013661
## stopped after 100 iterations
## # weights: 165
## initial value 26894.232432
## iter 10 value 22024.242448
## iter 20 value 19708.938217
## iter 30 value 18757.095876
## iter 40 value 18304.669545

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## iter 50 value 17750.516380
## iter 60 value 17275.435711
## iter 70 value 16816.405499
## iter 80 value 16429.003889
## iter 90 value 16170.213154
## iter 100 value 15944.344102
## final value 15944.344102
## stopped after 100 iterations
## # weights: 37
## initial value 26474.324228
## iter 10 value 23827.449403
## iter 20 value 23663.628066
## iter 30 value 23122.191192
## iter 40 value 22832.412812
## iter 50 value 22286.319457
## iter 60 value 21922.426571
## iter 70 value 21668.714452
## iter 80 value 21641.375208
## iter 90 value 21613.233031
## iter 100 value 21563.118569
## final value 21563.118569
## stopped after 100 iterations
## # weights: 101
## initial value 25842.089698
## iter 10 value 22153.799381
## iter 20 value 19983.097863
## iter 30 value 19363.950456
## iter 40 value 18906.241269
## iter 50 value 18576.750795
## iter 60 value 18273.855488
## iter 70 value 18089.427706
## iter 80 value 17991.042707
## iter 90 value 17937.382077
## iter 100 value 17896.514975
## final value 17896.514975
## stopped after 100 iterations
## # weights: 165
## initial value 27844.606438
## iter 10 value 21788.329399
## iter 20 value 19006.518459
## iter 30 value 18024.788138
## iter 40 value 17758.582520
## iter 50 value 17405.587797
## iter 60 value 17197.216679
## iter 70 value 16826.316131
## iter 80 value 16539.539557
## iter 90 value 16334.566405
## iter 100 value 16210.455928
## final value 16210.455928
## stopped after 100 iterations
## # weights: 37
## initial value 27171.456232
## iter 10 value 23704.943740
## iter 20 value 23529.600677

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## iter 30 value 22080.507437
## iter 40 value 21756.091856
## iter 50 value 21558.669058
## iter 60 value 21439.990023
## iter 70 value 21410.196621
## iter 80 value 21393.023098
## iter 90 value 21391.574595
## iter 100 value 21381.506419
## final value 21381.506419
## stopped after 100 iterations
## # weights: 101
## initial value 26284.966662
## iter 10 value 22943.568366
## iter 20 value 21222.483933
## iter 30 value 20836.961084
## iter 40 value 20344.495333
## iter 50 value 19913.051127
## iter 60 value 19575.306440
## iter 70 value 19226.318878
## iter 80 value 18709.487138
## iter 90 value 18396.505463
## iter 100 value 18197.887956
## final value 18197.887956
## stopped after 100 iterations
## # weights: 165
## initial value 25923.596114
## iter 10 value 21945.346353
## iter 20 value 19644.858429
## iter 30 value 19047.104796
## iter 40 value 18223.740221
## iter 50 value 17700.804675
## iter 60 value 17359.494262
## iter 70 value 17101.933975
## iter 80 value 16941.877067
## iter 90 value 16757.302413
## iter 100 value 16576.256478
## final value 16576.256478
## stopped after 100 iterations
## # weights: 37
## initial value 26751.793764
## iter 10 value 24447.918988
## iter 20 value 24050.679001
## iter 30 value 23307.391964
## iter 40 value 22628.583691
## iter 50 value 22028.858800
## iter 60 value 21847.298434
## iter 70 value 21770.412435
## iter 80 value 21709.631684
## iter 90 value 21624.587114
## iter 100 value 21593.299709
## final value 21593.299709
## stopped after 100 iterations
## # weights: 101
## initial value 25971.112667

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## iter 10 value 21848.251347
## iter 20 value 20332.674470
## iter 30 value 19911.462977
## iter 40 value 19598.369530
## iter 50 value 19398.236159
## iter 60 value 19217.103537
## iter 70 value 19091.437307
## iter 80 value 18950.512184
## iter 90 value 18812.356385
## iter 100 value 18722.297212
## final value 18722.297212
## stopped after 100 iterations
## # weights: 165
## initial value 26571.612026
## iter 10 value 21252.473583
## iter 20 value 19246.123626
## iter 30 value 18658.730326
## iter 40 value 18450.880890
## iter 50 value 18066.328374
## iter 60 value 17571.700037
## iter 70 value 17322.951891
## iter 80 value 17101.161567
## iter 90 value 16972.868695
## iter 100 value 16856.719908
## final value 16856.719908
## stopped after 100 iterations
## # weights: 37
## initial value 25690.911689
## iter 10 value 22901.100606
## iter 20 value 22642.425733
## iter 30 value 22394.203033
## iter 40 value 22080.494185
## iter 50 value 21767.788617
## iter 60 value 21676.212804
## iter 70 value 21556.120867
## iter 80 value 21484.077275
## iter 90 value 21458.698383
## iter 100 value 21444.014771
## final value 21444.014771
## stopped after 100 iterations
## # weights: 101
## initial value 27264.007145
## iter 10 value 22846.379506
## iter 20 value 20802.900106
## iter 30 value 20297.100240
## iter 40 value 20012.098955
## iter 50 value 19651.407505
## iter 60 value 19442.820353
## iter 70 value 19200.211301
## iter 80 value 18878.785399
## iter 90 value 18697.424006
## iter 100 value 18523.369795
## final value 18523.369795
## stopped after 100 iterations

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```

## # weights: 165
## initial value 28383.539047
## iter 10 value 21298.948989
## iter 20 value 18633.220379
## iter 30 value 17888.027502
## iter 40 value 17125.206721
## iter 50 value 16697.207613
## iter 60 value 16238.736173
## iter 70 value 16003.314332
## iter 80 value 15883.886664
## iter 90 value 15810.086307
## iter 100 value 15737.275491
## final value 15737.275491
## stopped after 100 iterations
## # weights: 37
## initial value 27493.498301
## iter 10 value 23639.208383
## iter 20 value 23149.460201
## iter 30 value 22487.305942
## iter 40 value 22179.601316
## iter 50 value 21849.075087
## iter 60 value 21694.154495
## iter 70 value 21552.241386
## iter 80 value 21500.037815
## iter 90 value 21457.594003
## iter 100 value 21430.325606
## final value 21430.325606
## stopped after 100 iterations
## # weights: 101
## initial value 27920.472824
## iter 10 value 22515.200314
## iter 20 value 20878.896714
## iter 30 value 20235.999579
## iter 40 value 19967.446816
## iter 50 value 19608.676304
## iter 60 value 19471.558985
## iter 70 value 19339.736490
## iter 80 value 19244.317801
## iter 90 value 19190.924433
## iter 100 value 19130.354190
## final value 19130.354190
## stopped after 100 iterations
## # weights: 165
## initial value 27056.244683
## iter 10 value 20731.068961
## iter 20 value 18017.445331
## iter 30 value 17125.592751
## iter 40 value 16818.623802
## iter 50 value 16561.822386
## iter 60 value 16229.268215
## iter 70 value 15995.823865
## iter 80 value 15831.958555
## iter 90 value 15734.972852
## iter 100 value 15673.610957

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```

## final value 15673.610957
## stopped after 100 iterations
## # weights: 37
## initial value 26816.639833
## iter 10 value 24506.280844
## iter 20 value 23916.898825
## iter 30 value 23204.758261
## iter 40 value 22635.583715
## iter 50 value 22170.201140
## iter 60 value 21973.671574
## iter 70 value 21839.645007
## iter 80 value 21759.265976
## iter 90 value 21735.189965
## iter 100 value 21716.461174
## final value 21716.461174
## stopped after 100 iterations
## # weights: 101
## initial value 26990.106877
## iter 10 value 21902.522222
## iter 20 value 19738.265732
## iter 30 value 19091.217612
## iter 40 value 18882.516145
## iter 50 value 18399.281244
## iter 60 value 18186.169334
## iter 70 value 17882.610708
## iter 80 value 17757.388075
## iter 90 value 17683.658762
## iter 100 value 17633.915798
## final value 17633.915798
## stopped after 100 iterations
## # weights: 165
## initial value 25685.054101
## iter 10 value 20086.735022
## iter 20 value 18467.586726
## iter 30 value 17490.286998
## iter 40 value 16995.004984
## iter 50 value 16708.783824
## iter 60 value 16472.731801
## iter 70 value 16255.276408
## iter 80 value 16078.162054
## iter 90 value 15949.922381
## iter 100 value 15834.347815
## final value 15834.347815
## stopped after 100 iterations
## # weights: 37
## initial value 28180.700763
## iter 10 value 23319.576260
## iter 20 value 22516.428435
## iter 30 value 22138.673782
## iter 40 value 21891.829058
## iter 50 value 21749.407155
## iter 60 value 21664.546692
## iter 70 value 21592.157190
## iter 80 value 21456.955639

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## iter 90 value 21416.391233
## iter 100 value 21388.022148
## final value 21388.022148
## stopped after 100 iterations
## # weights: 101
## initial value 27099.861135
## iter 10 value 22934.659673
## iter 20 value 21246.606500
## iter 30 value 20561.044272
## iter 40 value 20321.158256
## iter 50 value 19910.857558
## iter 60 value 19452.080704
## iter 70 value 19133.634869
## iter 80 value 18893.331824
## iter 90 value 18661.604538
## iter 100 value 18447.931540
## final value 18447.931540
## stopped after 100 iterations
## # weights: 165
## initial value 28097.720189
## iter 10 value 20510.075515
## iter 20 value 17853.044231
## iter 30 value 16989.029688
## iter 40 value 16863.661605
## iter 50 value 16629.288747
## iter 60 value 16437.694587
## iter 70 value 16187.179475
## iter 80 value 15985.934507
## iter 90 value 15850.997393
## iter 100 value 15733.100555
## final value 15733.100555
## stopped after 100 iterations
## # weights: 35
## initial value 28917.245706
## iter 10 value 24836.665190
## iter 20 value 24116.116355
## iter 30 value 23504.413715
## iter 40 value 22870.952295
## iter 50 value 22582.048781
## iter 60 value 22231.999089
## iter 70 value 22031.429186
## iter 80 value 22006.410389
## iter 90 value 21979.521529
## iter 100 value 21959.337627
## final value 21959.337627
## stopped after 100 iterations
## # weights: 95
## initial value 25520.236268
## iter 10 value 20792.218189
## iter 20 value 19661.112074
## iter 30 value 19273.067484
## iter 40 value 19086.914576
## iter 50 value 18621.358987
## iter 60 value 18260.846201

```



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## iter 70 value 17958.516848
## iter 80 value 17709.147079
## iter 90 value 17518.958220
## iter 100 value 17432.015867
## final value 17432.015867
## stopped after 100 iterations
## # weights: 155
## initial value 27399.241037
## iter 10 value 20144.696112
## iter 20 value 17842.648470
## iter 30 value 17162.656639
## iter 40 value 16742.454283
## iter 50 value 16481.309563
## iter 60 value 16200.580858
## iter 70 value 15992.846270
## iter 80 value 15863.152606
## iter 90 value 15771.726629
## iter 100 value 15688.220301
## final value 15688.220301
## stopped after 100 iterations
## # weights: 35
## initial value 28134.178758
## iter 10 value 23543.026155
## iter 20 value 23082.338575
## iter 30 value 22580.681950
## iter 40 value 22241.178035
## iter 50 value 22123.478467
## iter 60 value 22062.542957
## iter 70 value 21978.847532
## iter 80 value 21925.571433
## iter 90 value 21858.673736
## iter 100 value 21851.602425
## final value 21851.602425
## stopped after 100 iterations
## # weights: 95
## initial value 27863.647788
## iter 10 value 22675.974112
## iter 20 value 20761.308252
## iter 30 value 20138.415085
## iter 40 value 19766.717818
## iter 50 value 19513.682147
## iter 60 value 19305.372744
## iter 70 value 19065.712931
## iter 80 value 18813.620586
## iter 90 value 18594.886006
## iter 100 value 18289.651195
## final value 18289.651195
## stopped after 100 iterations
## # weights: 155
## initial value 30285.578918
## iter 10 value 21172.168066
## iter 20 value 18680.227456
## iter 30 value 17675.953315
## iter 40 value 17338.566239

```

```

## iter 50 value 17122.193537
## iter 60 value 16879.684488
## iter 70 value 16552.500697
## iter 80 value 16157.186031
## iter 90 value 15890.992792
## iter 100 value 15696.028653
## final value 15696.028653
## stopped after 100 iterations
## # weights: 35
## initial value 25709.447142
## iter 10 value 22463.849402
## iter 20 value 22356.757424
## iter 30 value 22114.366351
## iter 40 value 21790.304367
## iter 50 value 21663.135416
## iter 60 value 21570.485610
## iter 70 value 21520.257495
## iter 80 value 21511.472688
## iter 90 value 21494.109979
## iter 100 value 21484.028454
## final value 21484.028454
## stopped after 100 iterations
## # weights: 95
## initial value 25424.921717
## iter 10 value 22317.600987
## iter 20 value 21183.821916
## iter 30 value 20508.269664
## iter 40 value 19975.828192
## iter 50 value 19728.689482
## iter 60 value 19534.669310
## iter 70 value 19428.841847
## iter 80 value 19382.311059
## iter 90 value 19350.533172
## iter 100 value 19328.313349
## final value 19328.313349
## stopped after 100 iterations
## # weights: 155
## initial value 28031.840363
## iter 10 value 20606.922850
## iter 20 value 17870.217630
## iter 30 value 17165.614847
## iter 40 value 16876.725861
## iter 50 value 16489.427314
## iter 60 value 15957.674243
## iter 70 value 15725.861058
## iter 80 value 15466.317336
## iter 90 value 15296.680148
## iter 100 value 15218.974981
## final value 15218.974981
## stopped after 100 iterations
## # weights: 37
## initial value 25752.159762
## iter 10 value 23834.713131
## iter 20 value 23100.121008

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```

## iter 30 value 22677.328629
## iter 40 value 22340.003846
## iter 50 value 22175.806841
## iter 60 value 22114.220362
## iter 70 value 22002.307463
## iter 80 value 21887.137075
## iter 90 value 21721.625251
## iter 100 value 21636.112086
## final value 21636.112086
## stopped after 100 iterations
## # weights: 101
## initial value 26047.218288
## iter 10 value 21132.768472
## iter 20 value 19544.330260
## iter 30 value 19265.821895
## iter 40 value 18952.037907
## iter 50 value 18725.980726
## iter 60 value 18529.444317
## iter 70 value 18381.549607
## iter 80 value 18278.016046
## iter 90 value 18216.125988
## iter 100 value 18192.751083
## final value 18192.751083
## stopped after 100 iterations
## # weights: 165
## initial value 26852.622006
## iter 10 value 21086.693602
## iter 20 value 18024.187776
## iter 30 value 17063.260343
## iter 40 value 16676.693867
## iter 50 value 16366.943676
## iter 60 value 16089.856328
## iter 70 value 15968.283157
## iter 80 value 15906.118058
## iter 90 value 15844.967203
## iter 100 value 15805.121576
## final value 15805.121576
## stopped after 100 iterations
## # weights: 37
## initial value 25979.495010
## iter 10 value 23666.440998
## iter 20 value 23099.265617
## iter 30 value 22408.422005
## iter 40 value 22101.035820
## iter 50 value 21827.142713
## iter 60 value 21629.384533
## iter 70 value 21542.093733
## iter 80 value 21523.391529
## iter 90 value 21506.782496
## iter 100 value 21497.633468
## final value 21497.633468
## stopped after 100 iterations
## # weights: 101
## initial value 26814.561753

```

```

## iter 10 value 22237.900490
## iter 20 value 20265.746570
## iter 30 value 19822.640538
## iter 40 value 19528.357868
## iter 50 value 19338.221433
## iter 60 value 19083.083529
## iter 70 value 18910.094911
## iter 80 value 18817.195331
## iter 90 value 18763.645758
## iter 100 value 18733.319250
## final value 18733.319250
## stopped after 100 iterations
## # weights: 165
## initial value 26937.124069
## iter 10 value 20650.795262
## iter 20 value 18282.510862
## iter 30 value 17534.953235
## iter 40 value 17194.869381
## iter 50 value 16893.121174
## iter 60 value 16605.615208
## iter 70 value 16404.276744
## iter 80 value 16265.509751
## iter 90 value 16175.966240
## iter 100 value 16119.660224
## final value 16119.660224
## stopped after 100 iterations
## # weights: 37
## initial value 26453.781711
## iter 10 value 24087.338763
## iter 20 value 23951.072403
## iter 30 value 23161.696788
## iter 40 value 22791.596649
## iter 50 value 22502.756315
## iter 60 value 22446.818890
## iter 70 value 22407.724285
## iter 80 value 22390.839444
## iter 90 value 22384.467867
## iter 100 value 22378.537866
## final value 22378.537866
## stopped after 100 iterations
## # weights: 101
## initial value 28193.761475
## iter 10 value 22936.878983
## iter 20 value 21541.172671
## iter 30 value 20510.390667
## iter 40 value 19985.008458
## iter 50 value 19788.396118
## iter 60 value 19295.031631
## iter 70 value 18999.202207
## iter 80 value 18711.545913
## iter 90 value 18442.218003
## iter 100 value 18145.250626
## final value 18145.250626
## stopped after 100 iterations

```

```

## # weights: 165
## initial value 27831.543502
## iter 10 value 20670.357716
## iter 20 value 18628.328887
## iter 30 value 17677.532269
## iter 40 value 17387.443674
## iter 50 value 17147.366353
## iter 60 value 16967.710077
## iter 70 value 16881.954072
## iter 80 value 16818.005105
## iter 90 value 16791.421114
## iter 100 value 16748.364516
## final value 16748.364516
## stopped after 100 iterations
## # weights: 35
## initial value 25521.786326
## iter 10 value 24036.490295
## iter 20 value 23736.405465
## iter 30 value 23489.681342
## iter 40 value 23314.663213
## iter 50 value 23245.063855
## iter 60 value 23235.255453
## iter 70 value 23219.590625
## iter 80 value 23214.759334
## iter 90 value 23211.131463
## iter 100 value 23209.264824
## final value 23209.264824
## stopped after 100 iterations
## # weights: 95
## initial value 28051.932090
## iter 10 value 22460.501759
## iter 20 value 20019.426123
## iter 30 value 19532.248584
## iter 40 value 19339.160111
## iter 50 value 19220.058332
## iter 60 value 19147.684684
## iter 70 value 18996.453272
## iter 80 value 18677.510196
## iter 90 value 18430.074330
## iter 100 value 18286.378157
## final value 18286.378157
## stopped after 100 iterations
## # weights: 155
## initial value 30373.803580
## iter 10 value 21031.865396
## iter 20 value 19536.083551
## iter 30 value 18343.771785
## iter 40 value 17725.401093
## iter 50 value 17323.441889
## iter 60 value 16889.029190
## iter 70 value 16451.412461
## iter 80 value 16163.343968
## iter 90 value 15995.694102
## iter 100 value 15824.288429

```

```

## final value 15824.288429
## stopped after 100 iterations
## # weights: 35
## initial value 28857.758380
## iter 10 value 24180.311088
## iter 20 value 23887.609019
## iter 30 value 23509.515383
## iter 40 value 23297.038613
## iter 50 value 22308.346084
## iter 60 value 21965.538948
## iter 70 value 21945.463830
## iter 80 value 21935.481478
## iter 90 value 21924.604493
## iter 100 value 21916.306707
## final value 21916.306707
## stopped after 100 iterations
## # weights: 95
## initial value 27974.815415
## iter 10 value 22345.100127
## iter 20 value 20233.777525
## iter 30 value 19720.389167
## iter 40 value 19492.190550
## iter 50 value 19310.099765
## iter 60 value 19083.932701
## iter 70 value 18959.369664
## iter 80 value 18854.130108
## iter 90 value 18762.812758
## iter 100 value 18691.545263
## final value 18691.545263
## stopped after 100 iterations
## # weights: 155
## initial value 32355.371293
## iter 10 value 21933.511499
## iter 20 value 19359.601941
## iter 30 value 18712.772332
## iter 40 value 17963.058713
## iter 50 value 17356.404338
## iter 60 value 16922.683231
## iter 70 value 16458.744755
## iter 80 value 16154.456043
## iter 90 value 15838.830546
## iter 100 value 15643.663047
## final value 15643.663047
## stopped after 100 iterations
## # weights: 35
## initial value 27379.647119
## iter 10 value 23489.966014
## iter 20 value 22796.876703
## iter 30 value 22471.895165
## iter 40 value 22384.440569
## iter 50 value 22355.831059
## iter 60 value 22153.677297
## iter 70 value 21946.522435
## iter 80 value 21921.752471

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```

## iter 90 value 21916.735905
## iter 100 value 21903.393352
## final value 21903.393352
## stopped after 100 iterations
## # weights: 95
## initial value 28274.939325
## iter 10 value 21655.747115
## iter 20 value 20438.515189
## iter 30 value 19921.501886
## iter 40 value 19550.099789
## iter 50 value 19315.387780
## iter 60 value 19091.675216
## iter 70 value 18836.318985
## iter 80 value 18548.502875
## iter 90 value 18336.983452
## iter 100 value 18166.304596
## final value 18166.304596
## stopped after 100 iterations
## # weights: 155
## initial value 27971.837122
## iter 10 value 20403.757653
## iter 20 value 18221.766266
## iter 30 value 17182.748797
## iter 40 value 16782.622891
## iter 50 value 16641.746012
## iter 60 value 16461.900173
## iter 70 value 16149.254674
## iter 80 value 15899.721313
## iter 90 value 15722.015422
## iter 100 value 15608.890909
## final value 15608.890909
## stopped after 100 iterations
## # weights: 160
## initial value 27435.551091
## iter 10 value 21579.109355
## iter 20 value 18539.555041
## iter 30 value 17672.970019
## iter 40 value 17225.970929
## iter 50 value 16855.937499
## iter 60 value 16616.137742
## iter 70 value 16472.954306
## iter 80 value 16386.745035
## iter 90 value 16320.353963
## iter 100 value 16164.498964
## final value 16164.498964
## stopped after 100 iterations
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Neural Network
##
## 15698 samples
## 52 predictor
## 5 classes: 'A', 'B', 'C', 'D', 'E'

```

```

##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results across tuning parameters:
##
##   size  decay  Accuracy  Kappa
##   1     0e+00  0.3671534  0.1806058
##   1     1e-04  0.3581907  0.1778779
##   1     1e-01  0.3683424  0.1856845
##   3     0e+00  0.5136117  0.3845592
##   3     1e-04  0.5135583  0.3832975
##   3     1e-01  0.5156204  0.3877779
##   5     0e+00  0.5854035  0.4748609
##   5     1e-04  0.5901252  0.4796157
##   5     1e-01  0.5931845  0.4843620
##
## Accuracy was used to select the optimal model using the largest value.
## The final values used for the model were size = 5 and decay = 0.1.
## [1] 2
## # weights:  37
## initial value 25852.487645
## iter  10 value 22304.108119
## iter  20 value 22239.421298
## iter  30 value 21966.967965
## iter  40 value 21783.406027
## iter  50 value 21532.609500
## iter  60 value 21464.809561
## iter  70 value 21448.739075
## iter  80 value 21443.313080
## iter  90 value 21442.845911
## iter 100 value 21435.775996
## final value 21435.775996
## stopped after 100 iterations
## # weights:  101
## initial value 25467.326862
## iter  10 value 21690.156847
## iter  20 value 20147.985641
## iter  30 value 19834.519910
## iter  40 value 19476.186004
## iter  50 value 19341.732974
## iter  60 value 19220.273389
## iter  70 value 19109.892784
## iter  80 value 18949.999271
## iter  90 value 18849.753155
## iter 100 value 18805.785592
## final value 18805.785592
## stopped after 100 iterations
## # weights:  165
## initial value 27549.277111
## iter  10 value 21286.888741
## iter  20 value 18846.973284
## iter  30 value 18089.909152

```



```

## iter 40 value 17783.490574
## iter 50 value 17380.494477
## iter 60 value 17131.372713
## iter 70 value 16924.237705
## iter 80 value 16676.660617
## iter 90 value 16476.743457
## iter 100 value 16331.246473
## final value 16331.246473
## stopped after 100 iterations
## # weights: 37
## initial value 26784.012526
## iter 10 value 23650.594138
## iter 20 value 23402.754715
## iter 30 value 22734.673018
## iter 40 value 22253.956522
## iter 50 value 21992.727026
## iter 60 value 21925.754570
## iter 70 value 21856.034585
## iter 80 value 21816.307489
## iter 90 value 21750.605024
## iter 100 value 21741.838639
## final value 21741.838639
## stopped after 100 iterations
## # weights: 101
## initial value 27542.071892
## iter 10 value 22230.200917
## iter 20 value 20660.152684
## iter 30 value 20171.914962
## iter 40 value 19860.716126
## iter 50 value 19665.710302
## iter 60 value 19487.495593
## iter 70 value 19332.330203
## iter 80 value 19263.477448
## iter 90 value 19229.523951
## iter 100 value 19193.201807
## final value 19193.201807
## stopped after 100 iterations
## # weights: 165
## initial value 27612.547627
## iter 10 value 21617.936417
## iter 20 value 18980.973342
## iter 30 value 18420.006985
## iter 40 value 17938.016655
## iter 50 value 17463.759818
## iter 60 value 17088.850296
## iter 70 value 16803.235416
## iter 80 value 16534.773362
## iter 90 value 16310.678330
## iter 100 value 16151.831906
## final value 16151.831906
## stopped after 100 iterations
## # weights: 37
## initial value 26030.569512
## iter 10 value 22987.155528

```

```

## iter 20 value 22684.677450
## iter 30 value 22104.425327
## iter 40 value 21622.657941
## iter 50 value 21477.013486
## iter 60 value 21438.654930
## iter 70 value 21353.642885
## iter 80 value 21333.007178
## iter 90 value 21325.603968
## iter 100 value 21322.182995
## final value 21322.182995
## stopped after 100 iterations
## # weights: 101
## initial value 28936.975842
## iter 10 value 21383.812394
## iter 20 value 20099.336195
## iter 30 value 19874.662010
## iter 40 value 19787.007452
## iter 50 value 19624.666841
## iter 60 value 19446.339431
## iter 70 value 19305.650083
## iter 80 value 19207.836555
## iter 90 value 19091.533095
## iter 100 value 18964.136308
## final value 18964.136308
## stopped after 100 iterations
## # weights: 165
## initial value 30969.826030
## iter 10 value 20651.698412
## iter 20 value 18262.879821
## iter 30 value 17488.576658
## iter 40 value 17115.540796
## iter 50 value 16612.645375
## iter 60 value 16328.322457
## iter 70 value 16029.976057
## iter 80 value 15812.765894
## iter 90 value 15597.906345
## iter 100 value 15461.777019
## final value 15461.777019
## stopped after 100 iterations
## # weights: 35
## initial value 25881.944429
## iter 10 value 22977.029301
## iter 20 value 22804.016878
## iter 30 value 22520.829259
## iter 40 value 22160.683675
## iter 50 value 22115.063080
## iter 60 value 22085.982193
## iter 70 value 22075.871633
## iter 80 value 22060.421785
## iter 90 value 22037.145906
## iter 100 value 21973.191892
## final value 21973.191892
## stopped after 100 iterations
## # weights: 95

```

```

## initial value 27850.417329
## iter 10 value 21717.694852
## iter 20 value 19950.241560
## iter 30 value 19731.203234
## iter 40 value 19417.432123
## iter 50 value 19122.380889
## iter 60 value 18936.295098
## iter 70 value 18774.803637
## iter 80 value 18605.686842
## iter 90 value 18433.786098
## iter 100 value 18181.053974
## final value 18181.053974
## stopped after 100 iterations
## # weights: 155
## initial value 26518.752368
## iter 10 value 21049.051941
## iter 20 value 17928.773527
## iter 30 value 16940.112676
## iter 40 value 16606.391857
## iter 50 value 16220.915681
## iter 60 value 15838.697679
## iter 70 value 15631.189861
## iter 80 value 15286.037191
## iter 90 value 15035.614759
## iter 100 value 14910.731375
## final value 14910.731375
## stopped after 100 iterations
## # weights: 35
## initial value 25357.077251
## iter 10 value 23269.350793
## iter 20 value 22866.832390
## iter 30 value 22458.712295
## iter 40 value 22120.290984
## iter 50 value 21876.490385
## iter 60 value 21818.285175
## iter 70 value 21772.685138
## iter 80 value 21715.795811
## iter 90 value 21669.310406
## iter 100 value 21601.313495
## final value 21601.313495
## stopped after 100 iterations
## # weights: 95
## initial value 25982.246611
## iter 10 value 21895.583108
## iter 20 value 21074.042026
## iter 30 value 20658.019409
## iter 40 value 20130.226326
## iter 50 value 19802.648767
## iter 60 value 19412.697440
## iter 70 value 19223.435563
## iter 80 value 19019.090488
## iter 90 value 18905.457035
## iter 100 value 18833.015874
## final value 18833.015874

```

```

## stopped after 100 iterations
## # weights: 155
## initial value 28624.286196
## iter 10 value 22251.899830
## iter 20 value 19265.664181
## iter 30 value 18342.112454
## iter 40 value 17833.479364
## iter 50 value 17444.902729
## iter 60 value 17111.978678
## iter 70 value 16899.711798
## iter 80 value 16761.888050
## iter 90 value 16601.015691
## iter 100 value 16514.612282
## final value 16514.612282
## stopped after 100 iterations
## # weights: 35
## initial value 25970.361603
## iter 10 value 23022.060425
## iter 20 value 22568.230046
## iter 30 value 22370.906074
## iter 40 value 22046.926216
## iter 50 value 21855.204432
## iter 60 value 21817.533407
## iter 70 value 21784.088972
## iter 80 value 21754.392021
## iter 90 value 21681.571506
## iter 100 value 21564.825497
## final value 21564.825497
## stopped after 100 iterations
## # weights: 95
## initial value 27516.304329
## iter 10 value 21300.765393
## iter 20 value 20438.390797
## iter 30 value 20196.812292
## iter 40 value 20115.642418
## iter 50 value 19990.726472
## iter 60 value 19919.862652
## iter 70 value 19840.307440
## iter 80 value 19761.029384
## iter 90 value 19683.831936
## iter 100 value 19525.693020
## final value 19525.693020
## stopped after 100 iterations
## # weights: 155
## initial value 27453.809330
## iter 10 value 21657.567032
## iter 20 value 18925.044469
## iter 30 value 18220.408092
## iter 40 value 17583.515496
## iter 50 value 17208.720963
## iter 60 value 16989.717606
## iter 70 value 16846.582064
## iter 80 value 16721.179886
## iter 90 value 16547.223394

```

```

## iter 100 value 16347.517029
## final value 16347.517029
## stopped after 100 iterations
## # weights: 36
## initial value 26654.490779
## iter 10 value 24075.389883
## iter 20 value 23720.988787
## iter 30 value 23127.528777
## iter 40 value 22674.075416
## iter 50 value 22280.646183
## iter 60 value 22149.472889
## iter 70 value 22095.298353
## iter 80 value 22065.166547
## iter 90 value 22033.488160
## iter 100 value 22024.486213
## final value 22024.486213
## stopped after 100 iterations
## # weights: 98
## initial value 28091.721170
## iter 10 value 21941.493953
## iter 20 value 20185.568515
## iter 30 value 19416.567024
## iter 40 value 19026.408001
## iter 50 value 18597.384142
## iter 60 value 18246.576860
## iter 70 value 17965.950829
## iter 80 value 17857.034320
## iter 90 value 17798.235769
## iter 100 value 17752.597873
## final value 17752.597873
## stopped after 100 iterations
## # weights: 160
## initial value 31207.120982
## iter 10 value 24094.956486
## iter 20 value 19918.554629
## iter 30 value 18974.964556
## iter 40 value 18545.849537
## iter 50 value 17939.495929
## iter 60 value 17540.247084
## iter 70 value 17244.005593
## iter 80 value 16954.957143
## iter 90 value 16673.886309
## iter 100 value 16517.837348
## final value 16517.837348
## stopped after 100 iterations
## # weights: 36
## initial value 25638.459678
## iter 10 value 23257.017040
## iter 20 value 22979.499815
## iter 30 value 22661.853124
## iter 40 value 22391.733984
## iter 50 value 22242.873389
## iter 60 value 22214.835109
## iter 70 value 22204.780011

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## iter 80 value 22152.700199
## iter 90 value 22109.330769
## iter 100 value 22083.927704
## final value 22083.927704
## stopped after 100 iterations
## # weights: 98
## initial value 25410.987978
## iter 10 value 21221.205923
## iter 20 value 20031.160666
## iter 30 value 19596.213968
## iter 40 value 19298.752069
## iter 50 value 19088.905593
## iter 60 value 18952.989435
## iter 70 value 18818.412069
## iter 80 value 18636.674301
## iter 90 value 18335.709530
## iter 100 value 18101.965977
## final value 18101.965977
## stopped after 100 iterations
## # weights: 160
## initial value 26519.216232
## iter 10 value 20644.987915
## iter 20 value 19060.436384
## iter 30 value 18468.097699
## iter 40 value 18195.662176
## iter 50 value 17846.651934
## iter 60 value 17486.121927
## iter 70 value 17229.993980
## iter 80 value 16973.733030
## iter 90 value 16667.236151
## iter 100 value 16370.318904
## final value 16370.318904
## stopped after 100 iterations
## # weights: 36
## initial value 26487.453285
## iter 10 value 23659.889511
## iter 20 value 23080.206229
## iter 30 value 22408.156609
## iter 40 value 21923.304121
## iter 50 value 21843.381035
## iter 60 value 21747.212980
## iter 70 value 21683.301985
## iter 80 value 21660.480530
## iter 90 value 21652.421294
## iter 100 value 21643.375401
## final value 21643.375401
## stopped after 100 iterations
## # weights: 98
## initial value 27383.178467
## iter 10 value 23184.810519
## iter 20 value 21056.244211
## iter 30 value 20305.931605
## iter 40 value 19966.110595
## iter 50 value 19719.561483

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## iter 60 value 19531.238903
## iter 70 value 19428.788816
## iter 80 value 19391.552205
## iter 90 value 19381.608589
## iter 100 value 19372.466775
## final value 19372.466775
## stopped after 100 iterations
## # weights: 160
## initial value 31116.611438
## iter 10 value 22149.582206
## iter 20 value 18862.136472
## iter 30 value 18329.950513
## iter 40 value 18144.036737
## iter 50 value 17915.486126
## iter 60 value 17715.543829
## iter 70 value 17424.007722
## iter 80 value 17214.831664
## iter 90 value 17048.380674
## iter 100 value 16935.205383
## final value 16935.205383
## stopped after 100 iterations
## # weights: 36
## initial value 27831.479191
## iter 10 value 24562.660590
## iter 20 value 23827.993795
## iter 30 value 23021.706760
## iter 40 value 22741.874442
## iter 50 value 22203.702127
## iter 60 value 21875.832976
## iter 70 value 21806.007532
## iter 80 value 21797.059003
## iter 90 value 21785.529310
## iter 100 value 21743.390863
## final value 21743.390863
## stopped after 100 iterations
## # weights: 98
## initial value 26983.820999
## iter 10 value 22394.597307
## iter 20 value 20425.159730
## iter 30 value 19322.734329
## iter 40 value 19105.138008
## iter 50 value 18816.240191
## iter 60 value 18551.965286
## iter 70 value 18389.207176
## iter 80 value 18258.183609
## iter 90 value 18056.972536
## iter 100 value 17849.703176
## final value 17849.703176
## stopped after 100 iterations
## # weights: 160
## initial value 25941.650357
## iter 10 value 20841.445997
## iter 20 value 18682.505036
## iter 30 value 17882.840078

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## iter 40 value 17634.828014
## iter 50 value 17291.049723
## iter 60 value 16909.865328
## iter 70 value 16622.447762
## iter 80 value 16410.152948
## iter 90 value 16210.716596
## iter 100 value 16057.612713
## final value 16057.612713
## stopped after 100 iterations
## # weights: 36
## initial value 25564.972183
## iter 10 value 24280.957344
## iter 20 value 24044.650230
## iter 30 value 23435.022825
## iter 40 value 22503.239225
## iter 50 value 22113.677401
## iter 60 value 22081.464605
## iter 70 value 21993.955694
## iter 80 value 21872.274113
## iter 90 value 21826.351826
## iter 100 value 21815.867271
## final value 21815.867271
## stopped after 100 iterations
## # weights: 98
## initial value 27274.926420
## iter 10 value 22823.492562
## iter 20 value 21504.880502
## iter 30 value 20719.561507
## iter 40 value 20291.065568
## iter 50 value 20011.549323
## iter 60 value 19494.870538
## iter 70 value 19086.111160
## iter 80 value 18747.144295
## iter 90 value 18546.683750
## iter 100 value 18424.144553
## final value 18424.144553
## stopped after 100 iterations
## # weights: 160
## initial value 25849.212047
## iter 10 value 20083.219687
## iter 20 value 18341.655946
## iter 30 value 17559.746862
## iter 40 value 17360.341424
## iter 50 value 17154.511185
## iter 60 value 16890.913601
## iter 70 value 16684.026940
## iter 80 value 16455.782813
## iter 90 value 16227.226827
## iter 100 value 16083.335671
## final value 16083.335671
## stopped after 100 iterations
## # weights: 36
## initial value 27152.007041
## iter 10 value 24649.750123

```



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## iter 20 value 24078.910149
## iter 30 value 23327.464923
## iter 40 value 22419.646419
## iter 50 value 22184.916930
## iter 60 value 22151.555238
## iter 70 value 22104.913165
## iter 80 value 22100.391040
## iter 90 value 22094.893509
## iter 100 value 22081.270589
## final value 22081.270589
## stopped after 100 iterations
## # weights: 98
## initial value 26988.749873
## iter 10 value 22813.486643
## iter 20 value 21285.800067
## iter 30 value 20303.967212
## iter 40 value 19878.113743
## iter 50 value 19501.594951
## iter 60 value 19057.732679
## iter 70 value 18733.510558
## iter 80 value 18527.288362
## iter 90 value 18345.523383
## iter 100 value 18235.165049
## final value 18235.165049
## stopped after 100 iterations
## # weights: 160
## initial value 28822.270640
## iter 10 value 21723.329625
## iter 20 value 18357.189896
## iter 30 value 17067.186359
## iter 40 value 16779.170995
## iter 50 value 16417.639930
## iter 60 value 15961.416112
## iter 70 value 15704.497717
## iter 80 value 15526.749569
## iter 90 value 15410.125083
## iter 100 value 15297.015717
## final value 15297.015717
## stopped after 100 iterations
## # weights: 37
## initial value 27477.532163
## iter 10 value 23715.760980
## iter 20 value 23221.796249
## iter 30 value 22662.719846
## iter 40 value 22475.496187
## iter 50 value 22194.308817
## iter 60 value 22144.664410
## iter 70 value 22123.872141
## iter 80 value 22051.266350
## iter 90 value 22034.694754
## iter 100 value 22016.503212
## final value 22016.503212
## stopped after 100 iterations
## # weights: 101

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## initial value 28496.240311
## iter 10 value 21789.914721
## iter 20 value 20386.797760
## iter 30 value 20039.782213
## iter 40 value 19544.221857
## iter 50 value 19082.092506
## iter 60 value 18770.995575
## iter 70 value 18482.569524
## iter 80 value 18268.714755
## iter 90 value 17990.918492
## iter 100 value 17771.289425
## final value 17771.289425
## stopped after 100 iterations
## # weights: 165
## initial value 32780.409812
## iter 10 value 21807.906914
## iter 20 value 19642.065886
## iter 30 value 18499.754180
## iter 40 value 18233.236961
## iter 50 value 17974.765064
## iter 60 value 17556.835125
## iter 70 value 17177.206039
## iter 80 value 16777.695658
## iter 90 value 16520.298597
## iter 100 value 16347.983634
## final value 16347.983634
## stopped after 100 iterations
## # weights: 37
## initial value 26251.924611
## iter 10 value 24345.901526
## iter 20 value 23762.208783
## iter 30 value 23491.346123
## iter 40 value 23106.220868
## iter 50 value 22763.252143
## iter 60 value 22609.715620
## iter 70 value 22471.360947
## iter 80 value 22371.319543
## iter 90 value 22224.391523
## iter 100 value 22137.888124
## final value 22137.888124
## stopped after 100 iterations
## # weights: 101
## initial value 27609.093047
## iter 10 value 21922.220581
## iter 20 value 20110.026104
## iter 30 value 19592.015698
## iter 40 value 19485.900458
## iter 50 value 19270.335509
## iter 60 value 18994.686539
## iter 70 value 18779.356710
## iter 80 value 18677.324899
## iter 90 value 18598.300247
## iter 100 value 18531.496259
## final value 18531.496259

```

```

## stopped after 100 iterations
## # weights: 165
## initial value 25189.718802
## iter 10 value 19843.504473
## iter 20 value 18153.917136
## iter 30 value 17551.018050
## iter 40 value 17203.395591
## iter 50 value 16935.004232
## iter 60 value 16781.977105
## iter 70 value 16473.425498
## iter 80 value 16223.629095
## iter 90 value 16008.696050
## iter 100 value 15888.219093
## final value 15888.219093
## stopped after 100 iterations
## # weights: 37
## initial value 27421.532488
## iter 10 value 23734.436461
## iter 20 value 23434.012470
## iter 30 value 23116.193395
## iter 40 value 22593.565271
## iter 50 value 22062.121107
## iter 60 value 21865.932808
## iter 70 value 21777.304774
## iter 80 value 21725.633263
## iter 90 value 21716.138461
## iter 100 value 21697.600474
## final value 21697.600474
## stopped after 100 iterations
## # weights: 101
## initial value 27007.244301
## iter 10 value 22996.425767
## iter 20 value 21617.565945
## iter 30 value 20976.323034
## iter 40 value 20393.542164
## iter 50 value 19967.988336
## iter 60 value 19677.403325
## iter 70 value 19514.192006
## iter 80 value 19050.919196
## iter 90 value 18651.297800
## iter 100 value 18459.324124
## final value 18459.324124
## stopped after 100 iterations
## # weights: 165
## initial value 28036.908501
## iter 10 value 21153.831855
## iter 20 value 18775.807962
## iter 30 value 17191.467640
## iter 40 value 16789.659013
## iter 50 value 16604.069361
## iter 60 value 16434.838558
## iter 70 value 16214.305306
## iter 80 value 15986.001013
## iter 90 value 15822.942264

```

```

## iter 100 value 15750.250721
## final value 15750.250721
## stopped after 100 iterations
## # weights: 37
## initial value 27206.850314
## iter 10 value 23201.361955
## iter 20 value 23003.567527
## iter 30 value 22472.524938
## iter 40 value 22219.516786
## iter 50 value 22010.436124
## iter 60 value 21946.811263
## iter 70 value 21877.082023
## iter 80 value 21850.163265
## iter 90 value 21841.402726
## iter 100 value 21833.830055
## final value 21833.830055
## stopped after 100 iterations
## # weights: 101
## initial value 30060.126477
## iter 10 value 24739.535610
## iter 20 value 20956.265507
## iter 30 value 20473.218044
## iter 40 value 20172.071908
## iter 50 value 19880.999047
## iter 60 value 19638.812286
## iter 70 value 19471.775793
## iter 80 value 19353.582059
## iter 90 value 19223.110234
## iter 100 value 19147.688578
## final value 19147.688578
## stopped after 100 iterations
## # weights: 165
## initial value 27812.810069
## iter 10 value 22466.203260
## iter 20 value 18596.991426
## iter 30 value 17671.195476
## iter 40 value 17350.766076
## iter 50 value 17096.211585
## iter 60 value 16635.396135
## iter 70 value 16137.214158
## iter 80 value 15880.953334
## iter 90 value 15755.248499
## iter 100 value 15621.188365
## final value 15621.188365
## stopped after 100 iterations
## # weights: 37
## initial value 26045.974414
## iter 10 value 23557.850035
## iter 20 value 23126.341761
## iter 30 value 22562.966487
## iter 40 value 22210.773443
## iter 50 value 21975.189472
## iter 60 value 21888.797850
## iter 70 value 21792.906464

```

```

## iter 80 value 21747.056114
## iter 90 value 21728.215494
## iter 100 value 21699.610353
## final value 21699.610353
## stopped after 100 iterations
## # weights: 101
## initial value 27854.023981
## iter 10 value 22469.374471
## iter 20 value 21136.179379
## iter 30 value 20655.090462
## iter 40 value 20299.793784
## iter 50 value 20094.715641
## iter 60 value 19841.943061
## iter 70 value 19642.682240
## iter 80 value 19442.235805
## iter 90 value 19309.029215
## iter 100 value 19253.296802
## final value 19253.296802
## stopped after 100 iterations
## # weights: 165
## initial value 27156.451941
## iter 10 value 21062.903305
## iter 20 value 18794.372423
## iter 30 value 18445.827697
## iter 40 value 18113.076557
## iter 50 value 17703.169706
## iter 60 value 17344.443683
## iter 70 value 17044.950549
## iter 80 value 16657.030573
## iter 90 value 16241.634588
## iter 100 value 16009.016500
## final value 16009.016500
## stopped after 100 iterations
## # weights: 37
## initial value 25970.166575
## iter 10 value 23713.187222
## iter 20 value 23243.573096
## iter 30 value 22724.426923
## iter 40 value 22588.310347
## iter 50 value 22529.945371
## iter 60 value 22376.339169
## iter 70 value 22082.143976
## iter 80 value 21920.041312
## iter 90 value 21876.966005
## iter 100 value 21827.307504
## final value 21827.307504
## stopped after 100 iterations
## # weights: 101
## initial value 26215.517691
## iter 10 value 21644.901937
## iter 20 value 20779.322438
## iter 30 value 20382.556319
## iter 40 value 20059.742865
## iter 50 value 19867.091912

```

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## iter 60 value 19495.547597
## iter 70 value 19300.089317
## iter 80 value 19092.842277
## iter 90 value 18950.284008
## iter 100 value 18832.593171
## final value 18832.593171
## stopped after 100 iterations
## # weights: 165
## initial value 27899.190291
## iter 10 value 20420.429346
## iter 20 value 18386.484933
## iter 30 value 17148.084800
## iter 40 value 16757.826367
## iter 50 value 16549.987195
## iter 60 value 16339.723321
## iter 70 value 16230.875255
## iter 80 value 16057.413366
## iter 90 value 15846.906213
## iter 100 value 15725.892622
## final value 15725.892622
## stopped after 100 iterations
## # weights: 37
## initial value 27415.934009
## iter 10 value 24043.353632
## iter 20 value 23611.962702
## iter 30 value 22482.723931
## iter 40 value 22021.566186
## iter 50 value 21856.209905
## iter 60 value 21732.269947
## iter 70 value 21575.272499
## iter 80 value 21512.905560
## iter 90 value 21475.571368
## iter 100 value 21456.512251
## final value 21456.512251
## stopped after 100 iterations
## # weights: 101
## initial value 29781.118861
## iter 10 value 23468.003119
## iter 20 value 21605.283604
## iter 30 value 20727.876064
## iter 40 value 20330.244122
## iter 50 value 19891.381291
## iter 60 value 19400.216579
## iter 70 value 19044.078919
## iter 80 value 18841.587163
## iter 90 value 18682.747349
## iter 100 value 18584.618881
## final value 18584.618881
## stopped after 100 iterations
## # weights: 165
## initial value 31831.916417
## iter 10 value 22011.285559
## iter 20 value 19483.758179
## iter 30 value 18356.237762

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```

## iter 40 value 17750.740087
## iter 50 value 17452.905486
## iter 60 value 17337.102374
## iter 70 value 17075.275120
## iter 80 value 16715.252918
## iter 90 value 16199.063315
## iter 100 value 15865.647130
## final value 15865.647130
## stopped after 100 iterations
## # weights: 37
## initial value 25961.534083
## iter 10 value 24176.007750
## iter 20 value 23916.666276
## iter 30 value 23375.453980
## iter 40 value 22851.017924
## iter 50 value 22073.502301
## iter 60 value 21892.509179
## iter 70 value 21856.352020
## iter 80 value 21799.035409
## iter 90 value 21768.805191
## iter 100 value 21758.655357
## final value 21758.655357
## stopped after 100 iterations
## # weights: 101
## initial value 26794.206785
## iter 10 value 22224.295649
## iter 20 value 20575.851725
## iter 30 value 20167.390944
## iter 40 value 19906.288396
## iter 50 value 19593.856701
## iter 60 value 19438.263981
## iter 70 value 19373.083381
## iter 80 value 19324.799135
## iter 90 value 19297.381468
## iter 100 value 19279.836640
## final value 19279.836640
## stopped after 100 iterations
## # weights: 165
## initial value 26308.443812
## iter 10 value 21089.300844
## iter 20 value 18383.905194
## iter 30 value 17551.286965
## iter 40 value 17068.853064
## iter 50 value 16593.626569
## iter 60 value 16348.391964
## iter 70 value 16092.826215
## iter 80 value 15946.469345
## iter 90 value 15844.614128
## iter 100 value 15748.995990
## final value 15748.995990
## stopped after 100 iterations
## # weights: 37
## initial value 27959.933123
## iter 10 value 24000.883670

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```

## iter 20 value 23482.722042
## iter 30 value 22487.945075
## iter 40 value 21972.480672
## iter 50 value 21631.635314
## iter 60 value 21609.446453
## iter 70 value 21592.153909
## iter 80 value 21524.690814
## iter 90 value 21496.803912
## iter 100 value 21448.104443
## final value 21448.104443
## stopped after 100 iterations
## # weights: 101
## initial value 27363.793619
## iter 10 value 22083.142501
## iter 20 value 20397.764582
## iter 30 value 19955.789575
## iter 40 value 19806.608635
## iter 50 value 19653.103234
## iter 60 value 19340.918572
## iter 70 value 19049.807984
## iter 80 value 18740.399259
## iter 90 value 18515.344326
## iter 100 value 18178.054876
## final value 18178.054876
## stopped after 100 iterations
## # weights: 165
## initial value 26876.492735
## iter 10 value 20807.442688
## iter 20 value 17607.602288
## iter 30 value 16951.293958
## iter 40 value 16684.050987
## iter 50 value 16384.249954
## iter 60 value 16129.267460
## iter 70 value 15907.379532
## iter 80 value 15690.999532
## iter 90 value 15583.774605
## iter 100 value 15482.057712
## final value 15482.057712
## stopped after 100 iterations
## # weights: 37
## initial value 26033.564939
## iter 10 value 23019.007802
## iter 20 value 22592.096830
## iter 30 value 22237.778573
## iter 40 value 22031.018631
## iter 50 value 21761.882343
## iter 60 value 21672.022529
## iter 70 value 21631.648002
## iter 80 value 21583.688267
## iter 90 value 21566.987727
## iter 100 value 21551.694682
## final value 21551.694682
## stopped after 100 iterations
## # weights: 101

```



```

## initial value 27471.640669
## iter 10 value 22134.262667
## iter 20 value 20528.191796
## iter 30 value 20097.733039
## iter 40 value 19764.088048
## iter 50 value 19485.939107
## iter 60 value 19087.488602
## iter 70 value 18860.818717
## iter 80 value 18653.189812
## iter 90 value 18477.215276
## iter 100 value 18397.503756
## final value 18397.503756
## stopped after 100 iterations
## # weights: 165
## initial value 34174.304088
## iter 10 value 22137.904295
## iter 20 value 19579.417726
## iter 30 value 18197.510385
## iter 40 value 17657.244020
## iter 50 value 17234.179320
## iter 60 value 16731.413838
## iter 70 value 16287.209734
## iter 80 value 15976.774960
## iter 90 value 15695.536879
## iter 100 value 15525.389973
## final value 15525.389973
## stopped after 100 iterations
## # weights: 37
## initial value 25848.463844
## iter 10 value 23685.359172
## iter 20 value 23381.898362
## iter 30 value 22642.150241
## iter 40 value 22061.895911
## iter 50 value 21893.188221
## iter 60 value 21778.343665
## iter 70 value 21760.475762
## iter 80 value 21757.382033
## iter 90 value 21756.047675
## iter 100 value 21741.904071
## final value 21741.904071
## stopped after 100 iterations
## # weights: 101
## initial value 26224.277894
## iter 10 value 22258.209774
## iter 20 value 20371.225015
## iter 30 value 19651.815264
## iter 40 value 19138.735592
## iter 50 value 18774.999051
## iter 60 value 18402.491412
## iter 70 value 18106.872361
## iter 80 value 17895.102261
## iter 90 value 17768.955572
## iter 100 value 17706.552138
## final value 17706.552138

```

```

## stopped after 100 iterations
## # weights: 165
## initial value 27704.889993
## iter 10 value 20136.157406
## iter 20 value 18712.857735
## iter 30 value 17524.087252
## iter 40 value 17175.010576
## iter 50 value 16956.666982
## iter 60 value 16728.332803
## iter 70 value 16556.147562
## iter 80 value 16393.104711
## iter 90 value 16286.130228
## iter 100 value 16140.390366
## final value 16140.390366
## stopped after 100 iterations
## # weights: 37
## initial value 25683.272076
## iter 10 value 23373.513229
## iter 20 value 23079.712947
## iter 30 value 22649.797409
## iter 40 value 22233.851419
## iter 50 value 22091.578584
## iter 60 value 21984.072264
## iter 70 value 21868.035326
## iter 80 value 21802.870001
## iter 90 value 21783.447546
## iter 100 value 21768.363571
## final value 21768.363571
## stopped after 100 iterations
## # weights: 101
## initial value 26463.820597
## iter 10 value 22484.305538
## iter 20 value 21013.884155
## iter 30 value 20046.774056
## iter 40 value 19601.903107
## iter 50 value 19365.261189
## iter 60 value 19179.273766
## iter 70 value 19086.093495
## iter 80 value 19038.639190
## iter 90 value 19013.093773
## iter 100 value 18979.025456
## final value 18979.025456
## stopped after 100 iterations
## # weights: 165
## initial value 29677.075843
## iter 10 value 20500.597592
## iter 20 value 18855.769685
## iter 30 value 17912.717153
## iter 40 value 17433.690370
## iter 50 value 17166.062370
## iter 60 value 16963.846992
## iter 70 value 16598.104604
## iter 80 value 16398.868238
## iter 90 value 16209.370167

```

```

## iter 100 value 16108.462639
## final value 16108.462639
## stopped after 100 iterations
## # weights: 36
## initial value 25965.910706
## iter 10 value 24191.132757
## iter 20 value 23762.007668
## iter 30 value 23089.260960
## iter 40 value 22452.260697
## iter 50 value 21962.680040
## iter 60 value 21817.431172
## iter 70 value 21767.877268
## iter 80 value 21704.162455
## iter 90 value 21670.834118
## iter 100 value 21646.273262
## final value 21646.273262
## stopped after 100 iterations
## # weights: 98
## initial value 25792.863848
## iter 10 value 22125.301963
## iter 20 value 20517.246435
## iter 30 value 20017.600687
## iter 40 value 19579.746036
## iter 50 value 19256.385529
## iter 60 value 19079.092536
## iter 70 value 18756.434432
## iter 80 value 18465.678078
## iter 90 value 18263.124031
## iter 100 value 18068.431190
## final value 18068.431190
## stopped after 100 iterations
## # weights: 160
## initial value 28236.112530
## iter 10 value 21522.478193
## iter 20 value 18906.738490
## iter 30 value 18129.873338
## iter 40 value 17547.918744
## iter 50 value 16926.237781
## iter 60 value 16448.253737
## iter 70 value 16172.535328
## iter 80 value 15963.264300
## iter 90 value 15825.333907
## iter 100 value 15671.413562
## final value 15671.413562
## stopped after 100 iterations
## # weights: 36
## initial value 26908.639209
## iter 10 value 24144.178781
## iter 20 value 23934.792068
## iter 30 value 23546.182524
## iter 40 value 23149.777311
## iter 50 value 22670.263261
## iter 60 value 22483.818871
## iter 70 value 22466.383426

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## iter 80 value 22464.815690
## iter 90 value 22463.833979
## iter 100 value 22461.692121
## final value 22461.692121
## stopped after 100 iterations
## # weights: 98
## initial value 25557.649947
## iter 10 value 22373.858935
## iter 20 value 20556.193441
## iter 30 value 19723.101310
## iter 40 value 19382.321471
## iter 50 value 18941.550772
## iter 60 value 18699.184946
## iter 70 value 18556.667286
## iter 80 value 18461.111347
## iter 90 value 18384.319472
## iter 100 value 18327.497059
## final value 18327.497059
## stopped after 100 iterations
## # weights: 160
## initial value 26364.316743
## iter 10 value 21389.245381
## iter 20 value 19138.095685
## iter 30 value 18297.199288
## iter 40 value 17960.555919
## iter 50 value 17643.232635
## iter 60 value 17215.116307
## iter 70 value 16925.676679
## iter 80 value 16668.548707
## iter 90 value 16500.681083
## iter 100 value 16363.368858
## final value 16363.368858
## stopped after 100 iterations
## # weights: 36
## initial value 26324.434082
## iter 10 value 24523.793683
## iter 20 value 24247.718356
## iter 30 value 23731.912320
## iter 40 value 22989.676744
## iter 50 value 22369.587708
## iter 60 value 22225.314115
## iter 70 value 22150.203301
## iter 80 value 22096.020505
## iter 90 value 22055.215568
## iter 100 value 21956.895600
## final value 21956.895600
## stopped after 100 iterations
## # weights: 98
## initial value 28322.888371
## iter 10 value 22201.696080
## iter 20 value 20147.313004
## iter 30 value 19387.600251
## iter 40 value 18880.593327
## iter 50 value 18471.761465

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## iter 60 value 18326.961028
## iter 70 value 18034.637369
## iter 80 value 17857.150328
## iter 90 value 17760.650088
## iter 100 value 17704.160242
## final value 17704.160242
## stopped after 100 iterations
## # weights: 160
## initial value 30561.164418
## iter 10 value 21130.245370
## iter 20 value 19031.308089
## iter 30 value 17763.911619
## iter 40 value 17117.017796
## iter 50 value 16897.463162
## iter 60 value 16717.291603
## iter 70 value 16537.791848
## iter 80 value 16328.759681
## iter 90 value 16193.368313
## iter 100 value 16043.943061
## final value 16043.943061
## stopped after 100 iterations
## # weights: 37
## initial value 26008.401686
## iter 10 value 23136.363945
## iter 20 value 23016.366265
## iter 30 value 22632.176383
## iter 40 value 22151.258158
## iter 50 value 21703.341286
## iter 60 value 21505.352959
## iter 70 value 21313.582169
## iter 80 value 21282.926871
## iter 90 value 21275.282144
## iter 100 value 21239.968408
## final value 21239.968408
## stopped after 100 iterations
## # weights: 101
## initial value 28869.684049
## iter 10 value 23241.956909
## iter 20 value 20981.609098
## iter 30 value 20229.540968
## iter 40 value 19877.856897
## iter 50 value 19777.373943
## iter 60 value 19642.730117
## iter 70 value 19527.689683
## iter 80 value 19469.098960
## iter 90 value 19437.895775
## iter 100 value 19415.140112
## final value 19415.140112
## stopped after 100 iterations
## # weights: 165
## initial value 26300.209757
## iter 10 value 20790.874147
## iter 20 value 17441.250024
## iter 30 value 16814.484159

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## iter 40 value 16571.902832
## iter 50 value 16144.094421
## iter 60 value 15818.879585
## iter 70 value 15620.010490
## iter 80 value 15413.893015
## iter 90 value 15304.433357
## iter 100 value 15192.098123
## final value 15192.098123
## stopped after 100 iterations
## # weights: 37
## initial value 26868.625678
## iter 10 value 23841.944837
## iter 20 value 23594.833370
## iter 30 value 22631.556712
## iter 40 value 21799.257247
## iter 50 value 21495.314348
## iter 60 value 21389.003270
## iter 70 value 21352.057809
## iter 80 value 21335.430796
## iter 90 value 21334.023261
## iter 100 value 21330.508201
## final value 21330.508201
## stopped after 100 iterations
## # weights: 101
## initial value 27880.038715
## iter 10 value 22221.525784
## iter 20 value 19999.427559
## iter 30 value 19539.303897
## iter 40 value 19342.924238
## iter 50 value 18968.929692
## iter 60 value 18536.495634
## iter 70 value 18194.842322
## iter 80 value 17970.630613
## iter 90 value 17865.701494
## iter 100 value 17750.383078
## final value 17750.383078
## stopped after 100 iterations
## # weights: 165
## initial value 31506.575710
## iter 10 value 23174.218865
## iter 20 value 18962.773697
## iter 30 value 17998.390829
## iter 40 value 17403.965935
## iter 50 value 17156.734249
## iter 60 value 16976.668611
## iter 70 value 16666.813080
## iter 80 value 16326.311536
## iter 90 value 16067.353127
## iter 100 value 15901.184613
## final value 15901.184613
## stopped after 100 iterations
## # weights: 37
## initial value 25591.444845
## iter 10 value 23548.485324

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```

## iter 20 value 23194.554897
## iter 30 value 22580.367582
## iter 40 value 22235.039307
## iter 50 value 22003.674760
## iter 60 value 21893.633947
## iter 70 value 21876.107070
## iter 80 value 21853.287443
## iter 90 value 21809.380701
## iter 100 value 21661.085600
## final value 21661.085600
## stopped after 100 iterations
## # weights: 101
## initial value 29224.126746
## iter 10 value 21424.824377
## iter 20 value 19790.951561
## iter 30 value 19337.355337
## iter 40 value 19036.389175
## iter 50 value 18686.450287
## iter 60 value 18421.514063
## iter 70 value 18285.158595
## iter 80 value 18218.511008
## iter 90 value 18156.355912
## iter 100 value 18062.901105
## final value 18062.901105
## stopped after 100 iterations
## # weights: 165
## initial value 29915.855961
## iter 10 value 22476.378263
## iter 20 value 19033.198696
## iter 30 value 18115.811194
## iter 40 value 17714.645584
## iter 50 value 17157.297509
## iter 60 value 16716.613460
## iter 70 value 16544.121687
## iter 80 value 16412.242140
## iter 90 value 16312.404405
## iter 100 value 16239.551097
## final value 16239.551097
## stopped after 100 iterations
## # weights: 35
## initial value 26544.489834
## iter 10 value 23232.687378
## iter 20 value 22723.552197
## iter 30 value 22360.823989
## iter 40 value 21926.252204
## iter 50 value 21776.960916
## iter 60 value 21766.273577
## iter 70 value 21755.594657
## iter 80 value 21736.956574
## iter 90 value 21722.152997
## iter 100 value 21694.069532
## final value 21694.069532
## stopped after 100 iterations
## # weights: 95

```

```

## initial value 29704.371023
## iter 10 value 22829.191953
## iter 20 value 20436.839476
## iter 30 value 19781.652608
## iter 40 value 19507.987075
## iter 50 value 19328.850529
## iter 60 value 19070.725181
## iter 70 value 18754.370650
## iter 80 value 18548.006207
## iter 90 value 18447.035838
## iter 100 value 18391.070312
## final value 18391.070312
## stopped after 100 iterations
## # weights: 155
## initial value 27789.299269
## iter 10 value 21932.587115
## iter 20 value 18697.078797
## iter 30 value 17890.828857
## iter 40 value 17585.014788
## iter 50 value 17274.397962
## iter 60 value 16956.539143
## iter 70 value 16649.265793
## iter 80 value 16244.570207
## iter 90 value 15991.904609
## iter 100 value 15795.134370
## final value 15795.134370
## stopped after 100 iterations
## # weights: 35
## initial value 26791.738642
## iter 10 value 24364.388361
## iter 20 value 24153.607905
## iter 30 value 23376.804257
## iter 40 value 22806.744475
## iter 50 value 22503.580223
## iter 60 value 22320.355489
## iter 70 value 22235.307848
## iter 80 value 22185.503916
## iter 90 value 22176.653811
## iter 100 value 22164.617899
## final value 22164.617899
## stopped after 100 iterations
## # weights: 95
## initial value 28121.743205
## iter 10 value 23174.620774
## iter 20 value 20645.340635
## iter 30 value 20170.613167
## iter 40 value 19894.809208
## iter 50 value 19644.840462
## iter 60 value 19524.835328
## iter 70 value 19340.947923
## iter 80 value 19192.085157
## iter 90 value 19063.378038
## iter 100 value 18969.204700
## final value 18969.204700

```



```

## stopped after 100 iterations
## # weights: 155
## initial value 32686.655312
## iter 10 value 20801.371787
## iter 20 value 17906.869883
## iter 30 value 16987.662727
## iter 40 value 16735.333073
## iter 50 value 16498.830795
## iter 60 value 16112.157649
## iter 70 value 15795.671798
## iter 80 value 15555.481517
## iter 90 value 15279.181905
## iter 100 value 15089.148076
## final value 15089.148076
## stopped after 100 iterations
## # weights: 35
## initial value 27019.104794
## iter 10 value 23552.355825
## iter 20 value 23453.716215
## iter 30 value 23071.226568
## iter 40 value 22088.153201
## iter 50 value 21752.861062
## iter 60 value 21662.956419
## iter 70 value 21650.115860
## iter 80 value 21645.599018
## iter 90 value 21638.861029
## iter 100 value 21634.075671
## final value 21634.075671
## stopped after 100 iterations
## # weights: 95
## initial value 26401.408479
## iter 10 value 22343.573980
## iter 20 value 20678.979341
## iter 30 value 20071.562490
## iter 40 value 19648.502704
## iter 50 value 19504.863758
## iter 60 value 19269.586999
## iter 70 value 19096.213486
## iter 80 value 18963.419287
## iter 90 value 18750.499677
## iter 100 value 18507.378929
## final value 18507.378929
## stopped after 100 iterations
## # weights: 155
## initial value 26459.327173
## iter 10 value 21811.563575
## iter 20 value 19192.983973
## iter 30 value 18120.069476
## iter 40 value 17590.556441
## iter 50 value 17281.630876
## iter 60 value 17013.304980
## iter 70 value 16821.885218
## iter 80 value 16448.324846
## iter 90 value 16084.607762

```

```

## iter 100 value 15844.898583
## final value 15844.898583
## stopped after 100 iterations
## # weights: 37
## initial value 27160.497687
## iter 10 value 24975.384377
## iter 20 value 23852.039087
## iter 30 value 23514.184712
## iter 40 value 23339.219706
## iter 50 value 23176.618442
## iter 60 value 22785.618028
## iter 70 value 22657.175390
## iter 80 value 22630.680228
## iter 90 value 22624.446033
## iter 100 value 22610.254773
## final value 22610.254773
## stopped after 100 iterations
## # weights: 101
## initial value 27649.896971
## iter 10 value 22109.730384
## iter 20 value 20324.797847
## iter 30 value 19504.688473
## iter 40 value 19098.890797
## iter 50 value 18903.577594
## iter 60 value 18510.968701
## iter 70 value 18178.335530
## iter 80 value 17965.774070
## iter 90 value 17846.315099
## iter 100 value 17751.601151
## final value 17751.601151
## stopped after 100 iterations
## # weights: 165
## initial value 26893.817454
## iter 10 value 21221.709267
## iter 20 value 19033.505828
## iter 30 value 18475.549374
## iter 40 value 17756.152680
## iter 50 value 17037.807907
## iter 60 value 16525.605760
## iter 70 value 16246.335334
## iter 80 value 16087.325624
## iter 90 value 15953.347640
## iter 100 value 15864.944695
## final value 15864.944695
## stopped after 100 iterations
## # weights: 37
## initial value 25993.365749
## iter 10 value 23376.162280
## iter 20 value 22995.887617
## iter 30 value 22592.023300
## iter 40 value 22277.793194
## iter 50 value 22004.119810
## iter 60 value 21820.790748
## iter 70 value 21761.070399

```

```

## iter 80 value 21709.913208
## iter 90 value 21685.060106
## iter 100 value 21659.967287
## final value 21659.967287
## stopped after 100 iterations
## # weights: 101
## initial value 29242.533546
## iter 10 value 22402.334634
## iter 20 value 21009.986488
## iter 30 value 20586.351252
## iter 40 value 20270.796389
## iter 50 value 19821.009723
## iter 60 value 19452.978007
## iter 70 value 19193.125570
## iter 80 value 19044.599610
## iter 90 value 18868.493513
## iter 100 value 18765.175777
## final value 18765.175777
## stopped after 100 iterations
## # weights: 165
## initial value 28798.329563
## iter 10 value 21861.722193
## iter 20 value 19306.178905
## iter 30 value 18673.559211
## iter 40 value 18274.638691
## iter 50 value 17909.085742
## iter 60 value 17450.432943
## iter 70 value 17254.877995
## iter 80 value 17068.476904
## iter 90 value 16971.827314
## iter 100 value 16905.010146
## final value 16905.010146
## stopped after 100 iterations
## # weights: 37
## initial value 25667.329529
## iter 10 value 23038.489495
## iter 20 value 22486.241050
## iter 30 value 22252.914831
## iter 40 value 22184.236804
## iter 50 value 22052.329383
## iter 60 value 21976.433153
## iter 70 value 21890.612150
## iter 80 value 21835.293077
## iter 90 value 21819.545286
## iter 100 value 21782.399111
## final value 21782.399111
## stopped after 100 iterations
## # weights: 101
## initial value 28025.872039
## iter 10 value 22689.829998
## iter 20 value 21729.944988
## iter 30 value 21300.790151
## iter 40 value 20902.287418
## iter 50 value 20494.244132

```

```

## iter 60 value 20278.888907
## iter 70 value 20025.467808
## iter 80 value 19821.313507
## iter 90 value 19412.026374
## iter 100 value 19021.903322
## final value 19021.903322
## stopped after 100 iterations
## # weights: 165
## initial value 27390.343782
## iter 10 value 21514.683681
## iter 20 value 18617.183999
## iter 30 value 17834.107286
## iter 40 value 17301.755549
## iter 50 value 16899.446877
## iter 60 value 16541.399845
## iter 70 value 16314.987713
## iter 80 value 16202.303652
## iter 90 value 16104.368644
## iter 100 value 16013.288627
## final value 16013.288627
## stopped after 100 iterations
## # weights: 35
## initial value 25754.610817
## iter 10 value 22674.619849
## iter 20 value 22399.219130
## iter 30 value 22255.856801
## iter 40 value 22036.511097
## iter 50 value 21975.366159
## iter 60 value 21905.911699
## iter 70 value 21643.072722
## iter 80 value 21466.316252
## iter 90 value 21422.432736
## iter 100 value 21410.807695
## final value 21410.807695
## stopped after 100 iterations
## # weights: 95
## initial value 27255.131555
## iter 10 value 21966.249200
## iter 20 value 20288.213220
## iter 30 value 19769.870693
## iter 40 value 19335.012138
## iter 50 value 18996.720596
## iter 60 value 18717.675061
## iter 70 value 18331.958274
## iter 80 value 18154.205283
## iter 90 value 18066.102651
## iter 100 value 18015.028581
## final value 18015.028581
## stopped after 100 iterations
## # weights: 155
## initial value 26437.856927
## iter 10 value 21567.563257
## iter 20 value 18818.176991
## iter 30 value 18399.490514

```

```

## iter 40 value 18021.463057
## iter 50 value 17625.088757
## iter 60 value 17313.437836
## iter 70 value 17122.543730
## iter 80 value 16956.338006
## iter 90 value 16838.416618
## iter 100 value 16725.421291
## final value 16725.421291
## stopped after 100 iterations
## # weights: 35
## initial value 26229.923996
## iter 10 value 22837.158060
## iter 20 value 22633.692541
## iter 30 value 22288.074466
## iter 40 value 21852.429909
## iter 50 value 21527.465489
## iter 60 value 21458.272158
## iter 70 value 21389.293901
## iter 80 value 21371.250383
## iter 90 value 21361.469150
## iter 100 value 21351.493467
## final value 21351.493467
## stopped after 100 iterations
## # weights: 95
## initial value 27190.776633
## iter 10 value 22211.679678
## iter 20 value 20227.870903
## iter 30 value 19831.025923
## iter 40 value 19428.940922
## iter 50 value 19256.224764
## iter 60 value 19064.514474
## iter 70 value 18824.970379
## iter 80 value 18583.387468
## iter 90 value 18358.664054
## iter 100 value 18116.260878
## final value 18116.260878
## stopped after 100 iterations
## # weights: 155
## initial value 29140.694713
## iter 10 value 20150.669094
## iter 20 value 17905.455890
## iter 30 value 17040.178216
## iter 40 value 16734.247534
## iter 50 value 16478.421962
## iter 60 value 16137.184737
## iter 70 value 15910.565658
## iter 80 value 15739.665639
## iter 90 value 15614.172238
## iter 100 value 15459.653784
## final value 15459.653784
## stopped after 100 iterations
## # weights: 35
## initial value 27394.482408
## iter 10 value 24360.942951

```

```

## iter 20 value 23415.574092
## iter 30 value 22919.046285
## iter 40 value 22521.903488
## iter 50 value 22219.657718
## iter 60 value 22211.581317
## iter 70 value 22211.040947
## iter 80 value 22210.726108
## iter 90 value 22210.563565
## iter 100 value 22209.578892
## final value 22209.578892
## stopped after 100 iterations
## # weights: 95
## initial value 29380.941534
## iter 10 value 23265.868601
## iter 20 value 21708.985674
## iter 30 value 20894.650132
## iter 40 value 20005.001621
## iter 50 value 19698.614914
## iter 60 value 19355.085468
## iter 70 value 19052.813109
## iter 80 value 18881.949781
## iter 90 value 18788.171239
## iter 100 value 18705.745176
## final value 18705.745176
## stopped after 100 iterations
## # weights: 155
## initial value 26407.007398
## iter 10 value 21588.890790
## iter 20 value 18851.981977
## iter 30 value 17963.671972
## iter 40 value 17550.476256
## iter 50 value 17158.138508
## iter 60 value 16941.693277
## iter 70 value 16829.014915
## iter 80 value 16674.097505
## iter 90 value 16576.594325
## iter 100 value 16510.191344
## final value 16510.191344
## stopped after 100 iterations
## # weights: 35
## initial value 28010.569909
## iter 10 value 24892.001261
## iter 20 value 23720.478619
## iter 30 value 23386.277091
## iter 40 value 22825.380070
## iter 50 value 22309.742513
## iter 60 value 22098.715755
## iter 70 value 21956.587992
## iter 80 value 21857.157788
## iter 90 value 21799.887617
## iter 100 value 21769.032662
## final value 21769.032662
## stopped after 100 iterations
## # weights: 95

```

```

## initial value 29623.997000
## iter 10 value 22557.562224
## iter 20 value 20846.502303
## iter 30 value 19596.248821
## iter 40 value 18694.094731
## iter 50 value 18280.272204
## iter 60 value 17964.074083
## iter 70 value 17782.339127
## iter 80 value 17606.376853
## iter 90 value 17484.647600
## iter 100 value 17342.190322
## final value 17342.190322
## stopped after 100 iterations
## # weights: 155
## initial value 27189.650141
## iter 10 value 21166.381161
## iter 20 value 18423.141116
## iter 30 value 17890.376823
## iter 40 value 17523.343026
## iter 50 value 17196.568813
## iter 60 value 16790.863432
## iter 70 value 16556.213010
## iter 80 value 16325.102337
## iter 90 value 16216.976738
## iter 100 value 16156.842541
## final value 16156.842541
## stopped after 100 iterations
## # weights: 35
## initial value 26026.934657
## iter 10 value 23596.626186
## iter 20 value 22977.631071
## iter 30 value 22672.746609
## iter 40 value 21878.953952
## iter 50 value 21708.126738
## iter 60 value 21686.222335
## iter 70 value 21624.456434
## iter 80 value 21577.961009
## iter 90 value 21562.782095
## iter 100 value 21528.256998
## final value 21528.256998
## stopped after 100 iterations
## # weights: 95
## initial value 27393.373716
## iter 10 value 23583.516209
## iter 20 value 21666.931902
## iter 30 value 20851.548070
## iter 40 value 20449.349150
## iter 50 value 20073.056275
## iter 60 value 19793.031992
## iter 70 value 19620.921360
## iter 80 value 19511.320931
## iter 90 value 19422.113232
## iter 100 value 19270.233210
## final value 19270.233210

```

```

## stopped after 100 iterations
## # weights: 155
## initial value 28953.671028
## iter 10 value 22236.372869
## iter 20 value 19601.380302
## iter 30 value 18588.799243
## iter 40 value 18121.369052
## iter 50 value 17613.036294
## iter 60 value 17097.393230
## iter 70 value 16766.261633
## iter 80 value 16511.581983
## iter 90 value 16331.817006
## iter 100 value 16160.984319
## final value 16160.984319
## stopped after 100 iterations
## # weights: 35
## initial value 25873.618065
## iter 10 value 22941.612525
## iter 20 value 22693.411598
## iter 30 value 22108.393935
## iter 40 value 21819.730481
## iter 50 value 21593.472028
## iter 60 value 21517.400624
## iter 70 value 21406.589058
## iter 80 value 21391.032531
## iter 90 value 21374.244147
## iter 100 value 21368.252682
## final value 21368.252682
## stopped after 100 iterations
## # weights: 95
## initial value 26224.023529
## iter 10 value 21871.047214
## iter 20 value 20054.028518
## iter 30 value 19642.539668
## iter 40 value 19091.602857
## iter 50 value 18718.493101
## iter 60 value 18488.889229
## iter 70 value 18184.673767
## iter 80 value 17928.104674
## iter 90 value 17802.703153
## iter 100 value 17714.139254
## final value 17714.139254
## stopped after 100 iterations
## # weights: 155
## initial value 28745.438984
## iter 10 value 20541.331203
## iter 20 value 17982.164822
## iter 30 value 17252.274288
## iter 40 value 17033.187335
## iter 50 value 16655.578480
## iter 60 value 16277.056960
## iter 70 value 15899.363939
## iter 80 value 15699.514401
## iter 90 value 15541.610703

```



```

## iter 100 value 15429.374904
## final value 15429.374904
## stopped after 100 iterations
## # weights: 35
## initial value 26773.626123
## iter 10 value 23698.081879
## iter 20 value 23297.952213
## iter 30 value 22713.848961
## iter 40 value 22499.885552
## iter 50 value 22135.954949
## iter 60 value 21935.759859
## iter 70 value 21919.493376
## iter 80 value 21882.322815
## iter 90 value 21853.210982
## iter 100 value 21805.930539
## final value 21805.930539
## stopped after 100 iterations
## # weights: 95
## initial value 26811.492688
## iter 10 value 22437.374820
## iter 20 value 20328.193735
## iter 30 value 19599.787596
## iter 40 value 19177.177077
## iter 50 value 18958.248122
## iter 60 value 18773.124316
## iter 70 value 18583.966550
## iter 80 value 18369.445783
## iter 90 value 18188.625808
## iter 100 value 18032.479799
## final value 18032.479799
## stopped after 100 iterations
## # weights: 155
## initial value 27218.046298
## iter 10 value 21755.872754
## iter 20 value 18773.398414
## iter 30 value 17719.586833
## iter 40 value 17413.412283
## iter 50 value 17098.855176
## iter 60 value 16779.183740
## iter 70 value 16547.552849
## iter 80 value 16360.543359
## iter 90 value 16252.492618
## iter 100 value 16161.681009
## final value 16161.681009
## stopped after 100 iterations
## # weights: 35
## initial value 26896.549426
## iter 10 value 23873.435592
## iter 20 value 23376.951039
## iter 30 value 23110.865881
## iter 40 value 22889.300403
## iter 50 value 22657.216518
## iter 60 value 21927.774314
## iter 70 value 21715.143246

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## iter 80 value 21690.210681
## iter 90 value 21635.467412
## iter 100 value 21598.954659
## final value 21598.954659
## stopped after 100 iterations
## # weights: 95
## initial value 27518.929098
## iter 10 value 22166.479542
## iter 20 value 21115.919610
## iter 30 value 20587.753558
## iter 40 value 20365.176371
## iter 50 value 20175.541256
## iter 60 value 19830.256731
## iter 70 value 19444.907493
## iter 80 value 18962.757748
## iter 90 value 18402.352131
## iter 100 value 18010.544327
## final value 18010.544327
## stopped after 100 iterations
## # weights: 155
## initial value 26210.304980
## iter 10 value 21032.553044
## iter 20 value 18802.411373
## iter 30 value 18055.874210
## iter 40 value 17697.877585
## iter 50 value 17441.828168
## iter 60 value 17026.503332
## iter 70 value 16670.259857
## iter 80 value 16370.541939
## iter 90 value 16118.956178
## iter 100 value 15879.399849
## final value 15879.399849
## stopped after 100 iterations
## # weights: 35
## initial value 26099.000850
## iter 10 value 23721.799083
## iter 20 value 22926.811054
## iter 30 value 22079.198246
## iter 40 value 21679.449260
## iter 50 value 21589.906023
## iter 60 value 21573.270386
## iter 70 value 21558.478604
## iter 80 value 21555.493949
## iter 90 value 21546.125749
## iter 100 value 21504.756762
## final value 21504.756762
## stopped after 100 iterations
## # weights: 95
## initial value 26286.658429
## iter 10 value 21276.724448
## iter 20 value 19418.090742
## iter 30 value 19020.187319
## iter 40 value 18305.882039
## iter 50 value 17895.970911

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## iter 60 value 17690.624598
## iter 70 value 17515.806209
## iter 80 value 17424.185941
## iter 90 value 17330.372602
## iter 100 value 17243.316332
## final value 17243.316332
## stopped after 100 iterations
## # weights: 155
## initial value 26334.669418
## iter 10 value 20906.770463
## iter 20 value 18127.354915
## iter 30 value 17365.772147
## iter 40 value 16796.930932
## iter 50 value 16398.244556
## iter 60 value 16133.271047
## iter 70 value 15961.896633
## iter 80 value 15827.374569
## iter 90 value 15729.637921
## iter 100 value 15661.871823
## final value 15661.871823
## stopped after 100 iterations
## # weights: 37
## initial value 25501.707466
## iter 10 value 23741.035441
## iter 20 value 23314.339081
## iter 30 value 22994.633488
## iter 40 value 22898.465920
## iter 50 value 22808.710562
## iter 60 value 22786.693635
## iter 70 value 22782.254033
## iter 80 value 22777.237854
## iter 90 value 22773.219821
## iter 100 value 22764.294351
## final value 22764.294351
## stopped after 100 iterations
## # weights: 101
## initial value 28060.986715
## iter 10 value 22737.604298
## iter 20 value 21098.295605
## iter 30 value 20499.193955
## iter 40 value 20255.003266
## iter 50 value 20115.960626
## iter 60 value 20011.959482
## iter 70 value 19959.240396
## iter 80 value 19861.806324
## iter 90 value 19598.876465
## iter 100 value 19310.341809
## final value 19310.341809
## stopped after 100 iterations
## # weights: 165
## initial value 27886.245906
## iter 10 value 22939.286312
## iter 20 value 20266.771064
## iter 30 value 19448.462481

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## iter 40 value 18432.280279
## iter 50 value 17911.917953
## iter 60 value 17658.674786
## iter 70 value 17327.160640
## iter 80 value 16948.549995
## iter 90 value 16764.685973
## iter 100 value 16566.864067
## final value 16566.864067
## stopped after 100 iterations
## # weights: 37
## initial value 26206.552306
## iter 10 value 24209.582336
## iter 20 value 23728.507802
## iter 30 value 23252.998981
## iter 40 value 22902.294619
## iter 50 value 22389.219895
## iter 60 value 21838.212159
## iter 70 value 21730.201372
## iter 80 value 21695.394483
## iter 90 value 21665.786548
## iter 100 value 21646.109319
## final value 21646.109319
## stopped after 100 iterations
## # weights: 101
## initial value 27828.186966
## iter 10 value 22706.875168
## iter 20 value 20544.918834
## iter 30 value 19954.521736
## iter 40 value 19582.954109
## iter 50 value 19328.292427
## iter 60 value 18847.553369
## iter 70 value 18648.235183
## iter 80 value 18437.042183
## iter 90 value 18265.389271
## iter 100 value 18006.460072
## final value 18006.460072
## stopped after 100 iterations
## # weights: 165
## initial value 28567.606323
## iter 10 value 21184.832903
## iter 20 value 19108.987540
## iter 30 value 18189.926146
## iter 40 value 17897.263218
## iter 50 value 17600.481532
## iter 60 value 17228.466989
## iter 70 value 16893.282001
## iter 80 value 16651.646807
## iter 90 value 16440.940635
## iter 100 value 16327.935271
## final value 16327.935271
## stopped after 100 iterations
## # weights: 37
## initial value 26459.518552
## iter 10 value 24172.839474

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## iter 20 value 23859.930186
## iter 30 value 23514.701957
## iter 40 value 22384.837406
## iter 50 value 21662.061235
## iter 60 value 21593.010370
## iter 70 value 21465.618383
## iter 80 value 21385.800731
## iter 90 value 21379.913339
## iter 100 value 21370.697258
## final value 21370.697258
## stopped after 100 iterations
## # weights: 101
## initial value 26422.855317
## iter 10 value 22022.059050
## iter 20 value 20556.714066
## iter 30 value 19838.718725
## iter 40 value 19160.196024
## iter 50 value 18775.075737
## iter 60 value 18490.367227
## iter 70 value 18327.860650
## iter 80 value 18156.946677
## iter 90 value 17905.473613
## iter 100 value 17721.237723
## final value 17721.237723
## stopped after 100 iterations
## # weights: 165
## initial value 27414.312053
## iter 10 value 22725.526934
## iter 20 value 20306.182400
## iter 30 value 19100.239409
## iter 40 value 18306.874726
## iter 50 value 18028.204925
## iter 60 value 17790.283879
## iter 70 value 17373.255365
## iter 80 value 17048.028541
## iter 90 value 16813.522548
## iter 100 value 16700.788177
## final value 16700.788177
## stopped after 100 iterations
## # weights: 36
## initial value 26295.115644
## iter 10 value 24031.248043
## iter 20 value 23472.672325
## iter 30 value 22624.750043
## iter 40 value 21923.669352
## iter 50 value 21785.836922
## iter 60 value 21769.093216
## iter 70 value 21763.924689
## iter 80 value 21741.079708
## iter 90 value 21710.853867
## iter 100 value 21666.851714
## final value 21666.851714
## stopped after 100 iterations
## # weights: 98

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## initial value 29540.179506
## iter 10 value 22734.782721
## iter 20 value 20467.244822
## iter 30 value 20096.278422
## iter 40 value 19690.920871
## iter 50 value 19419.378937
## iter 60 value 19103.886671
## iter 70 value 18703.431033
## iter 80 value 18400.561691
## iter 90 value 18301.123381
## iter 100 value 18258.094645
## final value 18258.094645
## stopped after 100 iterations
## # weights: 160
## initial value 26952.348184
## iter 10 value 21475.892930
## iter 20 value 19441.049856
## iter 30 value 18815.053976
## iter 40 value 18182.695032
## iter 50 value 17636.173563
## iter 60 value 17273.700526
## iter 70 value 16924.198518
## iter 80 value 16655.497594
## iter 90 value 16408.593620
## iter 100 value 16275.340936
## final value 16275.340936
## stopped after 100 iterations
## # weights: 36
## initial value 26028.941997
## iter 10 value 24161.271765
## iter 20 value 23608.151499
## iter 30 value 22885.894563
## iter 40 value 22337.590908
## iter 50 value 22099.295062
## iter 60 value 21914.482278
## iter 70 value 21754.975734
## iter 80 value 21739.101003
## iter 90 value 21707.085959
## iter 100 value 21657.630446
## final value 21657.630446
## stopped after 100 iterations
## # weights: 98
## initial value 24802.736876
## iter 10 value 21960.364475
## iter 20 value 20693.079812
## iter 30 value 20324.027472
## iter 40 value 20137.369784
## iter 50 value 19872.168031
## iter 60 value 19737.823615
## iter 70 value 19483.951042
## iter 80 value 19245.275019
## iter 90 value 18992.592118
## iter 100 value 18874.539226
## final value 18874.539226

```

```

## stopped after 100 iterations
## # weights: 160
## initial value 28698.031649
## iter 10 value 22164.777393
## iter 20 value 20130.824927
## iter 30 value 19322.532833
## iter 40 value 18825.664614
## iter 50 value 18651.444280
## iter 60 value 18125.712054
## iter 70 value 17595.839204
## iter 80 value 17215.937271
## iter 90 value 16994.170987
## iter 100 value 16798.813777
## final value 16798.813777
## stopped after 100 iterations
## # weights: 36
## initial value 27647.226054
## iter 10 value 24039.259118
## iter 20 value 23361.863108
## iter 30 value 22655.257129
## iter 40 value 22182.578613
## iter 50 value 21906.106063
## iter 60 value 21832.603095
## iter 70 value 21811.985171
## iter 80 value 21781.515501
## iter 90 value 21773.404906
## iter 100 value 21756.408790
## final value 21756.408790
## stopped after 100 iterations
## # weights: 98
## initial value 27541.877947
## iter 10 value 22068.957133
## iter 20 value 20772.245825
## iter 30 value 20071.478791
## iter 40 value 19781.761582
## iter 50 value 19500.324455
## iter 60 value 18988.777402
## iter 70 value 18655.778512
## iter 80 value 18441.522038
## iter 90 value 18279.880751
## iter 100 value 18144.077712
## final value 18144.077712
## stopped after 100 iterations
## # weights: 160
## initial value 27462.727393
## iter 10 value 21089.027932
## iter 20 value 18428.247207
## iter 30 value 17534.533490
## iter 40 value 17145.767951
## iter 50 value 16658.466539
## iter 60 value 16267.186684
## iter 70 value 16029.289689
## iter 80 value 15866.964924
## iter 90 value 15761.045079

```

```

## iter 100 value 15692.962247
## final value 15692.962247
## stopped after 100 iterations
## # weights: 35
## initial value 26649.746453
## iter 10 value 23602.137704
## iter 20 value 23251.372182
## iter 30 value 22887.303047
## iter 40 value 22268.064431
## iter 50 value 21975.536274
## iter 60 value 21938.288663
## iter 70 value 21896.573802
## iter 80 value 21891.072733
## iter 90 value 21887.459769
## iter 100 value 21876.222270
## final value 21876.222270
## stopped after 100 iterations
## # weights: 95
## initial value 27740.733583
## iter 10 value 23869.629393
## iter 20 value 21662.721117
## iter 30 value 20882.841840
## iter 40 value 20382.138311
## iter 50 value 20110.262536
## iter 60 value 19755.533525
## iter 70 value 19517.271938
## iter 80 value 19151.744578
## iter 90 value 18903.564087
## iter 100 value 18713.407988
## final value 18713.407988
## stopped after 100 iterations
## # weights: 155
## initial value 31379.231976
## iter 10 value 23326.921479
## iter 20 value 19971.300784
## iter 30 value 19014.013341
## iter 40 value 18370.856345
## iter 50 value 17909.386224
## iter 60 value 17611.418199
## iter 70 value 17368.876006
## iter 80 value 17155.483906
## iter 90 value 17007.271060
## iter 100 value 16902.566901
## final value 16902.566901
## stopped after 100 iterations
## # weights: 35
## initial value 26397.353709
## iter 10 value 24124.814723
## iter 20 value 24004.011647
## iter 30 value 23274.350120
## iter 40 value 22688.187323
## iter 50 value 22384.251149
## iter 60 value 22302.295407
## iter 70 value 22034.713052

```



```

## iter 80 value 21859.422055
## iter 90 value 21810.310331
## iter 100 value 21779.430237
## final value 21779.430237
## stopped after 100 iterations
## # weights: 95
## initial value 28499.626739
## iter 10 value 23098.722193
## iter 20 value 21049.011767
## iter 30 value 20446.623906
## iter 40 value 20298.402933
## iter 50 value 19875.937296
## iter 60 value 19527.411605
## iter 70 value 19170.627701
## iter 80 value 18734.590083
## iter 90 value 18471.933231
## iter 100 value 18193.213016
## final value 18193.213016
## stopped after 100 iterations
## # weights: 155
## initial value 27373.393700
## iter 10 value 21918.231101
## iter 20 value 20159.069992
## iter 30 value 18574.830963
## iter 40 value 17915.750854
## iter 50 value 17571.073201
## iter 60 value 17299.119121
## iter 70 value 17026.929080
## iter 80 value 16838.168436
## iter 90 value 16686.587348
## iter 100 value 16556.043228
## final value 16556.043228
## stopped after 100 iterations
## # weights: 35
## initial value 26648.279072
## iter 10 value 24464.931096
## iter 20 value 23903.092342
## iter 30 value 23604.123028
## iter 40 value 23347.935787
## iter 50 value 23235.630374
## iter 60 value 23207.563694
## iter 70 value 23143.914782
## iter 80 value 23086.461995
## iter 90 value 23047.726203
## iter 100 value 23026.674633
## final value 23026.674633
## stopped after 100 iterations
## # weights: 95
## initial value 25936.981382
## iter 10 value 22222.990194
## iter 20 value 20483.706854
## iter 30 value 20012.079039
## iter 40 value 19652.168516
## iter 50 value 19347.140760

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## iter 60 value 19095.350842
## iter 70 value 18791.135798
## iter 80 value 18587.337655
## iter 90 value 18372.748829
## iter 100 value 18197.053904
## final value 18197.053904
## stopped after 100 iterations
## # weights: 155
## initial value 32854.799613
## iter 10 value 21286.412035
## iter 20 value 18658.590740
## iter 30 value 17876.720658
## iter 40 value 17658.986674
## iter 50 value 17342.482194
## iter 60 value 17144.724210
## iter 70 value 16985.770342
## iter 80 value 16840.669047
## iter 90 value 16726.402691
## iter 100 value 16610.107273
## final value 16610.107273
## stopped after 100 iterations
## # weights: 35
## initial value 26232.751675
## iter 10 value 24411.389639
## iter 20 value 24076.333318
## iter 30 value 23887.768005
## iter 40 value 23136.442746
## iter 50 value 22483.045716
## iter 60 value 22408.475619
## iter 70 value 22404.151447
## iter 80 value 22400.678871
## iter 90 value 22400.426896
## iter 100 value 22399.959987
## final value 22399.959987
## stopped after 100 iterations
## # weights: 95
## initial value 26841.969944
## iter 10 value 20896.649822
## iter 20 value 19965.537228
## iter 30 value 19745.354864
## iter 40 value 19555.380748
## iter 50 value 19420.634269
## iter 60 value 19319.865159
## iter 70 value 19249.421688
## iter 80 value 19149.037718
## iter 90 value 18974.438543
## iter 100 value 18712.947167
## final value 18712.947167
## stopped after 100 iterations
## # weights: 155
## initial value 28551.567156
## iter 10 value 22401.716659
## iter 20 value 19076.828443
## iter 30 value 18461.890978

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## iter 40 value 18071.674129
## iter 50 value 17607.914477
## iter 60 value 17286.495842
## iter 70 value 17123.529025
## iter 80 value 17021.111658
## iter 90 value 16927.409314
## iter 100 value 16866.616877
## final value 16866.616877
## stopped after 100 iterations
## # weights: 35
## initial value 25467.930599
## iter 10 value 24381.880798
## iter 20 value 23890.241602
## iter 30 value 23097.804701
## iter 40 value 22632.868728
## iter 50 value 22453.944658
## iter 60 value 22441.506223
## iter 70 value 22440.874308
## iter 80 value 22440.836073
## iter 90 value 22440.827614
## iter 90 value 22440.827499
## final value 22440.825786
## converged
## # weights: 95
## initial value 26713.486215
## iter 10 value 21148.297880
## iter 20 value 19968.317723
## iter 30 value 19268.000996
## iter 40 value 18926.154252
## iter 50 value 18566.202836
## iter 60 value 18162.169598
## iter 70 value 18041.343807
## iter 80 value 17935.317097
## iter 90 value 17846.077060
## iter 100 value 17769.780477
## final value 17769.780477
## stopped after 100 iterations
## # weights: 155
## initial value 25845.483819
## iter 10 value 21623.273713
## iter 20 value 18733.499383
## iter 30 value 18007.310226
## iter 40 value 17617.346837
## iter 50 value 17239.660736
## iter 60 value 16986.199396
## iter 70 value 16678.166451
## iter 80 value 16393.273231
## iter 90 value 16176.763507
## iter 100 value 15982.500693
## final value 15982.500693
## stopped after 100 iterations
## # weights: 35
## initial value 27307.730362
## iter 10 value 24754.213661

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```

## iter 20 value 23073.925154
## iter 30 value 22455.917581
## iter 40 value 22343.075511
## iter 50 value 22258.075370
## iter 60 value 22186.477101
## iter 70 value 22005.276714
## iter 80 value 21895.287726
## iter 90 value 21831.402124
## iter 100 value 21782.457004
## final value 21782.457004
## stopped after 100 iterations
## # weights: 95
## initial value 26468.646263
## iter 10 value 21838.971634
## iter 20 value 20036.966317
## iter 30 value 19733.483412
## iter 40 value 19469.676880
## iter 50 value 19240.697834
## iter 60 value 19078.958078
## iter 70 value 18902.999083
## iter 80 value 18841.476830
## iter 90 value 18773.992831
## iter 100 value 18678.182004
## final value 18678.182004
## stopped after 100 iterations
## # weights: 155
## initial value 29514.080858
## iter 10 value 21054.369422
## iter 20 value 19438.370415
## iter 30 value 18299.876871
## iter 40 value 17927.548072
## iter 50 value 17742.225695
## iter 60 value 17464.738843
## iter 70 value 17103.228211
## iter 80 value 16822.059562
## iter 90 value 16557.810633
## iter 100 value 16424.357260
## final value 16424.357260
## stopped after 100 iterations
## # weights: 36
## initial value 26728.512571
## iter 10 value 24314.867477
## iter 20 value 23673.051927
## iter 30 value 22831.100577
## iter 40 value 22417.376142
## iter 50 value 22177.124065
## iter 60 value 22003.837475
## iter 70 value 21939.351949
## iter 80 value 21898.660677
## iter 90 value 21827.394675
## iter 100 value 21729.327152
## final value 21729.327152
## stopped after 100 iterations
## # weights: 98

```

```

## initial value 25922.121541
## iter 10 value 22459.733614
## iter 20 value 20402.930231
## iter 30 value 19810.131535
## iter 40 value 19448.903340
## iter 50 value 19102.239731
## iter 60 value 18892.295594
## iter 70 value 18740.295468
## iter 80 value 18526.328037
## iter 90 value 18381.245385
## iter 100 value 18286.855501
## final value 18286.855501
## stopped after 100 iterations
## # weights: 160
## initial value 29697.901664
## iter 10 value 21233.927264
## iter 20 value 19382.908217
## iter 30 value 18417.378760
## iter 40 value 17877.136049
## iter 50 value 17645.102574
## iter 60 value 17388.395464
## iter 70 value 17053.351485
## iter 80 value 16825.915505
## iter 90 value 16629.069236
## iter 100 value 16486.828278
## final value 16486.828278
## stopped after 100 iterations
## # weights: 36
## initial value 27339.691834
## iter 10 value 23404.200696
## iter 20 value 23150.224028
## iter 30 value 22900.954331
## iter 40 value 22709.767317
## iter 50 value 22420.986178
## iter 60 value 22067.824531
## iter 70 value 21936.519434
## iter 80 value 21902.419860
## iter 90 value 21834.108359
## iter 100 value 21786.585011
## final value 21786.585011
## stopped after 100 iterations
## # weights: 98
## initial value 25743.833748
## iter 10 value 21515.388808
## iter 20 value 20307.867901
## iter 30 value 19810.010826
## iter 40 value 19435.548250
## iter 50 value 19111.829364
## iter 60 value 18977.731526
## iter 70 value 18799.885594
## iter 80 value 18654.478047
## iter 90 value 18605.252218
## iter 100 value 18574.190902
## final value 18574.190902

```

```

## stopped after 100 iterations
## # weights: 160
## initial value 26653.469613
## iter 10 value 20416.934499
## iter 20 value 18082.784190
## iter 30 value 17778.225379
## iter 40 value 17670.654137
## iter 50 value 17490.794421
## iter 60 value 17250.840098
## iter 70 value 16991.638914
## iter 80 value 16786.510315
## iter 90 value 16631.136711
## iter 100 value 16514.708830
## final value 16514.708830
## stopped after 100 iterations
## # weights: 36
## initial value 27806.307872
## iter 10 value 24922.979205
## iter 20 value 24094.465320
## iter 30 value 23294.230977
## iter 40 value 22838.643843
## iter 50 value 22704.519808
## iter 60 value 22698.665713
## iter 70 value 22693.038472
## iter 80 value 22690.923680
## iter 90 value 22685.990919
## iter 100 value 22674.978042
## final value 22674.978042
## stopped after 100 iterations
## # weights: 98
## initial value 27708.097642
## iter 10 value 21913.118944
## iter 20 value 20208.163883
## iter 30 value 19925.387613
## iter 40 value 19701.004765
## iter 50 value 19497.870072
## iter 60 value 19281.096895
## iter 70 value 19062.076941
## iter 80 value 18763.313501
## iter 90 value 18638.314786
## iter 100 value 18494.486486
## final value 18494.486486
## stopped after 100 iterations
## # weights: 160
## initial value 27523.121143
## iter 10 value 21849.923482
## iter 20 value 19021.595283
## iter 30 value 18134.127134
## iter 40 value 17827.299355
## iter 50 value 17484.751598
## iter 60 value 17159.744184
## iter 70 value 16948.259007
## iter 80 value 16815.622810
## iter 90 value 16486.585942

```

```

## iter 100 value 16367.700530
## final value 16367.700530
## stopped after 100 iterations
## # weights: 35
## initial value 27300.269549
## iter 10 value 23100.371643
## iter 20 value 22853.706430
## iter 30 value 22410.768517
## iter 40 value 21983.176100
## iter 50 value 21774.816759
## iter 60 value 21678.822869
## iter 70 value 21596.151621
## iter 80 value 21586.961920
## iter 90 value 21565.301777
## iter 100 value 21553.526973
## final value 21553.526973
## stopped after 100 iterations
## # weights: 95
## initial value 26914.082867
## iter 10 value 22081.273504
## iter 20 value 20523.009236
## iter 30 value 20110.604556
## iter 40 value 19736.232157
## iter 50 value 19354.560182
## iter 60 value 19070.818659
## iter 70 value 18916.652508
## iter 80 value 18690.758134
## iter 90 value 18456.068092
## iter 100 value 18236.155675
## final value 18236.155675
## stopped after 100 iterations
## # weights: 155
## initial value 27413.801955
## iter 10 value 21095.672320
## iter 20 value 19015.232061
## iter 30 value 18219.536534
## iter 40 value 17730.558371
## iter 50 value 17224.778459
## iter 60 value 16919.828991
## iter 70 value 16701.316688
## iter 80 value 16531.219655
## iter 90 value 16301.536417
## iter 100 value 16141.381591
## final value 16141.381591
## stopped after 100 iterations
## # weights: 35
## initial value 26996.714388
## iter 10 value 24112.270704
## iter 20 value 23752.030777
## iter 30 value 23403.265997
## iter 40 value 23239.244823
## iter 50 value 23222.453292
## iter 60 value 23126.949419
## iter 70 value 23078.505134

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## iter 80 value 23054.444690
## iter 90 value 23045.408078
## iter 100 value 23039.746991
## final value 23039.746991
## stopped after 100 iterations
## # weights: 95
## initial value 26528.275258
## iter 10 value 22349.092189
## iter 20 value 20428.410360
## iter 30 value 19883.358536
## iter 40 value 19577.944434
## iter 50 value 19273.270049
## iter 60 value 19006.796762
## iter 70 value 18804.105679
## iter 80 value 18562.509111
## iter 90 value 18452.435836
## iter 100 value 18316.955788
## final value 18316.955788
## stopped after 100 iterations
## # weights: 155
## initial value 31441.716173
## iter 10 value 21155.987969
## iter 20 value 18312.614702
## iter 30 value 17464.691550
## iter 40 value 17164.617688
## iter 50 value 16785.939852
## iter 60 value 16399.034058
## iter 70 value 15881.825466
## iter 80 value 15574.833270
## iter 90 value 15392.425839
## iter 100 value 15255.417266
## final value 15255.417266
## stopped after 100 iterations
## # weights: 35
## initial value 25677.204056
## iter 10 value 24160.600504
## iter 20 value 23559.591185
## iter 30 value 23089.652546
## iter 40 value 22940.081932
## iter 50 value 22854.029716
## iter 60 value 22845.348690
## iter 70 value 22790.397546
## iter 80 value 22780.391420
## iter 90 value 22759.890965
## iter 100 value 22739.350990
## final value 22739.350990
## stopped after 100 iterations
## # weights: 95
## initial value 27786.467796
## iter 10 value 22997.370016
## iter 20 value 20281.721776
## iter 30 value 19656.427962
## iter 40 value 19314.564832
## iter 50 value 19111.342003

```



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## iter 60 value 19009.260982
## iter 70 value 18913.840147
## iter 80 value 18812.976893
## iter 90 value 18782.648025
## iter 100 value 18652.574939
## final value 18652.574939
## stopped after 100 iterations
## # weights: 155
## initial value 32577.121570
## iter 10 value 22127.119257
## iter 20 value 18275.561381
## iter 30 value 17601.257388
## iter 40 value 17325.408245
## iter 50 value 16960.506166
## iter 60 value 16738.685040
## iter 70 value 16624.949172
## iter 80 value 16532.126862
## iter 90 value 16481.295550
## iter 100 value 16435.945653
## final value 16435.945653
## stopped after 100 iterations
## # weights: 37
## initial value 25727.567957
## iter 10 value 23205.741836
## iter 20 value 22816.040148
## iter 30 value 22572.069966
## iter 40 value 22434.926615
## iter 50 value 22301.827096
## iter 60 value 22066.702008
## iter 70 value 21747.482693
## iter 80 value 21602.909133
## iter 90 value 21547.541766
## iter 100 value 21519.903310
## final value 21519.903310
## stopped after 100 iterations
## # weights: 101
## initial value 25642.737187
## iter 10 value 21802.409335
## iter 20 value 20298.984538
## iter 30 value 19829.819446
## iter 40 value 19577.050592
## iter 50 value 19286.961820
## iter 60 value 19193.277199
## iter 70 value 19046.910665
## iter 80 value 18939.510199
## iter 90 value 18885.209471
## iter 100 value 18810.454662
## final value 18810.454662
## stopped after 100 iterations
## # weights: 165
## initial value 28631.502187
## iter 10 value 22403.162605
## iter 20 value 20261.237245
## iter 30 value 19191.450955

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## iter 40 value 18394.234646
## iter 50 value 17648.298562
## iter 60 value 16934.573730
## iter 70 value 16595.130912
## iter 80 value 16408.244728
## iter 90 value 16259.319107
## iter 100 value 16122.468567
## final value 16122.468567
## stopped after 100 iterations
## # weights: 37
## initial value 25959.215733
## iter 10 value 23874.284230
## iter 20 value 23575.760108
## iter 30 value 22885.678630
## iter 40 value 22675.290090
## iter 50 value 22380.450998
## iter 60 value 22170.475155
## iter 70 value 21824.843088
## iter 80 value 21642.322792
## iter 90 value 21582.674858
## iter 100 value 21545.407763
## final value 21545.407763
## stopped after 100 iterations
## # weights: 101
## initial value 27240.157951
## iter 10 value 21943.607792
## iter 20 value 20986.439009
## iter 30 value 20577.349507
## iter 40 value 20143.533790
## iter 50 value 19899.767813
## iter 60 value 19666.546218
## iter 70 value 19505.361329
## iter 80 value 19348.165485
## iter 90 value 19055.977856
## iter 100 value 18824.513639
## final value 18824.513639
## stopped after 100 iterations
## # weights: 165
## initial value 27443.043540
## iter 10 value 21231.998644
## iter 20 value 18344.522197
## iter 30 value 17297.363246
## iter 40 value 17000.241018
## iter 50 value 16781.468406
## iter 60 value 16675.261398
## iter 70 value 16510.957238
## iter 80 value 16311.797100
## iter 90 value 16109.255774
## iter 100 value 15896.464128
## final value 15896.464128
## stopped after 100 iterations
## # weights: 37
## initial value 25290.330964
## iter 10 value 24039.795664

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## iter 20 value 23685.203952
## iter 30 value 23363.477717
## iter 40 value 23210.295670
## iter 50 value 23074.051958
## iter 60 value 22952.854278
## iter 70 value 22846.689537
## iter 80 value 22507.967783
## iter 90 value 22483.721812
## iter 100 value 22482.748937
## final value 22482.748937
## stopped after 100 iterations
## # weights: 101
## initial value 26681.462173
## iter 10 value 22893.310671
## iter 20 value 20777.216684
## iter 30 value 20275.863561
## iter 40 value 19854.382162
## iter 50 value 19553.528498
## iter 60 value 19184.895171
## iter 70 value 19018.225866
## iter 80 value 18808.125407
## iter 90 value 18714.924994
## iter 100 value 18658.550235
## final value 18658.550235
## stopped after 100 iterations
## # weights: 165
## initial value 26286.005279
## iter 10 value 21400.081646
## iter 20 value 18703.208226
## iter 30 value 17732.731867
## iter 40 value 17540.981957
## iter 50 value 17324.479777
## iter 60 value 16880.639879
## iter 70 value 16601.525948
## iter 80 value 16377.304831
## iter 90 value 16203.392093
## iter 100 value 16003.335094
## final value 16003.335094
## stopped after 100 iterations
## # weights: 36
## initial value 26456.889716
## iter 10 value 23498.310461
## iter 20 value 23232.307150
## iter 30 value 22870.992146
## iter 40 value 22595.217592
## iter 50 value 22254.330730
## iter 60 value 22079.813608
## iter 70 value 22001.171012
## iter 80 value 21930.860759
## iter 90 value 21865.096034
## iter 100 value 21854.450749
## final value 21854.450749
## stopped after 100 iterations
## # weights: 98

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## initial value 29515.625403
## iter 10 value 22930.439629
## iter 20 value 20303.461333
## iter 30 value 19768.267213
## iter 40 value 19428.567627
## iter 50 value 19064.993858
## iter 60 value 18941.851993
## iter 70 value 18743.049251
## iter 80 value 18474.977771
## iter 90 value 18330.732562
## iter 100 value 18269.036032
## final value 18269.036032
## stopped after 100 iterations
## # weights: 160
## initial value 25702.511244
## iter 10 value 20195.281300
## iter 20 value 17691.695591
## iter 30 value 16841.644810
## iter 40 value 16342.962278
## iter 50 value 16129.006873
## iter 60 value 15831.004041
## iter 70 value 15592.718072
## iter 80 value 15497.641553
## iter 90 value 15402.434254
## iter 100 value 15361.915194
## final value 15361.915194
## stopped after 100 iterations
## # weights: 36
## initial value 25572.594725
## iter 10 value 23997.531694
## iter 20 value 23577.137689
## iter 30 value 22962.445771
## iter 40 value 22635.572308
## iter 50 value 22436.264147
## iter 60 value 22246.368155
## iter 70 value 22194.236241
## iter 80 value 22179.364984
## iter 90 value 22163.073301
## iter 100 value 22136.589309
## final value 22136.589309
## stopped after 100 iterations
## # weights: 98
## initial value 26020.964550
## iter 10 value 22632.599202
## iter 20 value 20572.943094
## iter 30 value 19850.040603
## iter 40 value 19701.492067
## iter 50 value 19516.631703
## iter 60 value 19285.543551
## iter 70 value 19066.183150
## iter 80 value 18910.787441
## iter 90 value 18679.423615
## iter 100 value 18557.643673
## final value 18557.643673

```

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## stopped after 100 iterations
## # weights: 160
## initial value 25589.634508
## iter 10 value 20475.575815
## iter 20 value 18333.131970
## iter 30 value 17656.014539
## iter 40 value 17344.775824
## iter 50 value 17074.569621
## iter 60 value 16682.303796
## iter 70 value 16295.948595
## iter 80 value 15936.394508
## iter 90 value 15696.512607
## iter 100 value 15517.074963
## final value 15517.074963
## stopped after 100 iterations
## # weights: 36
## initial value 25770.867556
## iter 10 value 24172.922731
## iter 20 value 23483.735545
## iter 30 value 22352.020878
## iter 40 value 22073.272896
## iter 50 value 22001.789492
## iter 60 value 21866.144877
## iter 70 value 21828.465787
## iter 80 value 21803.478054
## iter 90 value 21800.234621
## iter 100 value 21767.832029
## final value 21767.832029
## stopped after 100 iterations
## # weights: 98
## initial value 27116.024502
## iter 10 value 22227.474351
## iter 20 value 20614.262411
## iter 30 value 20175.738952
## iter 40 value 19879.545038
## iter 50 value 19527.017756
## iter 60 value 19370.460448
## iter 70 value 19160.826377
## iter 80 value 19033.155688
## iter 90 value 18966.751044
## iter 100 value 18897.776850
## final value 18897.776850
## stopped after 100 iterations
## # weights: 160
## initial value 27277.913544
## iter 10 value 22211.334890
## iter 20 value 19258.380220
## iter 30 value 18255.407374
## iter 40 value 17886.634618
## iter 50 value 17389.479715
## iter 60 value 16934.545236
## iter 70 value 16617.456375
## iter 80 value 16390.492824
## iter 90 value 16243.150683

```

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## iter 100 value 16120.775963
## final value 16120.775963
## stopped after 100 iterations
## # weights: 37
## initial value 27506.586573
## iter 10 value 23732.990331
## iter 20 value 23140.644729
## iter 30 value 22716.856977
## iter 40 value 22580.447069
## iter 50 value 22445.438329
## iter 60 value 22409.782843
## iter 70 value 22381.002819
## iter 80 value 22212.328016
## iter 90 value 22122.977551
## iter 100 value 22072.059565
## final value 22072.059565
## stopped after 100 iterations
## # weights: 101
## initial value 26060.366984
## iter 10 value 21743.577371
## iter 20 value 20482.666686
## iter 30 value 20080.069590
## iter 40 value 19821.107074
## iter 50 value 19694.902381
## iter 60 value 19549.402631
## iter 70 value 19422.534543
## iter 80 value 19363.598185
## iter 90 value 19342.557197
## iter 100 value 19321.259103
## final value 19321.259103
## stopped after 100 iterations
## # weights: 165
## initial value 26794.124324
## iter 10 value 21247.869399
## iter 20 value 18176.161557
## iter 30 value 17606.706018
## iter 40 value 17276.311748
## iter 50 value 16847.699644
## iter 60 value 16564.455953
## iter 70 value 16418.878290
## iter 80 value 16307.523739
## iter 90 value 16237.638359
## iter 100 value 16191.615351
## final value 16191.615351
## stopped after 100 iterations
## # weights: 37
## initial value 28826.479367
## iter 10 value 22566.928663
## iter 20 value 22396.843212
## iter 30 value 22115.817079
## iter 40 value 21752.933969
## iter 50 value 21533.178087
## iter 60 value 21480.993668
## iter 70 value 21477.263178

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## iter 80 value 21476.591858
## iter 90 value 21467.660855
## iter 100 value 21465.103683
## final value 21465.103683
## stopped after 100 iterations
## # weights: 101
## initial value 25709.766941
## iter 10 value 22129.552020
## iter 20 value 20360.519420
## iter 30 value 19995.451304
## iter 40 value 19576.811373
## iter 50 value 19334.243789
## iter 60 value 19022.784141
## iter 70 value 18633.518050
## iter 80 value 18353.510848
## iter 90 value 18164.108630
## iter 100 value 18050.105245
## final value 18050.105245
## stopped after 100 iterations
## # weights: 165
## initial value 27173.357395
## iter 10 value 21128.024588
## iter 20 value 18344.745263
## iter 30 value 17923.203037
## iter 40 value 17712.286111
## iter 50 value 17566.837517
## iter 60 value 17332.522310
## iter 70 value 17101.444004
## iter 80 value 16852.707007
## iter 90 value 16687.745631
## iter 100 value 16534.966077
## final value 16534.966077
## stopped after 100 iterations
## # weights: 37
## initial value 25614.569993
## iter 10 value 23382.575214
## iter 20 value 22854.334121
## iter 30 value 22534.006648
## iter 40 value 22376.928407
## iter 50 value 22333.008243
## iter 60 value 22305.596062
## iter 70 value 22278.849775
## iter 80 value 22202.943761
## iter 90 value 22140.355224
## iter 100 value 22061.605125
## final value 22061.605125
## stopped after 100 iterations
## # weights: 101
## initial value 30310.776540
## iter 10 value 21666.863674
## iter 20 value 20097.204942
## iter 30 value 19629.551889
## iter 40 value 19287.912380
## iter 50 value 19057.275290

```

```

## iter 60 value 18880.467266
## iter 70 value 18715.078599
## iter 80 value 18629.105252
## iter 90 value 18536.816310
## iter 100 value 18370.666516
## final value 18370.666516
## stopped after 100 iterations
## # weights: 165
## initial value 27749.348254
## iter 10 value 20503.335740
## iter 20 value 18169.333985
## iter 30 value 17512.792247
## iter 40 value 17369.494022
## iter 50 value 17124.264628
## iter 60 value 16916.343371
## iter 70 value 16765.356653
## iter 80 value 16576.488027
## iter 90 value 16382.772377
## iter 100 value 16196.019021
## final value 16196.019021
## stopped after 100 iterations
## # weights: 35
## initial value 25375.177236
## iter 10 value 23238.264623
## iter 20 value 22771.009624
## iter 30 value 22484.611880
## iter 40 value 22228.999606
## iter 50 value 21989.303156
## iter 60 value 21825.840462
## iter 70 value 21760.529489
## iter 80 value 21724.263298
## iter 90 value 21676.371409
## iter 100 value 21608.505098
## final value 21608.505098
## stopped after 100 iterations
## # weights: 95
## initial value 28021.082826
## iter 10 value 22506.960216
## iter 20 value 20946.662799
## iter 30 value 20399.928742
## iter 40 value 20020.178645
## iter 50 value 19636.860991
## iter 60 value 19451.211377
## iter 70 value 19224.312943
## iter 80 value 19048.310673
## iter 90 value 18926.733497
## iter 100 value 18854.108013
## final value 18854.108013
## stopped after 100 iterations
## # weights: 155
## initial value 27405.425166
## iter 10 value 21105.190082
## iter 20 value 19056.581677
## iter 30 value 18335.346304

```



```

## iter 40 value 17858.272182
## iter 50 value 17459.317073
## iter 60 value 17028.286751
## iter 70 value 16813.404196
## iter 80 value 16555.546060
## iter 90 value 16417.092221
## iter 100 value 16276.103046
## final value 16276.103046
## stopped after 100 iterations
## # weights: 35
## initial value 25352.658687
## iter 10 value 23551.912968
## iter 20 value 23340.403068
## iter 30 value 22764.838699
## iter 40 value 22359.419182
## iter 50 value 22192.183062
## iter 60 value 22117.483257
## iter 70 value 22052.304829
## iter 80 value 22031.113246
## iter 90 value 22014.494176
## iter 100 value 22001.178385
## final value 22001.178385
## stopped after 100 iterations
## # weights: 95
## initial value 27738.559611
## iter 10 value 22093.961304
## iter 20 value 21159.117126
## iter 30 value 20725.662263
## iter 40 value 20447.200989
## iter 50 value 20265.914182
## iter 60 value 20094.865364
## iter 70 value 19936.751117
## iter 80 value 19602.697513
## iter 90 value 19181.821115
## iter 100 value 18997.754838
## final value 18997.754838
## stopped after 100 iterations
## # weights: 155
## initial value 26579.441090
## iter 10 value 20737.768787
## iter 20 value 18867.126685
## iter 30 value 17803.728501
## iter 40 value 17494.123280
## iter 50 value 17254.330947
## iter 60 value 16938.217211
## iter 70 value 16684.104315
## iter 80 value 16417.346175
## iter 90 value 16234.266449
## iter 100 value 16109.305956
## final value 16109.305956
## stopped after 100 iterations
## # weights: 35
## initial value 25299.496919
## iter 10 value 23930.811004

```

```

## iter 20 value 23265.140437
## iter 30 value 22733.700149
## iter 40 value 22201.768266
## iter 50 value 22033.406410
## iter 60 value 21899.971472
## iter 70 value 21870.534750
## iter 80 value 21863.767073
## iter 90 value 21837.205275
## iter 100 value 21808.508357
## final value 21808.508357
## stopped after 100 iterations
## # weights: 95
## initial value 25785.418363
## iter 10 value 22007.649537
## iter 20 value 20870.111291
## iter 30 value 20577.238623
## iter 40 value 20280.463458
## iter 50 value 20079.759819
## iter 60 value 19922.966822
## iter 70 value 19763.707475
## iter 80 value 19705.651479
## iter 90 value 19688.737090
## iter 100 value 19674.373947
## final value 19674.373947
## stopped after 100 iterations
## # weights: 155
## initial value 27716.758842
## iter 10 value 21503.404758
## iter 20 value 18684.592966
## iter 30 value 18000.983368
## iter 40 value 17837.708937
## iter 50 value 17597.692741
## iter 60 value 17345.048510
## iter 70 value 17194.121506
## iter 80 value 17061.575826
## iter 90 value 16914.216828
## iter 100 value 16747.789781
## final value 16747.789781
## stopped after 100 iterations
## # weights: 160
## initial value 28904.125624
## iter 10 value 21198.758255
## iter 20 value 19579.917622
## iter 30 value 18306.195958
## iter 40 value 17099.255778
## iter 50 value 16833.247355
## iter 60 value 16475.711223
## iter 70 value 16149.961810
## iter 80 value 15984.423268
## iter 90 value 15876.857237
## iter 100 value 15739.920483
## final value 15739.920483
## stopped after 100 iterations
## [1] "Model Done"

```

```

## [1] "Predict Done"
## [1] "Confusion Done"
## Neural Network
##
## 15698 samples
##    52 predictor
##    5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results across tuning parameters:
##
##   size  decay  Accuracy  Kappa
##   1     0e+00  0.3634679  0.1819000
##   1     1e-04  0.3595706  0.1758807
##   1     1e-01  0.3632929  0.1775436
##   3     0e+00  0.5106508  0.3829920
##   3     1e-04  0.5082529  0.3782131
##   3     1e-01  0.5055447  0.3774821
##   5     0e+00  0.5832739  0.4725043
##   5     1e-04  0.5756745  0.4629415
##   5     1e-01  0.5841837  0.4733315
##
## Accuracy was used to select the optimal model using the largest value.
## The final values used for the model were size = 5 and decay = 0.1.
## [1] 3
## # weights:  37
## initial value 26368.735699
## iter  10 value 23008.203938
## iter  20 value 22886.319749
## iter  30 value 22013.419469
## iter  40 value 21802.689923
## iter  50 value 21431.476647
## iter  60 value 21293.772419
## iter  70 value 21263.387985
## iter  80 value 21255.057513
## iter  90 value 21254.722924
## iter 100 value 21253.565740
## final value 21253.565740
## stopped after 100 iterations
## # weights: 101
## initial value 26121.730389
## iter  10 value 21574.225300
## iter  20 value 19218.767888
## iter  30 value 18874.369801
## iter  40 value 18651.128091
## iter  50 value 18321.819926
## iter  60 value 18150.248482
## iter  70 value 18047.171468
## iter  80 value 17981.467189
## iter  90 value 17880.167283
## iter 100 value 17782.122778

```

```

## final value 17782.122778
## stopped after 100 iterations
## # weights: 165
## initial value 27020.062558
## iter 10 value 21496.768208
## iter 20 value 19124.155568
## iter 30 value 18473.374240
## iter 40 value 17938.503669
## iter 50 value 17612.863326
## iter 60 value 17414.669506
## iter 70 value 17265.510759
## iter 80 value 17148.247489
## iter 90 value 16954.192119
## iter 100 value 16755.050028
## final value 16755.050028
## stopped after 100 iterations
## # weights: 37
## initial value 26154.227674
## iter 10 value 24145.000148
## iter 20 value 23500.555157
## iter 30 value 23008.785096
## iter 40 value 22516.150003
## iter 50 value 21728.753366
## iter 60 value 21637.166783
## iter 70 value 21466.711774
## iter 80 value 21366.704955
## iter 90 value 21354.923601
## iter 100 value 21347.844841
## final value 21347.844841
## stopped after 100 iterations
## # weights: 101
## initial value 30403.529853
## iter 10 value 22879.614199
## iter 20 value 21260.636428
## iter 30 value 20483.252546
## iter 40 value 20096.123800
## iter 50 value 19761.578787
## iter 60 value 19305.417576
## iter 70 value 18998.278472
## iter 80 value 18702.713293
## iter 90 value 18492.806272
## iter 100 value 18383.060629
## final value 18383.060629
## stopped after 100 iterations
## # weights: 165
## initial value 26117.948774
## iter 10 value 21247.035272
## iter 20 value 19002.712809
## iter 30 value 18419.060744
## iter 40 value 17976.447406
## iter 50 value 17346.971131
## iter 60 value 16985.246902
## iter 70 value 16687.846497
## iter 80 value 16379.914373

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## iter 90 value 16181.865639
## iter 100 value 15899.964117
## final value 15899.964117
## stopped after 100 iterations
## # weights: 37
## initial value 27814.988797
## iter 10 value 24383.305191
## iter 20 value 24218.733190
## iter 30 value 23683.911428
## iter 40 value 23252.924970
## iter 50 value 22053.115296
## iter 60 value 21729.589307
## iter 70 value 21445.559973
## iter 80 value 21387.165186
## iter 90 value 21363.599461
## iter 100 value 21328.804904
## final value 21328.804904
## stopped after 100 iterations
## # weights: 101
## initial value 26483.127011
## iter 10 value 22833.936639
## iter 20 value 21653.305294
## iter 30 value 21203.848816
## iter 40 value 20779.540562
## iter 50 value 20394.905468
## iter 60 value 20162.229986
## iter 70 value 19928.526146
## iter 80 value 19627.396481
## iter 90 value 19430.716481
## iter 100 value 19186.207174
## final value 19186.207174
## stopped after 100 iterations
## # weights: 165
## initial value 27463.489323
## iter 10 value 23107.193967
## iter 20 value 19692.195433
## iter 30 value 18694.824569
## iter 40 value 18001.363472
## iter 50 value 17257.844414
## iter 60 value 16844.636967
## iter 70 value 16643.276108
## iter 80 value 16384.514032
## iter 90 value 16233.307737
## iter 100 value 16138.066065
## final value 16138.066065
## stopped after 100 iterations
## # weights: 37
## initial value 25750.830337
## iter 10 value 24679.251503
## iter 20 value 23912.871843
## iter 30 value 23262.293467
## iter 40 value 22856.617837
## iter 50 value 22589.230574
## iter 60 value 22284.018602

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## iter 70 value 22224.651897
## iter 80 value 22170.993362
## iter 90 value 22118.393867
## iter 100 value 21925.515300
## final value 21925.515300
## stopped after 100 iterations
## # weights: 101
## initial value 28468.482182
## iter 10 value 24259.503882
## iter 20 value 22201.965640
## iter 30 value 21459.061480
## iter 40 value 20899.977097
## iter 50 value 20262.078606
## iter 60 value 19856.092491
## iter 70 value 19522.853272
## iter 80 value 19101.443167
## iter 90 value 18760.353825
## iter 100 value 18494.493639
## final value 18494.493639
## stopped after 100 iterations
## # weights: 165
## initial value 30314.011177
## iter 10 value 21854.193142
## iter 20 value 19183.649756
## iter 30 value 18405.907708
## iter 40 value 18003.753936
## iter 50 value 17558.698430
## iter 60 value 17236.952598
## iter 70 value 17022.798351
## iter 80 value 16870.081698
## iter 90 value 16738.170394
## iter 100 value 16643.746380
## final value 16643.746380
## stopped after 100 iterations
## # weights: 37
## initial value 26391.154040
## iter 10 value 24149.490215
## iter 20 value 23941.117629
## iter 30 value 23321.428097
## iter 40 value 22803.024054
## iter 50 value 22469.232586
## iter 60 value 22306.139386
## iter 70 value 22162.032423
## iter 80 value 22059.919962
## iter 90 value 22016.288500
## iter 100 value 21992.577755
## final value 21992.577755
## stopped after 100 iterations
## # weights: 101
## initial value 26120.906855
## iter 10 value 22549.075702
## iter 20 value 21291.005515
## iter 30 value 20766.860819
## iter 40 value 20307.271686

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## iter 50 value 19902.197914
## iter 60 value 19641.803886
## iter 70 value 19435.078803
## iter 80 value 19316.980644
## iter 90 value 19172.233099
## iter 100 value 18949.464689
## final value 18949.464689
## stopped after 100 iterations
## # weights: 165
## initial value 27668.100793
## iter 10 value 20664.091494
## iter 20 value 18400.590974
## iter 30 value 17422.516589
## iter 40 value 16937.597960
## iter 50 value 16738.168267
## iter 60 value 16591.310698
## iter 70 value 16421.202952
## iter 80 value 16258.828821
## iter 90 value 16105.841680
## iter 100 value 16037.993926
## final value 16037.993926
## stopped after 100 iterations
## # weights: 37
## initial value 26503.961436
## iter 10 value 24347.972490
## iter 20 value 24088.972038
## iter 30 value 23406.056192
## iter 40 value 22399.046702
## iter 50 value 21860.889049
## iter 60 value 21592.498577
## iter 70 value 21481.968009
## iter 80 value 21455.821849
## iter 90 value 21450.356981
## iter 100 value 21432.949801
## final value 21432.949801
## stopped after 100 iterations
## # weights: 101
## initial value 25268.320479
## iter 10 value 21765.425852
## iter 20 value 20460.081700
## iter 30 value 20111.373191
## iter 40 value 19908.164185
## iter 50 value 19837.986179
## iter 60 value 19754.345816
## iter 70 value 19694.481391
## iter 80 value 19629.999939
## iter 90 value 19600.476561
## iter 100 value 19578.200356
## final value 19578.200356
## stopped after 100 iterations
## # weights: 165
## initial value 28654.708440
## iter 10 value 22097.667439
## iter 20 value 19259.110655

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## iter 30 value 18320.493792
## iter 40 value 17876.623305
## iter 50 value 17522.240889
## iter 60 value 17261.934134
## iter 70 value 16930.115478
## iter 80 value 16616.708167
## iter 90 value 16430.750369
## iter 100 value 16259.514732
## final value 16259.514732
## stopped after 100 iterations
## # weights: 37
## initial value 28550.379284
## iter 10 value 24659.195050
## iter 20 value 24176.011501
## iter 30 value 23352.468801
## iter 40 value 22136.922606
## iter 50 value 21732.723426
## iter 60 value 21659.948901
## iter 70 value 21654.681480
## iter 80 value 21648.845627
## iter 90 value 21646.845743
## iter 100 value 21628.796818
## final value 21628.796818
## stopped after 100 iterations
## # weights: 101
## initial value 27553.755118
## iter 10 value 22484.731361
## iter 20 value 20487.222227
## iter 30 value 19771.407633
## iter 40 value 19285.607090
## iter 50 value 18686.338298
## iter 60 value 18551.480819
## iter 70 value 18452.077117
## iter 80 value 18354.622934
## iter 90 value 18297.831344
## iter 100 value 18226.916980
## final value 18226.916980
## stopped after 100 iterations
## # weights: 165
## initial value 29944.882668
## iter 10 value 20416.197878
## iter 20 value 18061.468870
## iter 30 value 16773.409366
## iter 40 value 16127.581677
## iter 50 value 15908.248579
## iter 60 value 15623.993786
## iter 70 value 15323.224979
## iter 80 value 15066.041630
## iter 90 value 14879.114138
## iter 100 value 14721.761403
## final value 14721.761403
## stopped after 100 iterations
## # weights: 37
## initial value 26106.057201

```



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## iter 10 value 24059.034315
## iter 20 value 23598.816988
## iter 30 value 23353.840831
## iter 40 value 23254.986498
## iter 50 value 23219.550187
## iter 60 value 23048.058017
## iter 70 value 22728.340533
## iter 80 value 22139.747448
## iter 90 value 22083.100443
## iter 100 value 22051.472072
## final value 22051.472072
## stopped after 100 iterations
## # weights: 101
## initial value 26838.309650
## iter 10 value 21736.968267
## iter 20 value 20678.618804
## iter 30 value 20279.993107
## iter 40 value 20117.961867
## iter 50 value 19640.694595
## iter 60 value 19244.458610
## iter 70 value 18965.119856
## iter 80 value 18699.643811
## iter 90 value 18469.206168
## iter 100 value 18253.837692
## final value 18253.837692
## stopped after 100 iterations
## # weights: 165
## initial value 25899.759542
## iter 10 value 21751.539637
## iter 20 value 19459.936501
## iter 30 value 18192.717358
## iter 40 value 17846.311577
## iter 50 value 17453.717890
## iter 60 value 17180.437413
## iter 70 value 16928.034406
## iter 80 value 16738.473248
## iter 90 value 16617.522408
## iter 100 value 16480.066406
## final value 16480.066406
## stopped after 100 iterations
## # weights: 37
## initial value 26828.537028
## iter 10 value 23235.253473
## iter 20 value 22802.988101
## iter 30 value 22504.114709
## iter 40 value 22357.871558
## iter 50 value 22270.514245
## iter 60 value 22165.331494
## iter 70 value 21974.786167
## iter 80 value 21711.198053
## iter 90 value 21521.839745
## iter 100 value 21489.119796
## final value 21489.119796
## stopped after 100 iterations

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```

## # weights: 101
## initial value 25877.382446
## iter 10 value 22382.214527
## iter 20 value 20523.994734
## iter 30 value 20078.448462
## iter 40 value 19863.926090
## iter 50 value 19547.979496
## iter 60 value 19281.893364
## iter 70 value 18975.011168
## iter 80 value 18753.674466
## iter 90 value 18593.255563
## iter 100 value 18374.326115
## final value 18374.326115
## stopped after 100 iterations
## # weights: 165
## initial value 28960.121179
## iter 10 value 20295.522745
## iter 20 value 18241.320200
## iter 30 value 17461.761662
## iter 40 value 17193.873403
## iter 50 value 16877.477071
## iter 60 value 16621.692522
## iter 70 value 16336.282797
## iter 80 value 16164.029981
## iter 90 value 16063.777859
## iter 100 value 15958.467864
## final value 15958.467864
## stopped after 100 iterations
## # weights: 35
## initial value 27238.493316
## iter 10 value 23866.576789
## iter 20 value 23267.493438
## iter 30 value 22507.766521
## iter 40 value 22278.162419
## iter 50 value 22121.072774
## iter 60 value 22103.025079
## iter 70 value 22050.931713
## iter 80 value 21889.902933
## iter 90 value 21720.894275
## iter 100 value 21643.689164
## final value 21643.689164
## stopped after 100 iterations
## # weights: 95
## initial value 27804.066090
## iter 10 value 22346.522894
## iter 20 value 21021.687021
## iter 30 value 20539.447212
## iter 40 value 20122.886597
## iter 50 value 19893.387872
## iter 60 value 19504.532243
## iter 70 value 19265.196526
## iter 80 value 19003.258355
## iter 90 value 18864.428829
## iter 100 value 18777.868258

```

```

## final value 18777.868258
## stopped after 100 iterations
## # weights: 155
## initial value 28841.606938
## iter 10 value 21273.911962
## iter 20 value 19252.116420
## iter 30 value 18395.507344
## iter 40 value 18022.266826
## iter 50 value 17766.553451
## iter 60 value 17557.450547
## iter 70 value 17427.255921
## iter 80 value 17312.138079
## iter 90 value 17177.120687
## iter 100 value 16925.670559
## final value 16925.670559
## stopped after 100 iterations
## # weights: 35
## initial value 26055.314188
## iter 10 value 23642.616364
## iter 20 value 23010.833984
## iter 30 value 22525.973769
## iter 40 value 22439.664889
## iter 50 value 22364.484815
## iter 60 value 22325.654878
## iter 70 value 22267.224643
## iter 80 value 22181.068539
## iter 90 value 21833.897757
## iter 100 value 21664.215287
## final value 21664.215287
## stopped after 100 iterations
## # weights: 95
## initial value 25723.310129
## iter 10 value 21978.003829
## iter 20 value 19758.096964
## iter 30 value 19334.210389
## iter 40 value 18999.075728
## iter 50 value 18768.983558
## iter 60 value 18583.642853
## iter 70 value 18406.920494
## iter 80 value 18296.216879
## iter 90 value 18186.792609
## iter 100 value 18067.247879
## final value 18067.247879
## stopped after 100 iterations
## # weights: 155
## initial value 28531.601507
## iter 10 value 20722.358616
## iter 20 value 18864.279268
## iter 30 value 17931.284079
## iter 40 value 17517.385291
## iter 50 value 17045.133926
## iter 60 value 16615.366029
## iter 70 value 16334.243121
## iter 80 value 16115.820200

```

```

## iter 90 value 15998.199532
## iter 100 value 15915.033468
## final value 15915.033468
## stopped after 100 iterations
## # weights: 35
## initial value 26096.114270
## iter 10 value 24750.618847
## iter 20 value 24091.617798
## iter 30 value 23767.695069
## iter 40 value 23566.679380
## iter 50 value 23422.898902
## iter 60 value 23232.771161
## iter 70 value 23209.261740
## iter 80 value 23186.508455
## iter 90 value 23036.385465
## iter 100 value 22848.857754
## final value 22848.857754
## stopped after 100 iterations
## # weights: 95
## initial value 28097.422254
## iter 10 value 21930.968446
## iter 20 value 20080.985193
## iter 30 value 19749.893561
## iter 40 value 19507.961382
## iter 50 value 19287.574220
## iter 60 value 18951.864821
## iter 70 value 18662.159240
## iter 80 value 18336.942937
## iter 90 value 18090.725957
## iter 100 value 18005.181436
## final value 18005.181436
## stopped after 100 iterations
## # weights: 155
## initial value 26519.331776
## iter 10 value 19827.553939
## iter 20 value 17981.310490
## iter 30 value 17095.997763
## iter 40 value 16685.484617
## iter 50 value 16440.301250
## iter 60 value 16176.119954
## iter 70 value 15846.260736
## iter 80 value 15524.713463
## iter 90 value 15173.498853
## iter 100 value 14993.365180
## final value 14993.365180
## stopped after 100 iterations
## # weights: 35
## initial value 28200.270562
## iter 10 value 22911.090280
## iter 20 value 22536.250563
## iter 30 value 22220.625380
## iter 40 value 21914.844700
## iter 50 value 21723.751129
## iter 60 value 21698.250203

```

```

## iter 70 value 21690.993023
## iter 80 value 21682.965308
## iter 90 value 21673.906443
## iter 100 value 21626.394443
## final value 21626.394443
## stopped after 100 iterations
## # weights: 95
## initial value 28949.200167
## iter 10 value 22868.168611
## iter 20 value 20887.677160
## iter 30 value 20086.189132
## iter 40 value 19728.414504
## iter 50 value 19482.959732
## iter 60 value 19225.231233
## iter 70 value 19059.871245
## iter 80 value 19000.965816
## iter 90 value 18966.494387
## iter 100 value 18929.879324
## final value 18929.879324
## stopped after 100 iterations
## # weights: 155
## initial value 27099.730922
## iter 10 value 20872.937126
## iter 20 value 18922.228318
## iter 30 value 18402.198841
## iter 40 value 18008.353913
## iter 50 value 17538.041732
## iter 60 value 17257.822311
## iter 70 value 17115.052752
## iter 80 value 16907.950429
## iter 90 value 16778.786223
## iter 100 value 16656.661928
## final value 16656.661928
## stopped after 100 iterations
## # weights: 35
## initial value 28241.758490
## iter 10 value 24108.088299
## iter 20 value 23287.022236
## iter 30 value 22986.990683
## iter 40 value 22682.298173
## iter 50 value 22474.141971
## iter 60 value 22275.962380
## iter 70 value 22077.174739
## iter 80 value 22001.000349
## iter 90 value 21988.036613
## iter 100 value 21973.412632
## final value 21973.412632
## stopped after 100 iterations
## # weights: 95
## initial value 28224.457214
## iter 10 value 21617.933880
## iter 20 value 20026.347698
## iter 30 value 19565.714011
## iter 40 value 19383.536479

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```

## iter 50 value 19158.168075
## iter 60 value 18829.233810
## iter 70 value 18662.248257
## iter 80 value 18553.439370
## iter 90 value 18456.140172
## iter 100 value 18255.250174
## final value 18255.250174
## stopped after 100 iterations
## # weights: 155
## initial value 27093.924645
## iter 10 value 21263.652731
## iter 20 value 19347.089140
## iter 30 value 18794.762160
## iter 40 value 18415.744580
## iter 50 value 17900.981754
## iter 60 value 17322.699303
## iter 70 value 17022.853644
## iter 80 value 16596.110462
## iter 90 value 16307.701567
## iter 100 value 16099.630373
## final value 16099.630373
## stopped after 100 iterations
## # weights: 35
## initial value 29187.168412
## iter 10 value 24244.847268
## iter 20 value 23636.860634
## iter 30 value 23017.140273
## iter 40 value 22164.654727
## iter 50 value 21926.782574
## iter 60 value 21912.082878
## iter 70 value 21889.304810
## iter 80 value 21808.889590
## iter 90 value 21764.645241
## iter 100 value 21700.772788
## final value 21700.772788
## stopped after 100 iterations
## # weights: 95
## initial value 27729.523705
## iter 10 value 22780.603328
## iter 20 value 20681.285436
## iter 30 value 20082.656558
## iter 40 value 19837.338464
## iter 50 value 19634.154804
## iter 60 value 19403.022201
## iter 70 value 19266.061590
## iter 80 value 19156.407871
## iter 90 value 19052.051772
## iter 100 value 18890.384831
## final value 18890.384831
## stopped after 100 iterations
## # weights: 155
## initial value 26600.644060
## iter 10 value 21236.628860
## iter 20 value 19059.785065

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## iter 30 value 18579.222508
## iter 40 value 18103.979819
## iter 50 value 17617.336086
## iter 60 value 17268.703422
## iter 70 value 17033.901690
## iter 80 value 16815.134600
## iter 90 value 16633.504676
## iter 100 value 16521.623379
## final value 16521.623379
## stopped after 100 iterations
## # weights: 37
## initial value 26986.919682
## iter 10 value 23756.231880
## iter 20 value 23140.912799
## iter 30 value 22781.151131
## iter 40 value 22625.425386
## iter 50 value 22505.475435
## iter 60 value 22256.191870
## iter 70 value 22218.235715
## iter 80 value 22183.703651
## iter 90 value 22174.776539
## iter 100 value 22157.992436
## final value 22157.992436
## stopped after 100 iterations
## # weights: 101
## initial value 26501.553132
## iter 10 value 21753.132727
## iter 20 value 20107.467441
## iter 30 value 19615.534132
## iter 40 value 19420.948117
## iter 50 value 19060.808981
## iter 60 value 18888.047593
## iter 70 value 18695.725941
## iter 80 value 18615.485234
## iter 90 value 18552.818149
## iter 100 value 18433.278603
## final value 18433.278603
## stopped after 100 iterations
## # weights: 165
## initial value 28921.011793
## iter 10 value 22139.775732
## iter 20 value 19462.030723
## iter 30 value 18711.506802
## iter 40 value 18464.407413
## iter 50 value 18001.186403
## iter 60 value 17627.226017
## iter 70 value 17400.399502
## iter 80 value 17236.804109
## iter 90 value 17153.259141
## iter 100 value 17087.053971
## final value 17087.053971
## stopped after 100 iterations
## # weights: 37
## initial value 25244.196972

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```

## iter 10 value 23340.057046
## iter 20 value 23014.646946
## iter 30 value 22374.833031
## iter 40 value 22053.825769
## iter 50 value 21865.909828
## iter 60 value 21736.258456
## iter 70 value 21697.932587
## iter 80 value 21672.684954
## iter 90 value 21671.942523
## iter 100 value 21669.280695
## final value 21669.280695
## stopped after 100 iterations
## # weights: 101
## initial value 26123.778388
## iter 10 value 21207.619085
## iter 20 value 20210.876167
## iter 30 value 19844.783533
## iter 40 value 19448.227010
## iter 50 value 19174.729185
## iter 60 value 19039.307189
## iter 70 value 18915.752539
## iter 80 value 18823.919009
## iter 90 value 18726.769981
## iter 100 value 18590.169577
## final value 18590.169577
## stopped after 100 iterations
## # weights: 165
## initial value 28549.389473
## iter 10 value 22220.655578
## iter 20 value 19881.248818
## iter 30 value 18660.448346
## iter 40 value 18378.149696
## iter 50 value 18138.636986
## iter 60 value 17820.650072
## iter 70 value 17543.005080
## iter 80 value 17367.713055
## iter 90 value 17179.131403
## iter 100 value 16990.022764
## final value 16990.022764
## stopped after 100 iterations
## # weights: 37
## initial value 27923.854222
## iter 10 value 23138.472398
## iter 20 value 22790.448954
## iter 30 value 22452.674845
## iter 40 value 22289.013286
## iter 50 value 22206.157631
## iter 60 value 22096.824282
## iter 70 value 21980.221311
## iter 80 value 21938.865218
## iter 90 value 21898.270891
## iter 100 value 21883.459461
## final value 21883.459461
## stopped after 100 iterations

```



```

## # weights: 101
## initial value 26642.171263
## iter 10 value 21621.823132
## iter 20 value 20396.879849
## iter 30 value 20098.446425
## iter 40 value 19710.616502
## iter 50 value 19330.938825
## iter 60 value 19095.665334
## iter 70 value 18892.653115
## iter 80 value 18682.867027
## iter 90 value 18407.611713
## iter 100 value 18012.634283
## final value 18012.634283
## stopped after 100 iterations
## # weights: 165
## initial value 26188.333966
## iter 10 value 20474.991481
## iter 20 value 18226.572003
## iter 30 value 17248.880011
## iter 40 value 16978.722235
## iter 50 value 16795.753365
## iter 60 value 16512.997430
## iter 70 value 16318.721605
## iter 80 value 16170.100027
## iter 90 value 16035.708748
## iter 100 value 15954.484387
## final value 15954.484387
## stopped after 100 iterations
## # weights: 35
## initial value 26923.656818
## iter 10 value 24640.552051
## iter 20 value 22911.721388
## iter 30 value 22763.348367
## iter 40 value 22400.298529
## iter 50 value 22070.214057
## iter 60 value 21840.027907
## iter 70 value 21796.362182
## iter 80 value 21690.572843
## iter 90 value 21629.906421
## iter 100 value 21596.640759
## final value 21596.640759
## stopped after 100 iterations
## # weights: 95
## initial value 31018.173007
## iter 10 value 21296.238317
## iter 20 value 20744.999795
## iter 30 value 20526.077243
## iter 40 value 20229.051755
## iter 50 value 19764.323785
## iter 60 value 19268.095908
## iter 70 value 18918.328876
## iter 80 value 18601.325355
## iter 90 value 18362.809558
## iter 100 value 18079.114317

```

```

## final value 18079.114317
## stopped after 100 iterations
## # weights: 155
## initial value 26026.918435
## iter 10 value 20057.590067
## iter 20 value 18556.717913
## iter 30 value 17665.645524
## iter 40 value 17117.124659
## iter 50 value 16813.491145
## iter 60 value 16589.665348
## iter 70 value 16284.371358
## iter 80 value 15868.305512
## iter 90 value 15624.153088
## iter 100 value 15434.412161
## final value 15434.412161
## stopped after 100 iterations
## # weights: 35
## initial value 26502.696186
## iter 10 value 23988.958348
## iter 20 value 23686.503826
## iter 30 value 23332.755879
## iter 40 value 23058.280124
## iter 50 value 22975.138189
## iter 60 value 22561.045918
## iter 70 value 22344.654822
## iter 80 value 22216.419672
## iter 90 value 22160.135061
## iter 100 value 21950.641871
## final value 21950.641871
## stopped after 100 iterations
## # weights: 95
## initial value 27561.785073
## iter 10 value 20921.063295
## iter 20 value 19943.947540
## iter 30 value 19668.149884
## iter 40 value 19544.901335
## iter 50 value 19369.779223
## iter 60 value 19055.913933
## iter 70 value 18926.439953
## iter 80 value 18821.812957
## iter 90 value 18742.074523
## iter 100 value 18612.931546
## final value 18612.931546
## stopped after 100 iterations
## # weights: 155
## initial value 31419.605031
## iter 10 value 22405.766067
## iter 20 value 19325.470897
## iter 30 value 18431.791381
## iter 40 value 17930.101780
## iter 50 value 17563.159807
## iter 60 value 17190.878203
## iter 70 value 16960.001793
## iter 80 value 16819.953209

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## iter 90 value 16674.551538
## iter 100 value 16526.449965
## final value 16526.449965
## stopped after 100 iterations
## # weights: 35
## initial value 28433.513532
## iter 10 value 24115.857581
## iter 20 value 23792.396891
## iter 30 value 22323.674834
## iter 40 value 21738.723032
## iter 50 value 21505.595291
## iter 60 value 21433.650819
## iter 70 value 21403.950641
## iter 80 value 21396.262042
## iter 90 value 21393.986731
## iter 100 value 21386.648437
## final value 21386.648437
## stopped after 100 iterations
## # weights: 95
## initial value 25904.177234
## iter 10 value 20999.858777
## iter 20 value 19368.961184
## iter 30 value 18921.455674
## iter 40 value 18708.806916
## iter 50 value 18479.562518
## iter 60 value 18164.263677
## iter 70 value 18032.874018
## iter 80 value 17919.837418
## iter 90 value 17811.988428
## iter 100 value 17717.287408
## final value 17717.287408
## stopped after 100 iterations
## # weights: 155
## initial value 29266.666115
## iter 10 value 21854.216704
## iter 20 value 19100.190016
## iter 30 value 18518.640402
## iter 40 value 18225.464405
## iter 50 value 17615.225594
## iter 60 value 17376.958707
## iter 70 value 17196.256880
## iter 80 value 17069.611594
## iter 90 value 16945.288428
## iter 100 value 16777.282026
## final value 16777.282026
## stopped after 100 iterations
## # weights: 36
## initial value 26059.047276
## iter 10 value 23448.646885
## iter 20 value 23011.199164
## iter 30 value 22513.531463
## iter 40 value 22285.526543
## iter 50 value 22106.650130
## iter 60 value 22069.137478

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## iter 70 value 21997.484301
## iter 80 value 21975.042906
## iter 90 value 21957.563607
## iter 100 value 21951.049118
## final value 21951.049118
## stopped after 100 iterations
## # weights: 98
## initial value 28159.326695
## iter 10 value 21353.357774
## iter 20 value 19708.305377
## iter 30 value 19226.351761
## iter 40 value 18960.658493
## iter 50 value 18598.865726
## iter 60 value 18215.671527
## iter 70 value 18085.081438
## iter 80 value 17946.893889
## iter 90 value 17837.367648
## iter 100 value 17767.391070
## final value 17767.391070
## stopped after 100 iterations
## # weights: 160
## initial value 26822.036447
## iter 10 value 20481.486733
## iter 20 value 18254.480181
## iter 30 value 17158.720596
## iter 40 value 16635.858969
## iter 50 value 16327.730789
## iter 60 value 15926.859563
## iter 70 value 15529.256320
## iter 80 value 15358.007327
## iter 90 value 15191.593498
## iter 100 value 15099.227848
## final value 15099.227848
## stopped after 100 iterations
## # weights: 36
## initial value 26021.302027
## iter 10 value 23595.478627
## iter 20 value 23280.087022
## iter 30 value 22799.175074
## iter 40 value 22349.796402
## iter 50 value 22088.314947
## iter 60 value 22072.449399
## iter 70 value 21978.482420
## iter 80 value 21904.319962
## iter 90 value 21856.535678
## iter 100 value 21844.449821
## final value 21844.449821
## stopped after 100 iterations
## # weights: 98
## initial value 26328.264142
## iter 10 value 22424.722290
## iter 20 value 20427.891243
## iter 30 value 19771.649551
## iter 40 value 19447.278055

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## iter 50 value 19081.926220
## iter 60 value 18879.032161
## iter 70 value 18787.733006
## iter 80 value 18579.859423
## iter 90 value 18358.883782
## iter 100 value 17959.951145
## final value 17959.951145
## stopped after 100 iterations
## # weights: 160
## initial value 30342.772887
## iter 10 value 21670.088722
## iter 20 value 19296.792496
## iter 30 value 18075.536303
## iter 40 value 17602.963670
## iter 50 value 17213.872849
## iter 60 value 16717.947263
## iter 70 value 16359.107302
## iter 80 value 16104.357610
## iter 90 value 15896.053187
## iter 100 value 15738.795641
## final value 15738.795641
## stopped after 100 iterations
## # weights: 36
## initial value 26702.386473
## iter 10 value 24278.847585
## iter 20 value 23543.832609
## iter 30 value 23145.082685
## iter 40 value 22916.780483
## iter 50 value 22693.685022
## iter 60 value 22664.819961
## iter 70 value 22659.969553
## iter 80 value 22647.358513
## iter 90 value 22596.938013
## iter 100 value 22467.038119
## final value 22467.038119
## stopped after 100 iterations
## # weights: 98
## initial value 26676.389106
## iter 10 value 22154.500245
## iter 20 value 20266.308923
## iter 30 value 19857.125098
## iter 40 value 19639.611971
## iter 50 value 19260.809420
## iter 60 value 19018.934796
## iter 70 value 18848.607183
## iter 80 value 18713.290563
## iter 90 value 18613.106741
## iter 100 value 18552.795421
## final value 18552.795421
## stopped after 100 iterations
## # weights: 160
## initial value 29875.233768
## iter 10 value 21706.415965
## iter 20 value 18805.230301

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## iter 30 value 17811.169490
## iter 40 value 17347.269504
## iter 50 value 16969.149838
## iter 60 value 16627.470140
## iter 70 value 16370.398738
## iter 80 value 16189.840819
## iter 90 value 15958.435609
## iter 100 value 15826.473487
## final value 15826.473487
## stopped after 100 iterations
## # weights: 36
## initial value 26169.971676
## iter 10 value 24156.362989
## iter 20 value 23801.546327
## iter 30 value 23307.274568
## iter 40 value 22470.020870
## iter 50 value 22018.932865
## iter 60 value 21591.628095
## iter 70 value 21568.247007
## iter 80 value 21549.498899
## iter 90 value 21540.463795
## iter 100 value 21512.808943
## final value 21512.808943
## stopped after 100 iterations
## # weights: 98
## initial value 26809.849633
## iter 10 value 21484.206128
## iter 20 value 20451.072457
## iter 30 value 20180.578828
## iter 40 value 19867.746068
## iter 50 value 19638.860070
## iter 60 value 19528.614167
## iter 70 value 19435.282999
## iter 80 value 19323.828825
## iter 90 value 19222.712167
## iter 100 value 19138.451067
## final value 19138.451067
## stopped after 100 iterations
## # weights: 160
## initial value 28038.769498
## iter 10 value 21147.662889
## iter 20 value 18257.657576
## iter 30 value 17457.223334
## iter 40 value 16986.486334
## iter 50 value 16748.027907
## iter 60 value 16547.968538
## iter 70 value 16253.662230
## iter 80 value 16027.642806
## iter 90 value 15852.710678
## iter 100 value 15724.135442
## final value 15724.135442
## stopped after 100 iterations
## # weights: 36
## initial value 27119.323871

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## iter 10 value 23326.764056
## iter 20 value 23205.040611
## iter 30 value 22759.757615
## iter 40 value 21638.283808
## iter 50 value 21487.862895
## iter 60 value 21457.526794
## iter 70 value 21444.858194
## iter 80 value 21429.967526
## iter 90 value 21416.289169
## iter 100 value 21407.579451
## final value 21407.579451
## stopped after 100 iterations
## # weights: 98
## initial value 25007.963835
## iter 10 value 20881.616612
## iter 20 value 19484.632437
## iter 30 value 19245.310574
## iter 40 value 18979.458400
## iter 50 value 18597.094978
## iter 60 value 18406.058165
## iter 70 value 18342.643732
## iter 80 value 18255.367665
## iter 90 value 18175.634464
## iter 100 value 18126.822363
## final value 18126.822363
## stopped after 100 iterations
## # weights: 160
## initial value 26959.791515
## iter 10 value 22086.991473
## iter 20 value 19013.591854
## iter 30 value 18322.257955
## iter 40 value 17868.095119
## iter 50 value 17372.037359
## iter 60 value 17089.203101
## iter 70 value 16815.002297
## iter 80 value 16618.024549
## iter 90 value 16326.221442
## iter 100 value 16106.875093
## final value 16106.875093
## stopped after 100 iterations
## # weights: 36
## initial value 25526.444701
## iter 10 value 23762.176330
## iter 20 value 23598.448612
## iter 30 value 23287.835315
## iter 40 value 22652.017366
## iter 50 value 22090.522709
## iter 60 value 21987.676324
## iter 70 value 21966.187198
## iter 80 value 21942.090732
## iter 90 value 21931.007852
## iter 100 value 21922.352962
## final value 21922.352962
## stopped after 100 iterations

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## # weights: 98
## initial value 27304.644793
## iter 10 value 23093.628639
## iter 20 value 20391.044551
## iter 30 value 19811.479413
## iter 40 value 19526.792710
## iter 50 value 19261.112983
## iter 60 value 19088.092833
## iter 70 value 18886.082114
## iter 80 value 18726.847761
## iter 90 value 18572.492924
## iter 100 value 18444.585708
## final value 18444.585708
## stopped after 100 iterations
## # weights: 160
## initial value 27569.681608
## iter 10 value 20640.383247
## iter 20 value 18647.091616
## iter 30 value 17805.013759
## iter 40 value 17544.877482
## iter 50 value 17204.202626
## iter 60 value 16737.635091
## iter 70 value 16383.933731
## iter 80 value 16156.838772
## iter 90 value 15952.063890
## iter 100 value 15824.264259
## final value 15824.264259
## stopped after 100 iterations
## # weights: 37
## initial value 26625.410889
## iter 10 value 23595.188635
## iter 20 value 23050.893006
## iter 30 value 22556.304595
## iter 40 value 22362.630846
## iter 50 value 22268.385666
## iter 60 value 22197.776566
## iter 70 value 22106.089405
## iter 80 value 22041.567940
## iter 90 value 22035.233552
## iter 100 value 22017.894471
## final value 22017.894471
## stopped after 100 iterations
## # weights: 101
## initial value 27666.289213
## iter 10 value 22502.641304
## iter 20 value 20866.361432
## iter 30 value 20349.268899
## iter 40 value 20069.130252
## iter 50 value 19754.647654
## iter 60 value 19439.566535
## iter 70 value 19080.695277
## iter 80 value 18772.995510
## iter 90 value 18386.328611
## iter 100 value 18122.027166

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## final value 18122.027166
## stopped after 100 iterations
## # weights: 165
## initial value 26540.910799
## iter 10 value 21553.774627
## iter 20 value 19230.366369
## iter 30 value 18472.950258
## iter 40 value 18100.680651
## iter 50 value 17610.985859
## iter 60 value 17334.553577
## iter 70 value 17120.775397
## iter 80 value 16922.901284
## iter 90 value 16806.662755
## iter 100 value 16705.890094
## final value 16705.890094
## stopped after 100 iterations
## # weights: 37
## initial value 26169.562384
## iter 10 value 24414.804477
## iter 20 value 23989.116430
## iter 30 value 23255.169697
## iter 40 value 22988.584887
## iter 50 value 22856.741027
## iter 60 value 22788.605087
## iter 70 value 22718.383259
## iter 80 value 22682.147054
## iter 90 value 22678.293318
## iter 100 value 22670.093657
## final value 22670.093657
## stopped after 100 iterations
## # weights: 101
## initial value 26204.088768
## iter 10 value 23177.139009
## iter 20 value 21245.927031
## iter 30 value 20124.315251
## iter 40 value 19639.719390
## iter 50 value 19076.573138
## iter 60 value 18867.363500
## iter 70 value 18550.761034
## iter 80 value 18396.006644
## iter 90 value 18285.769568
## iter 100 value 18134.880460
## final value 18134.880460
## stopped after 100 iterations
## # weights: 165
## initial value 31840.033637
## iter 10 value 20389.947487
## iter 20 value 18344.923668
## iter 30 value 17329.912314
## iter 40 value 17020.615604
## iter 50 value 16806.008473
## iter 60 value 16606.781047
## iter 70 value 16290.537089
## iter 80 value 15957.916390

```

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## iter 90 value 15754.138671
## iter 100 value 15609.123570
## final value 15609.123570
## stopped after 100 iterations
## # weights: 37
## initial value 25724.124299
## iter 10 value 23955.488623
## iter 20 value 23778.212118
## iter 30 value 22706.143570
## iter 40 value 22197.677641
## iter 50 value 21705.456272
## iter 60 value 21506.916733
## iter 70 value 21463.895204
## iter 80 value 21447.405686
## iter 90 value 21434.113544
## iter 100 value 21418.641716
## final value 21418.641716
## stopped after 100 iterations
## # weights: 101
## initial value 26736.591970
## iter 10 value 24118.625949
## iter 20 value 22079.500638
## iter 30 value 21270.131385
## iter 40 value 20656.107777
## iter 50 value 20162.485264
## iter 60 value 19797.881630
## iter 70 value 19427.608215
## iter 80 value 19136.233958
## iter 90 value 18896.614243
## iter 100 value 18745.311130
## final value 18745.311130
## stopped after 100 iterations
## # weights: 165
## initial value 27849.201563
## iter 10 value 21990.130592
## iter 20 value 18341.793683
## iter 30 value 17271.574067
## iter 40 value 16918.124102
## iter 50 value 16586.253470
## iter 60 value 16344.139265
## iter 70 value 16189.381249
## iter 80 value 16044.492077
## iter 90 value 15969.973805
## iter 100 value 15879.966795
## final value 15879.966795
## stopped after 100 iterations
## # weights: 36
## initial value 26542.442789
## iter 10 value 23698.262648
## iter 20 value 23091.591458
## iter 30 value 22778.586014
## iter 40 value 22292.836771
## iter 50 value 21803.143216
## iter 60 value 21700.737116

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## iter 70 value 21626.324311
## iter 80 value 21579.811937
## iter 90 value 21559.870989
## iter 100 value 21540.872136
## final value 21540.872136
## stopped after 100 iterations
## # weights: 98
## initial value 26206.801294
## iter 10 value 22354.628270
## iter 20 value 20644.737145
## iter 30 value 19898.096380
## iter 40 value 19513.017192
## iter 50 value 19102.459442
## iter 60 value 18735.106518
## iter 70 value 18308.915046
## iter 80 value 17995.670846
## iter 90 value 17844.718308
## iter 100 value 17758.957151
## final value 17758.957151
## stopped after 100 iterations
## # weights: 160
## initial value 27175.447166
## iter 10 value 21531.548875
## iter 20 value 18977.252950
## iter 30 value 18075.524219
## iter 40 value 17542.045134
## iter 50 value 17095.212010
## iter 60 value 16708.983472
## iter 70 value 16465.718900
## iter 80 value 16269.969966
## iter 90 value 16123.171398
## iter 100 value 16016.593361
## final value 16016.593361
## stopped after 100 iterations
## # weights: 36
## initial value 25719.503453
## iter 10 value 24209.557647
## iter 20 value 23945.310963
## iter 30 value 22892.294453
## iter 40 value 22262.881574
## iter 50 value 22020.328119
## iter 60 value 21985.391508
## iter 70 value 21921.667764
## iter 80 value 21879.582008
## iter 90 value 21816.296360
## iter 100 value 21805.895512
## final value 21805.895512
## stopped after 100 iterations
## # weights: 98
## initial value 26136.957953
## iter 10 value 20886.770778
## iter 20 value 20011.326070
## iter 30 value 19400.050299
## iter 40 value 19181.578532

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## iter 50 value 18654.065697
## iter 60 value 18421.833004
## iter 70 value 18271.292476
## iter 80 value 18188.172524
## iter 90 value 18107.658694
## iter 100 value 18038.656271
## final value 18038.656271
## stopped after 100 iterations
## # weights: 160
## initial value 26632.571078
## iter 10 value 20677.521807
## iter 20 value 18490.610459
## iter 30 value 17608.843785
## iter 40 value 17233.600048
## iter 50 value 17025.666023
## iter 60 value 16822.190392
## iter 70 value 16501.811965
## iter 80 value 16229.423240
## iter 90 value 15858.494636
## iter 100 value 15579.612754
## final value 15579.612754
## stopped after 100 iterations
## # weights: 36
## initial value 26601.032193
## iter 10 value 23264.291273
## iter 20 value 23145.136626
## iter 30 value 22810.500409
## iter 40 value 22049.172255
## iter 50 value 21670.585720
## iter 60 value 21511.275895
## iter 70 value 21468.160694
## iter 80 value 21454.972817
## iter 90 value 21447.692815
## iter 100 value 21437.492812
## final value 21437.492812
## stopped after 100 iterations
## # weights: 98
## initial value 28316.932661
## iter 10 value 23207.494774
## iter 20 value 21642.394607
## iter 30 value 20789.812123
## iter 40 value 20078.230909
## iter 50 value 19820.895223
## iter 60 value 19709.649668
## iter 70 value 19632.304590
## iter 80 value 19596.341873
## iter 90 value 19564.310299
## iter 100 value 19553.029841
## final value 19553.029841
## stopped after 100 iterations
## # weights: 160
## initial value 25608.495078
## iter 10 value 21568.445346
## iter 20 value 18648.519440

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## iter 30 value 17958.317025
## iter 40 value 17696.449021
## iter 50 value 17384.744229
## iter 60 value 17049.928954
## iter 70 value 16852.486420
## iter 80 value 16640.623239
## iter 90 value 16537.486125
## iter 100 value 16459.929872
## final value 16459.929872
## stopped after 100 iterations
## # weights: 36
## initial value 26449.292595
## iter 10 value 22856.145918
## iter 20 value 22552.328619
## iter 30 value 22321.957720
## iter 40 value 22096.266503
## iter 50 value 21765.880546
## iter 60 value 21681.765960
## iter 70 value 21600.896190
## iter 80 value 21554.670824
## iter 90 value 21503.019902
## iter 100 value 21486.331672
## final value 21486.331672
## stopped after 100 iterations
## # weights: 98
## initial value 25659.617872
## iter 10 value 22188.451160
## iter 20 value 21285.038460
## iter 30 value 20892.469111
## iter 40 value 20606.966244
## iter 50 value 20395.338242
## iter 60 value 20128.033472
## iter 70 value 19918.611281
## iter 80 value 19706.341154
## iter 90 value 19476.184373
## iter 100 value 19361.785796
## final value 19361.785796
## stopped after 100 iterations
## # weights: 160
## initial value 28926.982646
## iter 10 value 20720.136093
## iter 20 value 18794.775967
## iter 30 value 18134.341722
## iter 40 value 17578.826776
## iter 50 value 16843.965543
## iter 60 value 16466.950433
## iter 70 value 16138.414209
## iter 80 value 15925.681769
## iter 90 value 15781.493311
## iter 100 value 15657.936361
## final value 15657.936361
## stopped after 100 iterations
## # weights: 36
## initial value 26844.638057

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```

## iter 10 value 23952.739446
## iter 20 value 23355.387369
## iter 30 value 22501.113463
## iter 40 value 21993.461622
## iter 50 value 21713.177781
## iter 60 value 21648.303131
## iter 70 value 21591.175608
## iter 80 value 21521.288207
## iter 90 value 21503.469461
## iter 100 value 21492.937797
## final value 21492.937797
## stopped after 100 iterations
## # weights: 98
## initial value 26702.793052
## iter 10 value 21688.667653
## iter 20 value 19692.970277
## iter 30 value 19186.516817
## iter 40 value 19063.211387
## iter 50 value 18853.169099
## iter 60 value 18555.359517
## iter 70 value 18219.750148
## iter 80 value 18079.971526
## iter 90 value 18009.443057
## iter 100 value 17924.870457
## final value 17924.870457
## stopped after 100 iterations
## # weights: 160
## initial value 28746.305610
## iter 10 value 22070.983327
## iter 20 value 19595.659502
## iter 30 value 18700.925359
## iter 40 value 18154.223200
## iter 50 value 17583.263867
## iter 60 value 17167.861796
## iter 70 value 16756.107887
## iter 80 value 16300.843285
## iter 90 value 15947.055104
## iter 100 value 15694.576449
## final value 15694.576449
## stopped after 100 iterations
## # weights: 36
## initial value 27552.680982
## iter 10 value 24080.662447
## iter 20 value 22862.290019
## iter 30 value 22273.639326
## iter 40 value 21953.401871
## iter 50 value 21791.999403
## iter 60 value 21735.346541
## iter 70 value 21714.648422
## iter 80 value 21707.327112
## iter 90 value 21684.461317
## iter 100 value 21604.046291
## final value 21604.046291
## stopped after 100 iterations

```

```

## # weights: 98
## initial value 25777.537938
## iter 10 value 21172.513524
## iter 20 value 20142.337561
## iter 30 value 19753.102277
## iter 40 value 19545.006448
## iter 50 value 19289.167099
## iter 60 value 19062.385873
## iter 70 value 18851.513369
## iter 80 value 18735.037205
## iter 90 value 18589.691037
## iter 100 value 18492.941984
## final value 18492.941984
## stopped after 100 iterations
## # weights: 160
## initial value 27341.934351
## iter 10 value 21093.954743
## iter 20 value 19026.536371
## iter 30 value 17529.758546
## iter 40 value 17013.167253
## iter 50 value 16574.763244
## iter 60 value 16252.066795
## iter 70 value 16084.868883
## iter 80 value 15920.804886
## iter 90 value 15802.114616
## iter 100 value 15675.016506
## final value 15675.016506
## stopped after 100 iterations
## # weights: 37
## initial value 26094.371021
## iter 10 value 23598.901958
## iter 20 value 22971.767741
## iter 30 value 22484.049107
## iter 40 value 22167.148951
## iter 50 value 21837.143890
## iter 60 value 21749.438596
## iter 70 value 21600.199791
## iter 80 value 21510.718138
## iter 90 value 21444.703449
## iter 100 value 21419.316939
## final value 21419.316939
## stopped after 100 iterations
## # weights: 101
## initial value 26170.595409
## iter 10 value 22535.737434
## iter 20 value 20737.307800
## iter 30 value 20004.042177
## iter 40 value 19656.097145
## iter 50 value 19181.383489
## iter 60 value 18891.843831
## iter 70 value 18720.503564
## iter 80 value 18592.932998
## iter 90 value 18538.212747
## iter 100 value 18495.163439

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## final value 18495.163439
## stopped after 100 iterations
## # weights: 165
## initial value 27376.820412
## iter 10 value 20702.428891
## iter 20 value 18272.692554
## iter 30 value 17496.978948
## iter 40 value 17318.816488
## iter 50 value 17127.321283
## iter 60 value 16858.458832
## iter 70 value 16544.513688
## iter 80 value 16395.489399
## iter 90 value 16289.587316
## iter 100 value 16227.435184
## final value 16227.435184
## stopped after 100 iterations
## # weights: 37
## initial value 27472.356020
## iter 10 value 22862.223361
## iter 20 value 22727.478357
## iter 30 value 22253.516560
## iter 40 value 21824.724958
## iter 50 value 21478.661943
## iter 60 value 21397.979989
## iter 70 value 21372.225321
## iter 80 value 21364.869873
## iter 90 value 21364.538010
## iter 100 value 21363.964726
## final value 21363.964726
## stopped after 100 iterations
## # weights: 101
## initial value 26506.831958
## iter 10 value 21956.597279
## iter 20 value 20787.817326
## iter 30 value 20337.887211
## iter 40 value 20175.958052
## iter 50 value 19930.734176
## iter 60 value 19645.791069
## iter 70 value 19384.512971
## iter 80 value 19251.555585
## iter 90 value 19171.047945
## iter 100 value 19080.813304
## final value 19080.813304
## stopped after 100 iterations
## # weights: 165
## initial value 28504.126420
## iter 10 value 21235.900787
## iter 20 value 18772.702018
## iter 30 value 17817.992803
## iter 40 value 17536.469860
## iter 50 value 17403.791910
## iter 60 value 17277.444266
## iter 70 value 17102.001296
## iter 80 value 16982.647271

```



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## iter 90 value 16877.602284
## iter 100 value 16785.559309
## final value 16785.559309
## stopped after 100 iterations
## # weights: 37
## initial value 25962.314578
## iter 10 value 24336.368756
## iter 20 value 23440.455004
## iter 30 value 22776.107184
## iter 40 value 22463.686482
## iter 50 value 22252.632832
## iter 60 value 22071.727074
## iter 70 value 21929.230875
## iter 80 value 21770.180826
## iter 90 value 21644.910676
## iter 100 value 21607.812343
## final value 21607.812343
## stopped after 100 iterations
## # weights: 101
## initial value 25522.070820
## iter 10 value 21761.630512
## iter 20 value 20144.920245
## iter 30 value 19623.807874
## iter 40 value 19265.655620
## iter 50 value 18900.832068
## iter 60 value 18673.859088
## iter 70 value 18443.478186
## iter 80 value 18170.312559
## iter 90 value 18038.507467
## iter 100 value 17888.390724
## final value 17888.390724
## stopped after 100 iterations
## # weights: 165
## initial value 29256.870676
## iter 10 value 23344.800168
## iter 20 value 20446.862381
## iter 30 value 19826.865205
## iter 40 value 18999.052244
## iter 50 value 18368.954972
## iter 60 value 18039.571868
## iter 70 value 17721.553745
## iter 80 value 17413.081577
## iter 90 value 16948.145936
## iter 100 value 16515.901074
## final value 16515.901074
## stopped after 100 iterations
## # weights: 37
## initial value 25205.920611
## iter 10 value 23083.628481
## iter 20 value 22918.476845
## iter 30 value 22634.630255
## iter 40 value 22462.018711
## iter 50 value 22309.155209
## iter 60 value 22006.027612

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## iter 70 value 21744.177624
## iter 80 value 21666.706233
## iter 90 value 21640.780767
## iter 100 value 21624.235339
## final value 21624.235339
## stopped after 100 iterations
## # weights: 101
## initial value 28451.653097
## iter 10 value 24325.569469
## iter 20 value 22089.012696
## iter 30 value 21035.518257
## iter 40 value 20643.333393
## iter 50 value 20271.820475
## iter 60 value 19909.953538
## iter 70 value 19481.259275
## iter 80 value 19011.942952
## iter 90 value 18618.204490
## iter 100 value 18420.992614
## final value 18420.992614
## stopped after 100 iterations
## # weights: 165
## initial value 27021.742910
## iter 10 value 21248.879932
## iter 20 value 18967.603824
## iter 30 value 17694.323699
## iter 40 value 17105.596157
## iter 50 value 16729.451178
## iter 60 value 16560.225841
## iter 70 value 16388.979271
## iter 80 value 16142.754231
## iter 90 value 15845.446101
## iter 100 value 15457.971717
## final value 15457.971717
## stopped after 100 iterations
## # weights: 37
## initial value 25922.892016
## iter 10 value 23834.445535
## iter 20 value 23370.924727
## iter 30 value 23004.740173
## iter 40 value 22834.126867
## iter 50 value 22556.504838
## iter 60 value 22463.204195
## iter 70 value 22411.336341
## iter 80 value 22352.425065
## iter 90 value 22296.443434
## iter 100 value 22142.412149
## final value 22142.412149
## stopped after 100 iterations
## # weights: 101
## initial value 28843.298757
## iter 10 value 23511.458496
## iter 20 value 21610.172766
## iter 30 value 21075.330182
## iter 40 value 20480.410933

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## iter 50 value 19842.598411
## iter 60 value 19418.234449
## iter 70 value 18937.720676
## iter 80 value 18515.720602
## iter 90 value 18232.238925
## iter 100 value 18138.456200
## final value 18138.456200
## stopped after 100 iterations
## # weights: 165
## initial value 27000.924052
## iter 10 value 22284.978029
## iter 20 value 20072.875067
## iter 30 value 19316.378872
## iter 40 value 18837.735597
## iter 50 value 18598.546261
## iter 60 value 18336.895584
## iter 70 value 17899.432939
## iter 80 value 17635.330446
## iter 90 value 17392.267532
## iter 100 value 17176.325444
## final value 17176.325444
## stopped after 100 iterations
## # weights: 37
## initial value 25510.954498
## iter 10 value 23677.000708
## iter 20 value 23524.968738
## iter 30 value 22760.059876
## iter 40 value 22229.753759
## iter 50 value 21836.518545
## iter 60 value 21652.830689
## iter 70 value 21447.412208
## iter 80 value 21429.411963
## iter 90 value 21386.474813
## iter 100 value 21380.691426
## final value 21380.691426
## stopped after 100 iterations
## # weights: 101
## initial value 26559.657972
## iter 10 value 21762.713341
## iter 20 value 19667.515773
## iter 30 value 19073.551946
## iter 40 value 18778.538477
## iter 50 value 18581.527713
## iter 60 value 18421.345447
## iter 70 value 18284.302426
## iter 80 value 18154.913975
## iter 90 value 18079.651048
## iter 100 value 18035.320308
## final value 18035.320308
## stopped after 100 iterations
## # weights: 165
## initial value 26762.926218
## iter 10 value 21224.242364
## iter 20 value 19741.150965

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## iter 30 value 18921.995366
## iter 40 value 18395.277250
## iter 50 value 18056.199046
## iter 60 value 17794.295570
## iter 70 value 17482.441701
## iter 80 value 17170.560807
## iter 90 value 16881.953094
## iter 100 value 16634.096571
## final value 16634.096571
## stopped after 100 iterations
## # weights: 35
## initial value 27651.133376
## iter 10 value 24573.395294
## iter 20 value 24073.815090
## iter 30 value 23257.156602
## iter 40 value 22766.804779
## iter 50 value 22606.850788
## iter 60 value 22596.828414
## iter 70 value 22593.611916
## iter 80 value 22586.144128
## iter 90 value 22580.876162
## iter 100 value 22571.639165
## final value 22571.639165
## stopped after 100 iterations
## # weights: 95
## initial value 26651.254745
## iter 10 value 21950.743401
## iter 20 value 20023.850059
## iter 30 value 19661.331597
## iter 40 value 19402.250639
## iter 50 value 19094.942557
## iter 60 value 18959.389903
## iter 70 value 18896.276695
## iter 80 value 18713.568267
## iter 90 value 18444.022270
## iter 100 value 18225.382674
## final value 18225.382674
## stopped after 100 iterations
## # weights: 155
## initial value 26317.950046
## iter 10 value 21168.018499
## iter 20 value 18482.629228
## iter 30 value 17755.019421
## iter 40 value 17417.717403
## iter 50 value 16998.002264
## iter 60 value 16749.338641
## iter 70 value 16621.383652
## iter 80 value 16550.941513
## iter 90 value 16478.248281
## iter 100 value 16397.430539
## final value 16397.430539
## stopped after 100 iterations
## # weights: 35
## initial value 26828.666487

```

```

## iter 10 value 23578.834954
## iter 20 value 23156.341647
## iter 30 value 22605.930135
## iter 40 value 22092.498581
## iter 50 value 22007.300605
## iter 60 value 21874.055461
## iter 70 value 21732.809982
## iter 80 value 21691.553300
## iter 90 value 21662.022222
## iter 100 value 21650.502978
## final value 21650.502978
## stopped after 100 iterations
## # weights: 95
## initial value 26961.651776
## iter 10 value 22003.349878
## iter 20 value 20613.263726
## iter 30 value 20316.390052
## iter 40 value 20143.190772
## iter 50 value 19869.524563
## iter 60 value 19719.144526
## iter 70 value 19373.919676
## iter 80 value 19205.276405
## iter 90 value 19081.995293
## iter 100 value 18855.417700
## final value 18855.417700
## stopped after 100 iterations
## # weights: 155
## initial value 27911.483196
## iter 10 value 21977.640807
## iter 20 value 18781.721187
## iter 30 value 17788.481251
## iter 40 value 17430.066582
## iter 50 value 17012.049632
## iter 60 value 16704.676846
## iter 70 value 16396.313815
## iter 80 value 16144.938476
## iter 90 value 15961.311068
## iter 100 value 15798.366025
## final value 15798.366025
## stopped after 100 iterations
## # weights: 35
## initial value 25643.386330
## iter 10 value 24040.218214
## iter 20 value 23888.764024
## iter 30 value 23492.950932
## iter 40 value 22815.698473
## iter 50 value 22344.802230
## iter 60 value 22272.246427
## iter 70 value 22256.409250
## iter 80 value 22235.124942
## iter 90 value 22171.690942
## iter 100 value 21881.535821
## final value 21881.535821
## stopped after 100 iterations

```

```

## # weights: 95
## initial value 25359.431688
## iter 10 value 22100.842867
## iter 20 value 20473.928607
## iter 30 value 19997.336192
## iter 40 value 19574.488601
## iter 50 value 19395.054518
## iter 60 value 19263.617071
## iter 70 value 19104.959392
## iter 80 value 18962.325049
## iter 90 value 18879.238731
## iter 100 value 18800.142024
## final value 18800.142024
## stopped after 100 iterations
## # weights: 155
## initial value 27720.031303
## iter 10 value 20776.970360
## iter 20 value 18555.806678
## iter 30 value 17538.414277
## iter 40 value 17184.515632
## iter 50 value 16903.401995
## iter 60 value 16478.930610
## iter 70 value 16188.774812
## iter 80 value 15959.214018
## iter 90 value 15773.360379
## iter 100 value 15572.373283
## final value 15572.373283
## stopped after 100 iterations
## # weights: 36
## initial value 26342.119816
## iter 10 value 24519.160384
## iter 20 value 23864.537890
## iter 30 value 22987.858006
## iter 40 value 22475.451926
## iter 50 value 22291.996673
## iter 60 value 22216.096631
## iter 70 value 22196.282009
## iter 80 value 22184.245985
## iter 90 value 22174.932557
## iter 100 value 22156.912782
## final value 22156.912782
## stopped after 100 iterations
## # weights: 98
## initial value 28128.830185
## iter 10 value 23182.324776
## iter 20 value 21174.641641
## iter 30 value 20300.584726
## iter 40 value 19730.523985
## iter 50 value 19339.807555
## iter 60 value 18971.992582
## iter 70 value 18823.463414
## iter 80 value 18734.975298
## iter 90 value 18683.241188
## iter 100 value 18628.555290

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```

## final value 18628.555290
## stopped after 100 iterations
## # weights: 160
## initial value 27093.809408
## iter 10 value 21002.233829
## iter 20 value 19010.393402
## iter 30 value 18121.806321
## iter 40 value 17467.412034
## iter 50 value 16882.780211
## iter 60 value 16507.818981
## iter 70 value 16211.377584
## iter 80 value 15985.778985
## iter 90 value 15824.125489
## iter 100 value 15729.919448
## final value 15729.919448
## stopped after 100 iterations
## # weights: 36
## initial value 26087.120020
## iter 10 value 24143.273390
## iter 20 value 23625.765651
## iter 30 value 23252.496243
## iter 40 value 22906.460859
## iter 50 value 22795.476414
## iter 60 value 22776.672066
## iter 70 value 22683.842624
## iter 80 value 22526.776636
## iter 90 value 22410.199665
## iter 100 value 22355.492724
## final value 22355.492724
## stopped after 100 iterations
## # weights: 98
## initial value 29359.139517
## iter 10 value 21183.821817
## iter 20 value 19307.666982
## iter 30 value 19025.919786
## iter 40 value 18717.121865
## iter 50 value 18325.711290
## iter 60 value 18096.675416
## iter 70 value 17949.363384
## iter 80 value 17814.080831
## iter 90 value 17657.264866
## iter 100 value 17504.832800
## final value 17504.832800
## stopped after 100 iterations
## # weights: 160
## initial value 26896.399271
## iter 10 value 22086.216985
## iter 20 value 19406.913412
## iter 30 value 18074.076192
## iter 40 value 17531.720333
## iter 50 value 17278.522775
## iter 60 value 17111.383506
## iter 70 value 16816.552596
## iter 80 value 16507.777821

```

```

## iter 90 value 16221.199435
## iter 100 value 16068.024823
## final value 16068.024823
## stopped after 100 iterations
## # weights: 36
## initial value 25729.058100
## iter 10 value 24161.298194
## iter 20 value 23749.137873
## iter 30 value 23141.412503
## iter 40 value 22647.946408
## iter 50 value 22454.026725
## iter 60 value 22444.171016
## iter 70 value 22440.976300
## iter 80 value 22440.732285
## iter 90 value 22440.639738
## iter 100 value 22440.326048
## final value 22440.326048
## stopped after 100 iterations
## # weights: 98
## initial value 28383.731058
## iter 10 value 21363.109506
## iter 20 value 19235.617018
## iter 30 value 18466.949526
## iter 40 value 18284.237504
## iter 50 value 18057.022648
## iter 60 value 17949.578383
## iter 70 value 17837.984025
## iter 80 value 17767.632081
## iter 90 value 17735.198939
## iter 100 value 17720.202590
## final value 17720.202590
## stopped after 100 iterations
## # weights: 160
## initial value 27596.999089
## iter 10 value 21322.580831
## iter 20 value 18948.176526
## iter 30 value 17718.041765
## iter 40 value 17239.556609
## iter 50 value 17016.938106
## iter 60 value 16666.694703
## iter 70 value 16389.294082
## iter 80 value 16218.715325
## iter 90 value 16067.067179
## iter 100 value 15905.362089
## final value 15905.362089
## stopped after 100 iterations
## # weights: 36
## initial value 25752.973347
## iter 10 value 23471.527800
## iter 20 value 23209.511733
## iter 30 value 23027.799699
## iter 40 value 21772.928545
## iter 50 value 21507.155754
## iter 60 value 21438.805512

```



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## iter 70 value 21403.812818
## iter 80 value 21396.601661
## iter 90 value 21392.122182
## iter 100 value 21390.586817
## final value 21390.586817
## stopped after 100 iterations
## # weights: 98
## initial value 26256.367410
## iter 10 value 21453.242177
## iter 20 value 20273.417372
## iter 30 value 19912.358496
## iter 40 value 19709.375680
## iter 50 value 19336.551629
## iter 60 value 19010.493911
## iter 70 value 18694.159738
## iter 80 value 18410.698137
## iter 90 value 18161.161499
## iter 100 value 18003.233081
## final value 18003.233081
## stopped after 100 iterations
## # weights: 160
## initial value 27470.172705
## iter 10 value 20637.576025
## iter 20 value 18569.150856
## iter 30 value 17759.100532
## iter 40 value 17348.131553
## iter 50 value 16985.991993
## iter 60 value 16708.783216
## iter 70 value 16535.634030
## iter 80 value 16401.228474
## iter 90 value 16262.511938
## iter 100 value 16206.595781
## final value 16206.595781
## stopped after 100 iterations
## # weights: 36
## initial value 25765.111732
## iter 10 value 23767.534739
## iter 20 value 23365.701825
## iter 30 value 22776.194447
## iter 40 value 22246.710577
## iter 50 value 21844.076361
## iter 60 value 21702.184197
## iter 70 value 21626.158269
## iter 80 value 21569.316724
## iter 90 value 21525.790545
## iter 100 value 21492.360072
## final value 21492.360072
## stopped after 100 iterations
## # weights: 98
## initial value 27812.096085
## iter 10 value 23133.186314
## iter 20 value 20625.581140
## iter 30 value 20002.027353
## iter 40 value 19799.445119

```

```

## iter 50 value 19538.952327
## iter 60 value 19111.378665
## iter 70 value 18789.181419
## iter 80 value 18554.880438
## iter 90 value 18372.614667
## iter 100 value 18249.094372
## final value 18249.094372
## stopped after 100 iterations
## # weights: 160
## initial value 26863.296520
## iter 10 value 21617.920882
## iter 20 value 19345.798745
## iter 30 value 18426.179126
## iter 40 value 17997.469949
## iter 50 value 17622.666748
## iter 60 value 17085.346036
## iter 70 value 16689.836322
## iter 80 value 16360.409366
## iter 90 value 16161.821389
## iter 100 value 15997.520990
## final value 15997.520990
## stopped after 100 iterations
## # weights: 36
## initial value 27825.567430
## iter 10 value 24535.588228
## iter 20 value 24163.466766
## iter 30 value 23081.538291
## iter 40 value 22416.338619
## iter 50 value 21947.138114
## iter 60 value 21728.902044
## iter 70 value 21673.985089
## iter 80 value 21658.123556
## iter 90 value 21633.502605
## iter 100 value 21597.302498
## final value 21597.302498
## stopped after 100 iterations
## # weights: 98
## initial value 27350.015599
## iter 10 value 22402.356543
## iter 20 value 21109.838236
## iter 30 value 20308.719950
## iter 40 value 19939.897028
## iter 50 value 19512.368222
## iter 60 value 19207.911836
## iter 70 value 18979.113972
## iter 80 value 18743.272141
## iter 90 value 18535.078729
## iter 100 value 18352.185898
## final value 18352.185898
## stopped after 100 iterations
## # weights: 160
## initial value 25781.026980
## iter 10 value 20540.920051
## iter 20 value 17923.393375

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## iter 30 value 16844.731099
## iter 40 value 16557.874651
## iter 50 value 16393.095982
## iter 60 value 16158.849626
## iter 70 value 15908.547501
## iter 80 value 15803.488666
## iter 90 value 15735.629185
## iter 100 value 15633.739390
## final value 15633.739390
## stopped after 100 iterations
## # weights: 37
## initial value 26049.210539
## iter 10 value 23017.947596
## iter 20 value 22642.505740
## iter 30 value 22043.705723
## iter 40 value 21795.912732
## iter 50 value 21658.212664
## iter 60 value 21512.199869
## iter 70 value 21468.393096
## iter 80 value 21392.986810
## iter 90 value 21356.147195
## iter 100 value 21346.803764
## final value 21346.803764
## stopped after 100 iterations
## # weights: 101
## initial value 27154.061209
## iter 10 value 21031.851646
## iter 20 value 19644.882119
## iter 30 value 19085.768477
## iter 40 value 18692.138657
## iter 50 value 18524.640581
## iter 60 value 18364.636355
## iter 70 value 18237.864987
## iter 80 value 18088.132053
## iter 90 value 17980.597953
## iter 100 value 17847.251147
## final value 17847.251147
## stopped after 100 iterations
## # weights: 165
## initial value 29185.554429
## iter 10 value 21075.757979
## iter 20 value 18725.226615
## iter 30 value 17855.344641
## iter 40 value 17176.260604
## iter 50 value 16701.665227
## iter 60 value 16403.456204
## iter 70 value 16209.057339
## iter 80 value 16091.201715
## iter 90 value 15966.350084
## iter 100 value 15815.167284
## final value 15815.167284
## stopped after 100 iterations
## # weights: 37
## initial value 28011.580219

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```

## iter 10 value 23855.844080
## iter 20 value 23150.711683
## iter 30 value 22417.953725
## iter 40 value 22076.365155
## iter 50 value 21806.002485
## iter 60 value 21744.120119
## iter 70 value 21588.407235
## iter 80 value 21524.954717
## iter 90 value 21467.057880
## iter 100 value 21453.724812
## final value 21453.724812
## stopped after 100 iterations
## # weights: 101
## initial value 25684.528880
## iter 10 value 23059.278889
## iter 20 value 21672.848083
## iter 30 value 20753.968912
## iter 40 value 20337.382353
## iter 50 value 19759.909230
## iter 60 value 19335.832660
## iter 70 value 18921.954846
## iter 80 value 18695.687896
## iter 90 value 18443.397903
## iter 100 value 18320.341044
## final value 18320.341044
## stopped after 100 iterations
## # weights: 165
## initial value 31304.099083
## iter 10 value 21647.177757
## iter 20 value 18813.301362
## iter 30 value 18180.305709
## iter 40 value 17859.682678
## iter 50 value 17542.875855
## iter 60 value 16987.342558
## iter 70 value 16393.598597
## iter 80 value 15987.187784
## iter 90 value 15609.100935
## iter 100 value 15348.058337
## final value 15348.058337
## stopped after 100 iterations
## # weights: 37
## initial value 26315.800156
## iter 10 value 24265.967458
## iter 20 value 23606.973900
## iter 30 value 22561.328090
## iter 40 value 22180.161532
## iter 50 value 21797.450220
## iter 60 value 21639.838147
## iter 70 value 21579.673506
## iter 80 value 21557.333113
## iter 90 value 21550.088423
## iter 100 value 21541.405545
## final value 21541.405545
## stopped after 100 iterations

```

```

## # weights: 101
## initial value 29051.966757
## iter 10 value 23295.544414
## iter 20 value 21420.893982
## iter 30 value 20754.197859
## iter 40 value 20231.779865
## iter 50 value 19534.258612
## iter 60 value 18976.573942
## iter 70 value 18469.575814
## iter 80 value 18208.871139
## iter 90 value 17948.419450
## iter 100 value 17770.381776
## final value 17770.381776
## stopped after 100 iterations
## # weights: 165
## initial value 26158.880485
## iter 10 value 20620.635794
## iter 20 value 17982.824696
## iter 30 value 17203.255985
## iter 40 value 16956.515593
## iter 50 value 16818.522038
## iter 60 value 16717.245966
## iter 70 value 16518.247088
## iter 80 value 16413.416474
## iter 90 value 16142.871377
## iter 100 value 15842.943029
## final value 15842.943029
## stopped after 100 iterations
## # weights: 36
## initial value 25785.667671
## iter 10 value 23450.643698
## iter 20 value 23325.259441
## iter 30 value 22604.123502
## iter 40 value 21639.741110
## iter 50 value 21363.995081
## iter 60 value 21242.347742
## iter 70 value 21175.768533
## iter 80 value 21154.899251
## iter 90 value 21152.293857
## iter 100 value 21144.047591
## final value 21144.047591
## stopped after 100 iterations
## # weights: 98
## initial value 27262.423583
## iter 10 value 22197.957078
## iter 20 value 20647.954488
## iter 30 value 20253.150451
## iter 40 value 19859.082106
## iter 50 value 19537.960134
## iter 60 value 19245.205585
## iter 70 value 18818.329757
## iter 80 value 18524.365901
## iter 90 value 18287.298028
## iter 100 value 18181.374353

```

```

## final value 18181.374353
## stopped after 100 iterations
## # weights: 160
## initial value 29250.923528
## iter 10 value 21139.724139
## iter 20 value 18449.791124
## iter 30 value 17581.759088
## iter 40 value 17133.160642
## iter 50 value 16917.702329
## iter 60 value 16735.809126
## iter 70 value 16487.326218
## iter 80 value 16322.116288
## iter 90 value 16209.063496
## iter 100 value 16143.802639
## final value 16143.802639
## stopped after 100 iterations
## # weights: 36
## initial value 25961.698293
## iter 10 value 22856.042764
## iter 20 value 22708.024726
## iter 30 value 21992.887415
## iter 40 value 21498.971867
## iter 50 value 21237.960897
## iter 60 value 21203.671738
## iter 70 value 21200.987511
## iter 80 value 21200.812403
## iter 90 value 21200.799621
## final value 21200.797701
## converged
## # weights: 98
## initial value 29792.497695
## iter 10 value 22232.554504
## iter 20 value 20331.977930
## iter 30 value 19842.351017
## iter 40 value 19419.582991
## iter 50 value 19099.800147
## iter 60 value 18776.900314
## iter 70 value 18547.381821
## iter 80 value 18318.572774
## iter 90 value 18182.230642
## iter 100 value 17995.476685
## final value 17995.476685
## stopped after 100 iterations
## # weights: 160
## initial value 28179.822105
## iter 10 value 22380.725782
## iter 20 value 19979.986424
## iter 30 value 19214.240130
## iter 40 value 18485.185391
## iter 50 value 17840.172200
## iter 60 value 17476.319096
## iter 70 value 17218.469831
## iter 80 value 16955.513926
## iter 90 value 16813.181090

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## iter 100 value 16483.605728
## final value 16483.605728
## stopped after 100 iterations
## # weights: 36
## initial value 29139.522080
## iter 10 value 23739.079276
## iter 20 value 23465.503819
## iter 30 value 22781.468976
## iter 40 value 22064.178699
## iter 50 value 21742.163211
## iter 60 value 21436.981549
## iter 70 value 21348.206404
## iter 80 value 21314.385987
## iter 90 value 21294.183949
## iter 100 value 21274.522354
## final value 21274.522354
## stopped after 100 iterations
## # weights: 98
## initial value 29021.861458
## iter 10 value 22123.198079
## iter 20 value 20268.114746
## iter 30 value 19789.515980
## iter 40 value 19441.091115
## iter 50 value 19136.098440
## iter 60 value 18847.347353
## iter 70 value 18674.248200
## iter 80 value 18443.826325
## iter 90 value 18257.885390
## iter 100 value 18044.036424
## final value 18044.036424
## stopped after 100 iterations
## # weights: 160
## initial value 27527.833051
## iter 10 value 20705.321840
## iter 20 value 17857.806243
## iter 30 value 17365.271423
## iter 40 value 17019.225294
## iter 50 value 16717.731600
## iter 60 value 16434.394267
## iter 70 value 16244.368491
## iter 80 value 16131.297867
## iter 90 value 15982.809971
## iter 100 value 15846.800245
## final value 15846.800245
## stopped after 100 iterations
## # weights: 36
## initial value 28491.066362
## iter 10 value 24673.779218
## iter 20 value 24335.022088
## iter 30 value 23766.280390
## iter 40 value 23077.849384
## iter 50 value 22858.074249
## iter 60 value 22636.033293
## iter 70 value 22539.301604

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## iter 80 value 22393.521916
## iter 90 value 22352.561821
## iter 100 value 22307.749776
## final value 22307.749776
## stopped after 100 iterations
## # weights: 98
## initial value 25898.512738
## iter 10 value 20729.427053
## iter 20 value 19416.195143
## iter 30 value 19111.340791
## iter 40 value 18817.220540
## iter 50 value 18634.657408
## iter 60 value 18468.167678
## iter 70 value 18313.108521
## iter 80 value 18089.580308
## iter 90 value 17863.060791
## iter 100 value 17600.453009
## final value 17600.453009
## stopped after 100 iterations
## # weights: 160
## initial value 28180.375326
## iter 10 value 22155.665717
## iter 20 value 19593.829402
## iter 30 value 18555.439558
## iter 40 value 17747.057830
## iter 50 value 17144.563171
## iter 60 value 16668.532407
## iter 70 value 16391.264168
## iter 80 value 16196.826481
## iter 90 value 16070.059537
## iter 100 value 15993.285748
## final value 15993.285748
## stopped after 100 iterations
## # weights: 36
## initial value 28068.980832
## iter 10 value 23971.690684
## iter 20 value 23543.498513
## iter 30 value 22534.579391
## iter 40 value 22082.544959
## iter 50 value 21937.588797
## iter 60 value 21811.599686
## iter 70 value 21655.628517
## iter 80 value 21619.395926
## iter 90 value 21599.851983
## iter 100 value 21584.779884
## final value 21584.779884
## stopped after 100 iterations
## # weights: 98
## initial value 25869.378103
## iter 10 value 21836.079426
## iter 20 value 20708.263053
## iter 30 value 20061.385102
## iter 40 value 19706.696485
## iter 50 value 19352.719847

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## iter 60 value 19080.329486
## iter 70 value 18799.916268
## iter 80 value 18414.463591
## iter 90 value 18027.424478
## iter 100 value 17788.278518
## final value 17788.278518
## stopped after 100 iterations
## # weights: 160
## initial value 26152.815368
## iter 10 value 21137.435338
## iter 20 value 19556.466357
## iter 30 value 18727.900619
## iter 40 value 18021.837203
## iter 50 value 17717.259102
## iter 60 value 17309.429375
## iter 70 value 16953.896869
## iter 80 value 16697.303211
## iter 90 value 16542.446116
## iter 100 value 16409.764792
## final value 16409.764792
## stopped after 100 iterations
## # weights: 36
## initial value 25656.169025
## iter 10 value 23470.843548
## iter 20 value 23060.828033
## iter 30 value 22747.188906
## iter 40 value 21974.764327
## iter 50 value 21682.366774
## iter 60 value 21523.687887
## iter 70 value 21469.800062
## iter 80 value 21460.609762
## iter 90 value 21442.803934
## iter 100 value 21430.078694
## final value 21430.078694
## stopped after 100 iterations
## # weights: 98
## initial value 26390.549726
## iter 10 value 21488.641019
## iter 20 value 19019.088862
## iter 30 value 18565.761038
## iter 40 value 18271.701978
## iter 50 value 18036.885790
## iter 60 value 17902.283528
## iter 70 value 17774.857171
## iter 80 value 17703.407155
## iter 90 value 17660.342278
## iter 100 value 17626.528464
## final value 17626.528464
## stopped after 100 iterations
## # weights: 160
## initial value 32181.146024
## iter 10 value 23924.158094
## iter 20 value 18946.647734
## iter 30 value 17841.112242

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## iter 40 value 17148.818119
## iter 50 value 16661.472586
## iter 60 value 16103.847554
## iter 70 value 15790.784986
## iter 80 value 15502.479817
## iter 90 value 15279.112317
## iter 100 value 15054.245321
## final value 15054.245321
## stopped after 100 iterations
## # weights: 36
## initial value 28121.116339
## iter 10 value 23890.952283
## iter 20 value 23223.406626
## iter 30 value 22741.031847
## iter 40 value 22134.428540
## iter 50 value 21742.317222
## iter 60 value 21548.844568
## iter 70 value 21466.822100
## iter 80 value 21425.666164
## iter 90 value 21405.794313
## iter 100 value 21394.175125
## final value 21394.175125
## stopped after 100 iterations
## # weights: 98
## initial value 26626.686386
## iter 10 value 22067.101792
## iter 20 value 20187.700725
## iter 30 value 19335.676154
## iter 40 value 18820.483410
## iter 50 value 18497.064517
## iter 60 value 17953.547304
## iter 70 value 17653.768430
## iter 80 value 17490.622087
## iter 90 value 17388.098182
## iter 100 value 17274.461033
## final value 17274.461033
## stopped after 100 iterations
## # weights: 160
## initial value 27392.530858
## iter 10 value 21361.356305
## iter 20 value 18585.567067
## iter 30 value 17226.797018
## iter 40 value 16651.281024
## iter 50 value 16474.331327
## iter 60 value 16205.406323
## iter 70 value 15878.533535
## iter 80 value 15728.697313
## iter 90 value 15629.345548
## iter 100 value 15582.046534
## final value 15582.046534
## stopped after 100 iterations
## # weights: 36
## initial value 25427.920288
## iter 10 value 23803.331543

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## iter 20 value 23181.594044
## iter 30 value 22898.706526
## iter 40 value 22719.879898
## iter 50 value 22516.385253
## iter 60 value 22230.951762
## iter 70 value 22116.663128
## iter 80 value 22075.256277
## iter 90 value 22047.395305
## iter 100 value 22029.038995
## final value 22029.038995
## stopped after 100 iterations
## # weights: 98
## initial value 25826.947180
## iter 10 value 22108.121573
## iter 20 value 20637.107616
## iter 30 value 20388.431273
## iter 40 value 20202.027202
## iter 50 value 19939.780671
## iter 60 value 19761.062021
## iter 70 value 19593.395655
## iter 80 value 19449.709115
## iter 90 value 19322.995568
## iter 100 value 19203.005105
## final value 19203.005105
## stopped after 100 iterations
## # weights: 160
## initial value 27273.773629
## iter 10 value 20898.133372
## iter 20 value 18733.622583
## iter 30 value 18087.901122
## iter 40 value 17778.638946
## iter 50 value 17378.005893
## iter 60 value 16897.727075
## iter 70 value 16652.993565
## iter 80 value 16429.833817
## iter 90 value 16248.518497
## iter 100 value 16052.691378
## final value 16052.691378
## stopped after 100 iterations
## # weights: 36
## initial value 26609.876399
## iter 10 value 22805.132998
## iter 20 value 22676.611960
## iter 30 value 22066.783648
## iter 40 value 21716.518112
## iter 50 value 21494.427941
## iter 60 value 21411.800904
## iter 70 value 21374.278126
## iter 80 value 21356.159269
## iter 90 value 21353.408543
## iter 100 value 21343.173715
## final value 21343.173715
## stopped after 100 iterations
## # weights: 98

```

```

## initial value 26899.507385
## iter 10 value 23203.182454
## iter 20 value 20743.793548
## iter 30 value 20419.504054
## iter 40 value 20039.183778
## iter 50 value 19383.882283
## iter 60 value 18975.443225
## iter 70 value 18675.437067
## iter 80 value 18451.698562
## iter 90 value 18299.528844
## iter 100 value 18207.019540
## final value 18207.019540
## stopped after 100 iterations
## # weights: 160
## initial value 25551.702199
## iter 10 value 20166.779326
## iter 20 value 18400.670661
## iter 30 value 17723.509522
## iter 40 value 17128.522172
## iter 50 value 16754.690248
## iter 60 value 16571.207286
## iter 70 value 16110.586229
## iter 80 value 15804.312061
## iter 90 value 15401.874510
## iter 100 value 15128.869723
## final value 15128.869723
## stopped after 100 iterations
## # weights: 37
## initial value 25884.268586
## iter 10 value 24160.903712
## iter 20 value 23650.477900
## iter 30 value 23382.370577
## iter 40 value 23010.528701
## iter 50 value 22787.690531
## iter 60 value 22746.652407
## iter 70 value 22743.604677
## final value 22742.334030
## converged
## # weights: 101
## initial value 27812.095341
## iter 10 value 22890.398049
## iter 20 value 19730.862879
## iter 30 value 19101.043435
## iter 40 value 18783.945989
## iter 50 value 18546.482769
## iter 60 value 18381.062194
## iter 70 value 18151.745506
## iter 80 value 17928.532103
## iter 90 value 17735.326138
## iter 100 value 17609.007380
## final value 17609.007380
## stopped after 100 iterations
## # weights: 165
## initial value 26688.823688

```

```

## iter 10 value 20388.738171
## iter 20 value 18487.438227
## iter 30 value 17428.887116
## iter 40 value 17084.412334
## iter 50 value 16948.648677
## iter 60 value 16808.926946
## iter 70 value 16527.161592
## iter 80 value 16205.965843
## iter 90 value 15986.264892
## iter 100 value 15852.316837
## final value 15852.316837
## stopped after 100 iterations
## # weights: 37
## initial value 27300.093468
## iter 10 value 24250.740342
## iter 20 value 24062.566499
## iter 30 value 22776.752324
## iter 40 value 22159.679492
## iter 50 value 21578.435417
## iter 60 value 21490.554463
## iter 70 value 21400.890888
## iter 80 value 21389.941209
## iter 90 value 21388.458519
## iter 100 value 21387.059016
## final value 21387.059016
## stopped after 100 iterations
## # weights: 101
## initial value 28376.671748
## iter 10 value 22056.188138
## iter 20 value 20670.675440
## iter 30 value 20465.639601
## iter 40 value 20115.519310
## iter 50 value 19819.359333
## iter 60 value 19532.423075
## iter 70 value 19128.647788
## iter 80 value 18697.385599
## iter 90 value 18311.906628
## iter 100 value 17999.987316
## final value 17999.987316
## stopped after 100 iterations
## # weights: 165
## initial value 27380.383410
## iter 10 value 21183.534005
## iter 20 value 18862.026508
## iter 30 value 17542.775708
## iter 40 value 17198.047131
## iter 50 value 16856.681522
## iter 60 value 16494.384908
## iter 70 value 16100.901700
## iter 80 value 15604.792848
## iter 90 value 15350.023114
## iter 100 value 15096.299206
## final value 15096.299206
## stopped after 100 iterations

```

```

## # weights:  37
## initial  value 25581.588263
## iter   10 value 23907.413868
## iter   20 value 23633.044343
## iter   30 value 23301.590402
## iter   40 value 23059.496402
## iter   50 value 22863.226571
## iter   60 value 22764.744724
## iter   70 value 22389.531096
## iter   80 value 22162.758698
## iter   90 value 22037.064949
## iter  100 value 21980.568035
## final   value 21980.568035
## stopped after 100 iterations
## # weights:  101
## initial  value 29733.041495
## iter   10 value 22402.313322
## iter   20 value 20088.019403
## iter   30 value 19701.877327
## iter   40 value 19437.655185
## iter   50 value 19185.905600
## iter   60 value 18906.030459
## iter   70 value 18763.238464
## iter   80 value 18608.586621
## iter   90 value 18448.973459
## iter  100 value 18343.070995
## final   value 18343.070995
## stopped after 100 iterations
## # weights:  165
## initial  value 29565.284048
## iter   10 value 20982.073286
## iter   20 value 19004.203469
## iter   30 value 18141.564490
## iter   40 value 17769.307798
## iter   50 value 17386.650492
## iter   60 value 17075.620233
## iter   70 value 16815.844918
## iter   80 value 16661.676074
## iter   90 value 16534.608648
## iter  100 value 16438.537413
## final   value 16438.537413
## stopped after 100 iterations
## # weights:   37
## initial  value 26147.759088
## iter   10 value 24150.880964
## iter   20 value 23651.654129
## iter   30 value 23304.039284
## iter   40 value 23036.690777
## iter   50 value 22960.137693
## iter   60 value 22851.907886
## iter   70 value 22318.408445
## iter   80 value 22258.068463
## iter   90 value 22254.270199
## iter  100 value 22250.476888

```

```

## final value 22250.476888
## stopped after 100 iterations
## # weights: 101
## initial value 28945.746154
## iter 10 value 23694.536782
## iter 20 value 21962.432072
## iter 30 value 21256.991227
## iter 40 value 20764.840439
## iter 50 value 20184.379927
## iter 60 value 19677.970103
## iter 70 value 19185.656900
## iter 80 value 18801.110022
## iter 90 value 18409.228104
## iter 100 value 18163.028481
## final value 18163.028481
## stopped after 100 iterations
## # weights: 165
## initial value 27740.833375
## iter 10 value 21478.765653
## iter 20 value 18937.804431
## iter 30 value 18223.948669
## iter 40 value 17900.558503
## iter 50 value 17530.338622
## iter 60 value 17295.717763
## iter 70 value 17197.437705
## iter 80 value 17119.410843
## iter 90 value 17061.657967
## iter 100 value 17010.500676
## final value 17010.500676
## stopped after 100 iterations
## # weights: 37
## initial value 28254.405222
## iter 10 value 24619.445631
## iter 20 value 23984.953680
## iter 30 value 23016.357153
## iter 40 value 22234.344182
## iter 50 value 21720.847206
## iter 60 value 21558.806131
## iter 70 value 21344.860761
## iter 80 value 21260.619226
## iter 90 value 21213.258161
## iter 100 value 21171.501385
## final value 21171.501385
## stopped after 100 iterations
## # weights: 101
## initial value 25542.460012
## iter 10 value 22350.959272
## iter 20 value 20314.424910
## iter 30 value 19992.525871
## iter 40 value 19578.751614
## iter 50 value 19240.898237
## iter 60 value 18986.347297
## iter 70 value 18772.945365
## iter 80 value 18446.043995

```

```

## iter 90 value 18155.997136
## iter 100 value 17929.205454
## final value 17929.205454
## stopped after 100 iterations
## # weights: 165
## initial value 25913.274503
## iter 10 value 20172.457446
## iter 20 value 18534.305374
## iter 30 value 17769.310558
## iter 40 value 17431.484079
## iter 50 value 17268.888650
## iter 60 value 17124.657871
## iter 70 value 16957.421685
## iter 80 value 16739.515510
## iter 90 value 16566.575452
## iter 100 value 16330.304172
## final value 16330.304172
## stopped after 100 iterations
## # weights: 37
## initial value 26753.375364
## iter 10 value 22709.418853
## iter 20 value 22544.327438
## iter 30 value 22284.550222
## iter 40 value 21673.350794
## iter 50 value 21314.743442
## iter 60 value 21168.155486
## iter 70 value 21097.331897
## iter 80 value 21079.863484
## iter 90 value 21076.624600
## iter 100 value 21072.144628
## final value 21072.144628
## stopped after 100 iterations
## # weights: 101
## initial value 27586.513787
## iter 10 value 22485.637640
## iter 20 value 19808.609872
## iter 30 value 19435.714414
## iter 40 value 19177.551227
## iter 50 value 18968.910420
## iter 60 value 18837.470661
## iter 70 value 18733.644345
## iter 80 value 18639.287485
## iter 90 value 18564.457700
## iter 100 value 18518.714657
## final value 18518.714657
## stopped after 100 iterations
## # weights: 165
## initial value 25551.848057
## iter 10 value 21305.649996
## iter 20 value 19018.742201
## iter 30 value 18092.143248
## iter 40 value 17696.899865
## iter 50 value 17248.949063
## iter 60 value 16941.324218

```



```

## iter 70 value 16615.329949
## iter 80 value 16341.856238
## iter 90 value 16144.000888
## iter 100 value 15927.364486
## final value 15927.364486
## stopped after 100 iterations
## # weights: 37
## initial value 28146.053223
## iter 10 value 24539.670346
## iter 20 value 24088.428852
## iter 30 value 23459.842456
## iter 40 value 23140.553829
## iter 50 value 22778.062712
## iter 60 value 22173.374246
## iter 70 value 22043.207550
## iter 80 value 21968.457705
## iter 90 value 21937.126700
## iter 100 value 21864.775083
## final value 21864.775083
## stopped after 100 iterations
## # weights: 101
## initial value 26608.752541
## iter 10 value 21512.894255
## iter 20 value 20277.684294
## iter 30 value 19864.904302
## iter 40 value 19531.614812
## iter 50 value 19279.837923
## iter 60 value 19087.499985
## iter 70 value 18699.864275
## iter 80 value 18434.146903
## iter 90 value 18192.324059
## iter 100 value 18031.123252
## final value 18031.123252
## stopped after 100 iterations
## # weights: 165
## initial value 28235.671763
## iter 10 value 20645.332072
## iter 20 value 18509.566149
## iter 30 value 17750.147165
## iter 40 value 17557.163523
## iter 50 value 17480.810467
## iter 60 value 17376.078058
## iter 70 value 17264.290943
## iter 80 value 17174.522390
## iter 90 value 17137.945681
## iter 100 value 17114.436759
## final value 17114.436759
## stopped after 100 iterations
## # weights: 37
## initial value 26788.372234
## iter 10 value 23173.760488
## iter 20 value 22533.325860
## iter 30 value 22241.550776
## iter 40 value 22048.526610

```

```

## iter 50 value 21918.794443
## iter 60 value 21860.128078
## iter 70 value 21846.698732
## iter 80 value 21790.855352
## iter 90 value 21780.247082
## iter 100 value 21754.789313
## final value 21754.789313
## stopped after 100 iterations
## # weights: 101
## initial value 28007.812600
## iter 10 value 23043.900753
## iter 20 value 21054.951759
## iter 30 value 20300.064622
## iter 40 value 20041.306616
## iter 50 value 19704.043632
## iter 60 value 19298.624638
## iter 70 value 18992.048759
## iter 80 value 18766.681904
## iter 90 value 18593.681504
## iter 100 value 18459.246039
## final value 18459.246039
## stopped after 100 iterations
## # weights: 165
## initial value 27582.076222
## iter 10 value 21494.409770
## iter 20 value 19328.334772
## iter 30 value 17955.220823
## iter 40 value 17484.417787
## iter 50 value 17352.515330
## iter 60 value 17170.336496
## iter 70 value 17024.987150
## iter 80 value 16790.316864
## iter 90 value 16625.754042
## iter 100 value 16503.891570
## final value 16503.891570
## stopped after 100 iterations
## # weights: 37
## initial value 26038.472857
## iter 10 value 23309.127735
## iter 20 value 23051.896529
## iter 30 value 22558.751159
## iter 40 value 22035.969854
## iter 50 value 21761.764194
## iter 60 value 21575.635172
## iter 70 value 21405.808240
## iter 80 value 21356.322183
## iter 90 value 21327.795996
## iter 100 value 21302.748141
## final value 21302.748141
## stopped after 100 iterations
## # weights: 101
## initial value 28727.106039
## iter 10 value 24320.345023
## iter 20 value 21663.317742

```

```

## iter 30 value 21083.328136
## iter 40 value 20380.645351
## iter 50 value 19996.651919
## iter 60 value 19632.200053
## iter 70 value 19217.977865
## iter 80 value 18849.168100
## iter 90 value 18468.885318
## iter 100 value 18187.282684
## final value 18187.282684
## stopped after 100 iterations
## # weights: 165
## initial value 25883.120282
## iter 10 value 20272.683547
## iter 20 value 18140.290939
## iter 30 value 17441.504810
## iter 40 value 17236.555239
## iter 50 value 17027.588412
## iter 60 value 16732.395653
## iter 70 value 16402.243038
## iter 80 value 16195.561858
## iter 90 value 16060.973048
## iter 100 value 15992.243652
## final value 15992.243652
## stopped after 100 iterations
## # weights: 36
## initial value 25529.130110
## iter 10 value 23970.361080
## iter 20 value 23336.621214
## iter 30 value 22673.681812
## iter 40 value 22117.400670
## iter 50 value 21956.337012
## iter 60 value 21933.501636
## iter 70 value 21865.510254
## iter 80 value 21765.425272
## iter 90 value 21708.414893
## iter 100 value 21699.912724
## final value 21699.912724
## stopped after 100 iterations
## # weights: 98
## initial value 29296.099812
## iter 10 value 21855.442728
## iter 20 value 19884.805214
## iter 30 value 19499.068643
## iter 40 value 18977.563444
## iter 50 value 18711.311565
## iter 60 value 18492.036735
## iter 70 value 18133.600607
## iter 80 value 17875.299548
## iter 90 value 17677.319524
## iter 100 value 17518.048594
## final value 17518.048594
## stopped after 100 iterations
## # weights: 160
## initial value 31103.609434

```

```

## iter 10 value 21913.775275
## iter 20 value 20258.263481
## iter 30 value 19523.126927
## iter 40 value 18801.501967
## iter 50 value 18239.150084
## iter 60 value 17807.008265
## iter 70 value 17513.161523
## iter 80 value 17204.130302
## iter 90 value 17028.924835
## iter 100 value 16913.707684
## final value 16913.707684
## stopped after 100 iterations
## # weights: 36
## initial value 26308.553692
## iter 10 value 23683.372455
## iter 20 value 23225.208942
## iter 30 value 22781.384288
## iter 40 value 22276.174867
## iter 50 value 21957.119915
## iter 60 value 21755.795589
## iter 70 value 21711.626539
## iter 80 value 21626.736961
## iter 90 value 21490.393960
## iter 100 value 21403.265591
## final value 21403.265591
## stopped after 100 iterations
## # weights: 98
## initial value 25619.118760
## iter 10 value 21779.210382
## iter 20 value 19938.808856
## iter 30 value 19620.542936
## iter 40 value 19346.364024
## iter 50 value 19087.267643
## iter 60 value 18959.713564
## iter 70 value 18870.288229
## iter 80 value 18756.292298
## iter 90 value 18649.849958
## iter 100 value 18604.786209
## final value 18604.786209
## stopped after 100 iterations
## # weights: 160
## initial value 26024.509984
## iter 10 value 21073.544795
## iter 20 value 18648.446766
## iter 30 value 17857.224757
## iter 40 value 17407.979311
## iter 50 value 16837.139856
## iter 60 value 16599.348398
## iter 70 value 16363.725414
## iter 80 value 16212.159816
## iter 90 value 16135.002472
## iter 100 value 16029.308759
## final value 16029.308759
## stopped after 100 iterations

```

```

## # weights: 36
## initial value 25946.959867
## iter 10 value 23771.756976
## iter 20 value 23640.663340
## iter 30 value 23408.266151
## iter 40 value 22524.612396
## iter 50 value 21945.076374
## iter 60 value 21896.505547
## iter 70 value 21763.017537
## iter 80 value 21681.256676
## iter 90 value 21628.897178
## iter 100 value 21605.085366
## final value 21605.085366
## stopped after 100 iterations
## # weights: 98
## initial value 27253.608201
## iter 10 value 21752.323763
## iter 20 value 19944.796885
## iter 30 value 19285.968853
## iter 40 value 18916.970112
## iter 50 value 18775.777350
## iter 60 value 18559.959612
## iter 70 value 18392.832269
## iter 80 value 18220.581568
## iter 90 value 18065.170377
## iter 100 value 17959.866539
## final value 17959.866539
## stopped after 100 iterations
## # weights: 160
## initial value 27249.903651
## iter 10 value 21124.553375
## iter 20 value 18887.874132
## iter 30 value 17874.777243
## iter 40 value 17665.445867
## iter 50 value 17383.542953
## iter 60 value 16971.007251
## iter 70 value 16611.907346
## iter 80 value 16405.853443
## iter 90 value 16242.133399
## iter 100 value 16119.828634
## final value 16119.828634
## stopped after 100 iterations
## # weights: 160
## initial value 26070.986141
## iter 10 value 20780.594211
## iter 20 value 18684.287885
## iter 30 value 18000.824253
## iter 40 value 17698.128344
## iter 50 value 17343.628448
## iter 60 value 16978.163424
## iter 70 value 16614.337905
## iter 80 value 16352.077247
## iter 90 value 16222.272500
## iter 100 value 16134.522997

```

```

## final value 16134.522997
## stopped after 100 iterations
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Neural Network
##
## 15698 samples
## 52 predictor
## 5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results across tuning parameters:
##
## size decay Accuracy Kappa
## 1 0e+00 0.3586177 0.1740994
## 1 1e-04 0.3673627 0.1860791
## 1 1e-01 0.3644668 0.1796216
## 3 0e+00 0.5112186 0.3818548
## 3 1e-04 0.5041452 0.3750226
## 3 1e-01 0.5131535 0.3814522
## 5 0e+00 0.5824386 0.4709221
## 5 1e-04 0.5892189 0.4801851
## 5 1e-01 0.5866314 0.4769706
##
## Accuracy was used to select the optimal model using the largest value.
## The final values used for the model were size = 5 and decay = 1e-04.
## [1] "svmRadial"
## [1] 1
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Support Vector Machines with Radial Basis Function Kernel
##
## 15698 samples
## 52 predictor
## 5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results across tuning parameters:
##
## C Accuracy Kappa
## 0.25 0.8513664 0.8116714
## 0.50 0.8841268 0.8531290
## 1.00 0.9119382 0.8883695
##
## Tuning parameter 'sigma' was held constant at a value of 0.026359
## Accuracy was used to select the optimal model using the largest value.

```

```

## The final values used for the model were sigma = 0.026359 and C = 1.
## [1] 2
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Support Vector Machines with Radial Basis Function Kernel
##
## 15698 samples
##    52 predictor
##    5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results across tuning parameters:
##
##    C      Accuracy  Kappa
## 0.25 0.8531937 0.8140985
## 0.50 0.8840204 0.8530468
## 1.00 0.9112616 0.8875527
##
## Tuning parameter 'sigma' was held constant at a value of 0.02600563
## Accuracy was used to select the optimal model using the largest value.
## The final values used for the model were sigma = 0.02600563 and C = 1.
## [1] 3
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Support Vector Machines with Radial Basis Function Kernel
##
## 15698 samples
##    52 predictor
##    5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results across tuning parameters:
##
##    C      Accuracy  Kappa
## 0.25 0.8536126 0.8147240
## 0.50 0.8849565 0.8543270
## 1.00 0.9122361 0.8888648
##
## Tuning parameter 'sigma' was held constant at a value of 0.02648696
## Accuracy was used to select the optimal model using the largest value.
## The final values used for the model were sigma = 0.02648696 and C = 1.
## [1] "qda"
## [1] 1
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"

```

```

## Quadratic Discriminant Analysis
##
## 15698 samples
##    52 predictor
##    5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results:
##
## Accuracy   Kappa
## 0.7373107  0.6705124
##
## [1] 2
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Quadratic Discriminant Analysis
##
## 15698 samples
##    52 predictor
##    5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results:
##
## Accuracy   Kappa
## 0.7505469  0.6862217
##
## [1] 3
## [1] "Model Done"
## [1] "Predict Done"
## [1] "Confusion Done"
## Quadratic Discriminant Analysis
##
## 15698 samples
##    52 predictor
##    5 classes: 'A', 'B', 'C', 'D', 'E'
##
## Pre-processing: principal component signal extraction (52), centered
## (52), scaled (52)
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 15698, 15698, 15698, 15698, 15698, 15698, ...
## Resampling results:
##
## Accuracy   Kappa
## 0.7355323  0.6680493

```



## Model Comparisson

```
modelComparisson<-data.frame(rep(NA,4),rep(NA,4),rep(NA,4),rep(NA,4))
names(modelComparisson)<-models$ModelCode
row.names(modelComparisson)<-c("Set 1","Set 2","Set 3","Mean")
modelComparisson

##      svmLinear nnet svmRadial qda
## Set 1      NA  NA      NA  NA
## Set 2      NA  NA      NA  NA
## Set 3      NA  NA      NA  NA
## Mean      NA  NA      NA  NA

for (row in (1:3)){
  for (col in models$ModelCode){
    accuracy<-sum(predict[[col]][[row]]==testSubsetClasse[[row]])/length(testSubsetClasse[[row]])
    modelComparisson[row,col]<-accuracy
  }
}
modelComparisson[4,]<-colMeans(modelComparisson[1:3,])
#modelComparisson[5,]<-colVars(modelComparisson[1:3,])
kable(modelComparisson)
```

	svmLinear	nnet	svmRadial	qda
Set 1	0.5606447	0.6095044	0.8343738	0.7103453
Set 2	0.5723022	0.5835775	0.8524653	0.7448720
Set 3	0.5746592	0.5674608	0.8514460	0.7662123
Mean	0.5692020	0.5868476	0.8460950	0.7404765

	svmLinear	nnet	svmRadial	qda
Set 1	0.5606447	0.6095044	0.8343738	0.7103453
Set 2	0.5723022	0.5835775	0.8524653	0.7448720
Set 3	0.5746592	0.5674608	0.8514460	0.7662123
Mean	0.5692020	0.5868476	0.8460950	0.7404765

## Model Selection and Accuracy

From the comparisson above we notice that **Support Vector Machines with Radial Basis Function Kernel** is the model that gets the best results. The **expected accuracy is 91.5%**, the mean onf the accuray on the tree resamples. We will rebuild the hole model, using the full traning set before predicting the values on the traning set.

```
modelFit<-train(y=train$classe,
               x=train[,-c(ncol(train))],
               method="svmRadial",
               preProcess=c("pca"))
```

## Results on the Test Set

ID	Prediction
1	B
2	A
3	C
4	A
5	A
6	E
7	D
8	B
9	A
10	A
11	A
12	C
13	B
14	A
15	E
16	E
17	A
18	B
19	B
20	B