

semmcci: Internal Tests

Ivan Jacob Agaloos Pesigan

Tests

```
#> test-semmcci-mc-latent-med-defined-none
#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-defined

#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-latent-med-std-defined-none

#> Test passed
#> Test passed
#> Test passed
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#> test-semmcci-mc-latent-med-std-defined

#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined-equality

#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined-inequality
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#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-defined-none

#> Test passed
#> Test passed
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#> test-semmcci-mc-simple-med-defined

#> Test passed
#> Test passed
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#> test-semmcci-mc-simple-med-std-defined-none-random-x

#> Test passed
#> Test passed
#> Test passed
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#> test-semmcci-mc-simple-med-std-defined-none

#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-simple-med-std-defined

#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-semmcci-mc-methods

#> Monte Carlo Confidence Intervals
#>
#>      est      se   R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x2    0.5535 0.1038 100 0.2569 0.2718 0.3115 0.7273 0.7682 0.7801
#> visual=~x3    0.7294 0.1025 100 0.4512 0.4673 0.5210 0.9148 0.9359 0.9411
#> textual=~x5    1.1131 0.0665 100 0.9383 0.9554 0.9868 1.2475 1.2660 1.2732
#> textual=~x6    0.9261 0.0495 100 0.8288 0.8304 0.8391 1.0327 1.0555 1.0645
#> speed=~x8     1.1800 0.1683 100 0.7761 0.7961 0.8324 1.4817 1.5984 1.6622
#> speed=~x9     1.0815 0.1693 100 0.6298 0.6547 0.7586 1.3783 1.5034 1.5576

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#> x1~~x1          0.5491 0.1125 100 0.2256 0.2381 0.3178 0.7079 0.7624 0.7706
#> x2~~x2          1.1338 0.0887 100 0.9037 0.9207 0.9527 1.3015 1.3129 1.3154
#> x3~~x3          0.8443 0.0856 100 0.6154 0.6521 0.7143 1.0313 1.0914 1.1016
#> x4~~x4          0.3712 0.0558 100 0.2231 0.2386 0.2643 0.4616 0.4961 0.5149
#> x5~~x5          0.4463 0.0609 100 0.2719 0.2881 0.3242 0.5560 0.6163 0.6292
#> x6~~x6          0.3562 0.0434 100 0.2436 0.2481 0.2747 0.4401 0.4621 0.4686
#> x7~~x7          0.7994 0.0800 100 0.6047 0.6076 0.6375 0.9513 0.9740 0.9777
#> x8~~x8          0.4877 0.0689 100 0.3444 0.3449 0.3632 0.6204 0.6399 0.6507
#> x9~~x9          0.5661 0.0680 100 0.3585 0.3805 0.4320 0.6575 0.7357 0.7707
#> visual~~visual  0.8093 0.1388 100 0.5387 0.5506 0.5662 1.1172 1.2236 1.2619
#> textual~~textual 0.9795 0.1101 100 0.7738 0.7744 0.8030 1.2205 1.3133 1.3830
#> speed~~speed    0.3837 0.0984 100 0.1975 0.2020 0.2098 0.6088 0.6392 0.6446
#> visual~~textual  0.4082 0.0711 100 0.2358 0.2375 0.2899 0.5572 0.5965 0.6084
#> visual~~speed    0.2622 0.0615 100 0.1148 0.1218 0.1395 0.3891 0.4218 0.4294
#> textual~~speed   0.1735 0.0530 100 0.0258 0.0413 0.0791 0.2618 0.2921 0.2937
#> Standardized Monte Carlo Confidence Intervals
#>
#>          est      se    R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> visual=~x2      0.4236 0.0613 100 0.2099 0.2152 0.2898 0.5204 0.5431 0.5538
#> visual=~x3      0.5811 0.0536 100 0.4535 0.4578 0.4646 0.6765 0.6924 0.6985
#> textual=~x5      0.8551 0.0246 100 0.7739 0.7794 0.8003 0.9019 0.9155 0.9223
#> textual=~x6      0.8380 0.0221 100 0.7917 0.7931 0.7954 0.8788 0.8922 0.8924
#> speed=~x8        0.7230 0.0489 100 0.5749 0.5855 0.6144 0.7929 0.8028 0.8051
#> speed=~x9        0.6650 0.0546 100 0.5226 0.5330 0.5534 0.7513 0.7680 0.7681
#> x1~~x1          0.4042 0.0817 100 0.1868 0.1961 0.2259 0.5316 0.5423 0.5448
#> x2~~x2          0.8206 0.0497 100 0.6932 0.7049 0.7292 0.9159 0.9537 0.9559
#> x3~~x3          0.6623 0.0613 100 0.5121 0.5205 0.5423 0.7841 0.7904 0.7943
#> x4~~x4          0.2748 0.0423 100 0.1537 0.1583 0.1802 0.3432 0.3490 0.3504
#> x5~~x5          0.2689 0.0419 100 0.1493 0.1619 0.1865 0.3595 0.3926 0.4011
#> x6~~x6          0.2977 0.0371 100 0.2037 0.2040 0.2277 0.3673 0.3710 0.3731
#> x7~~x7          0.6757 0.0669 100 0.4884 0.5067 0.5381 0.7974 0.8103 0.8151
#> x8~~x8          0.4772 0.0688 100 0.3519 0.3555 0.3714 0.6226 0.6571 0.6694
#> x9~~x9          0.5578 0.0713 100 0.4100 0.4102 0.4355 0.6938 0.7157 0.7269
#> visual~~visual  1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> textual~~textual 1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> speed~~speed    1.0000 0.0000 100 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
#> visual~~textual  0.4585 0.0645 100 0.3101 0.3130 0.3524 0.5909 0.6207 0.6261
#> visual~~speed    0.4705 0.0728 100 0.3025 0.3134 0.3322 0.5929 0.6311 0.6469
#> textual~~speed   0.2830 0.0743 100 0.0505 0.0791 0.1338 0.4106 0.4621 0.4880
#> Monte Carlo Confidence Intervals
#> Standardized Monte Carlo Confidence Intervals
#> test-semmcci-mvn
#> Test passed
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#> Test passed

#> test-semmcci-mvn

#> Test passed
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#> test-semmcci-mvn

#> Test passed
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#> Test passed

#> test-semmcci-npd

#> Test passed
#> Test passed
#> Test passed
#> [[1]]
#> [[1]] [[1]]
#> [[1]] [[1]]$value
#> [[1]] [[1]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]] [[1]]$visible
#> [1] TRUE
#>
#>
#> [[1]] [[2]]
#> [[1]] [[2]]$value
#> [[1]] [[2]]$value[[1]]
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#>
#>
#> [[1]] [[2]]$visible
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#>
#>
#> [[1]] [[3]]
#> [[1]] [[3]]$value
#> [[1]] [[3]]$value[[1]]
#> [1] TRUE

```

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#>
#>
#> [[1]][[3]]$visible
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#>
#> [[1]][[4]]
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#>
#> [[1]][[4]]$visible
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#>
#>
#> [[1]][[5]]
#> [[1]][[5]]$value
#> [[1]][[5]]$value[[1]]
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#>
#>
#> [[1]][[5]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[6]]
#> [[1]][[6]]$value
#> [[1]][[6]]$value[[1]]
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#>
#>
#> [[1]][[6]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[7]]
#> [[1]][[7]]$value
#> [[1]][[7]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[7]]$visible
#> [1] TRUE
#>
#>

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#> [[1]][[8]]
#> [[1]][[8]]$value
#> [[1]][[8]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[8]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[9]]
#> [[1]][[9]]$value
#> [[1]][[9]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[9]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[10]]
#> [[1]][[10]]$value
#> [[1]][[10]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[10]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[11]]
#> [[1]][[11]]$value
#> [[1]][[11]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[11]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[12]]
#> [[1]][[12]]$value
#> [[1]][[12]]$value[[1]]
#>
#> 2.5% 97.5%
#> visual=~x2 0.2897874 0.5203873

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#> visual=~x3      0.4646159 0.6765250
#> textual=~x5     0.8002979 0.9019032
#> textual=~x6     0.7954116 0.8787872
#> speed=~x8       0.6143520 0.7928503
#> speed=~x9       0.5533531 0.7513261
#> x1~~x1          0.2258972 0.5315962
#> x2~~x2          0.7291958 0.9158788
#> x3~~x3          0.5422806 0.7841317
#> x4~~x4          0.1801977 0.3432245
#> x5~~x5          0.1865401 0.3595047
#> x6~~x6          0.2277287 0.3673203
#> x7~~x7          0.5381230 0.7974247
#> x8~~x8          0.3713578 0.6225555
#> x9~~x9          0.4355037 0.6937509
#> visual~~visual  1.0000000 1.0000000
#> textual~~textual 1.0000000 1.0000000
#> speed~~speed    1.0000000 1.0000000
#> visual~~textual  0.3524238 0.5908821
#> visual~~speed    0.3321714 0.5928531
#> textual~~speed   0.1338109 0.4106239
#>
#>
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#>
#> [[1]][[13]]
#> [[1]][[13]]$value
#> [[1]][[13]]$value[[1]]
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#>
#> [[1]][[13]]$value[[2]]
#> [1] TRUE
#>
#> [[1]][[13]]$value[[3]]
#> [1] TRUE
#>
#>
#> [[1]][[13]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[14]]
#> [[1]][[14]]$value
#> [[1]][[14]]$value[[1]]
#> [[1]][[14]]$value[[1]]$thetahatstar

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```

#>          y1          y2          y3
#> [1,] 1.7970756905 2.863941859 4.506806294
#> [2,] 1.8110674524 3.342076472 5.961401220
#> [3,] 1.6404839610 2.872316084 4.065886805
#> [4,] -1.1584024141 -1.558403238 -0.645703837
#> [5,] 1.0654343110 0.555884319 0.568526405
#> [6,] -1.8976944298 -1.430929395 -1.970417146
#> [7,] -0.5970157141 -0.108327205 0.638613604
#> [8,] 1.3674059735 2.287867811 2.406862865
#> [9,] 1.0422544947 0.589594076 1.236499425
#> [10,] -0.1312050501 -1.979032586 -3.340345641
#> [11,] 1.3384999182 1.441961482 1.754542220
#> [12,] -0.7871261152 -2.364689561 -2.595624630
#> [13,] -0.1937486521 0.295082123 1.434664404
#> [14,] 0.9684725285 0.514116723 -0.104805869
#> [15,] 1.3244928289 2.944296638 4.279806246
#> [16,] 0.0930376802 -0.116608789 0.627367032
#> [17,] 0.7033506903 1.974366524 2.247790718
#> [18,] -0.0102597182 -1.037425667 -2.400847890
#> [19,] 0.7871206840 1.748608512 1.340706331
#> [20,] 0.4810447345 0.480712301 0.297136938
#> [21,] 0.4287002891 -1.685372417 -1.517956579
#> [22,] 0.9305393395 1.854531351 1.088136227
#> [23,] 0.8945198312 1.861332584 3.255001002
#> [24,] 0.0224009198 -0.068675362 1.008259587
#> [25,] 0.1611362801 0.387797634 1.304428433
#> [26,] 1.7132911728 1.697877480 2.297207621
#> [27,] -1.2687181250 -2.055217971 -2.672374781
#> [28,] 0.3597009416 0.279420206 0.358737823
#> [29,] -0.8003044051 -2.617409965 -3.390366625
#> [30,] -0.4009045681 -0.473888660 -1.246917880
#> [31,] -0.0228437018 -1.164526975 -2.366883373
#> [32,] 0.5276068060 1.621507209 2.439200514
#> [33,] -0.1605805048 -0.851740688 -0.548675322
#> [34,] -0.5440131732 -0.572395043 0.284984102
#> [35,] 0.5775100206 0.093689748 -1.687672397
#> [36,] -0.1206618380 0.932956997 1.469027248
#> [37,] 3.2800836881 5.926811147 6.788453563
#> [38,] 0.0853579787 0.200745896 0.899359143
#> [39,] -0.3917050541 0.435340063 1.146817020
#> [40,] 0.6174115178 2.192497679 2.458897357
#> [41,] -0.9888090972 -0.563164677 -0.395498406
#> [42,] 0.0256573824 -0.056829503 -0.018806521
#> [43,] 0.4740193861 -0.242767041 -0.210049259
#> [44,] -0.0678271981 0.801435680 1.633659674
#> [45,] 1.1744944961 1.915610549 2.022045337

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#> [46,] 1.4537455154 3.082426847 5.017368070
#> [47,] 1.0276334790 1.601038506 2.418975164
#> [48,] -1.4205320630 -3.530284474 -5.644186157
#> [49,] -1.3436111619 -2.669728365 -4.599090980
#> [50,] -0.3743928365 -1.588277767 -1.078519486
#> [51,] -3.0311257697 -4.743833330 -5.511472062
#> [52,] 2.6611282480 2.480458237 1.640591792
#> [53,] 1.1880034848 2.258617082 1.235084712
#> [54,] -1.2589544496 -1.057195780 -1.360421728
#> [55,] -0.6100599999 -1.295505490 -1.116811617
#> [56,] -0.7776999837 -2.143454352 -3.692915301
#> [57,] -1.1129697131 -0.571576160 -1.950050307
#> [58,] -0.4712967650 -0.511691029 -0.076507902
#> [59,] 1.6556004738 1.470539553 1.105633336
#> [60,] -1.5317621826 -2.642844946 -1.767523450
#> [61,] -0.5401308207 -1.666679786 -2.600115235
#> [62,] 1.1150673427 2.597067235 4.106722957
#> [63,] -0.9409377666 -1.116914355 -1.672099308
#> [64,] 0.4657358724 1.107576508 1.808758552
#> [65,] 0.1599484966 0.089543556 1.080110187
#> [66,] -1.0555235411 -0.567044320 -0.225014438
#> [67,] -2.1160435840 -5.042335227 -6.519063848
#> [68,] 3.1889156395 3.604075735 3.835641747
#> [69,] 1.0540938249 1.953930600 1.513879860
#> [70,] -3.0525837990 -5.701730692 -7.747219980
#> [71,] 1.2298496055 1.591617381 1.681007937
#> [72,] 3.0713241780 5.287868387 5.787697388
#> [73,] -1.2298484210 -1.906953232 -1.574497023
#> [74,] 1.1221376156 0.728184324 1.103831322
#> [75,] -0.4636280986 -1.304441314 -2.565684228
#> [76,] -3.2444980869 -5.954000796 -6.335791277
#> [77,] -0.5382464361 -0.908592395 -2.158505083
#> [78,] -2.0982597455 -3.443323126 -2.881228334
#> [79,] 1.8403553383 3.754687592 5.690374284
#> [80,] 1.0187007593 -0.093018710 0.396097464
#> [81,] 0.6361047335 -0.193279461 -1.617082211
#> [82,] 1.0299842546 1.493987463 2.047769110
#> [83,] -0.7704705862 -3.061970737 -3.222302479
#> [84,] 0.4489869464 1.167308764 0.904558849
#> [85,] 0.3593714799 0.466376323 1.736486083
#> [86,] 0.5936085563 2.407506710 3.685370521
#> [87,] 1.2980023524 2.437059594 3.303123252
#> [88,] 0.4647400150 1.980689904 4.299133891
#> [89,] -0.9109884857 -1.320121448 -2.045882905
#> [90,] 4.4536799350 6.468168299 6.694781333

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```

#> [91,] 0.6797137750 2.972286405 2.242582248
#> [92,] 0.6962889071 0.885919696 0.164107472
#> [93,] 1.5283055469 0.936562653 1.146234830
#> [94,] 0.8627672881 1.827795193 1.177267836
#> [95,] 0.0119975352 -1.460929564 -2.055958713
#> [96,] 1.4260672359 2.734785778 3.587873631
#> [97,] -0.2918112100 0.258382411 -1.037048173
#> [98,] 0.9998473601 1.189122638 1.643912163
#> [99,] 0.7615916534 -0.113021996 0.295828594
#> [100,] -1.1500461383 -2.428786713 -2.236692784
#> [101,] -1.1123743309 -1.315415047 -1.318188941
#> [102,] 0.9671868724 1.660194596 2.414442967
#> [103,] -0.8174565267 -0.783978229 -2.020544861
#> [104,] -2.8372520048 -4.409486593 -3.488310955
#> [105,] -2.3992236167 -2.859318540 -1.999684715
#> [106,] 1.7438351201 0.280591880 1.716610940
#> [107,] -0.7831253669 -1.730642571 -1.784083991
#> [108,] -1.7778638122 -1.229263667 -1.193490324
#> [109,] -0.8295708879 -1.104226955 -0.704099726
#> [110,] -1.2864385860 -2.567297949 -2.806579077
#> [111,] -0.7131253077 -1.920988078 -2.504066008
#> [112,] 1.7436167305 0.992191173 1.535803967
#> [113,] -1.3696959084 -2.388490652 -1.448417267
#> [114,] 0.8244099706 1.377602744 2.339424801
#> [115,] 2.0502033319 3.844537939 3.390245332
#> [116,] -2.3701371594 -3.979483190 -4.767279320
#> [117,] -1.2128688775 -2.557158724 -3.507851224
#> [118,] 0.2559481784 -0.909715851 -1.764015687
#> [119,] 2.6210921214 4.298396038 4.182789556
#> [120,] 1.4453842158 1.839267197 2.932435644
#> [121,] -2.2277307097 -2.688310644 -3.346420866
#> [122,] -0.0880879919 -0.537096828 0.641793066
#> [123,] 0.6704916931 0.733873025 1.170846533
#> [124,] -0.7346312565 -0.775959272 0.002146935
#> [125,] -1.2283912946 -0.999827978 -1.275169070
#> [126,] -0.3242188784 -0.015302362 -0.556286647
#> [127,] 0.8541945826 1.411174080 3.153302007
#> [128,] 1.4649194221 1.848821494 1.928045859
#> [129,] 0.0597448028 0.113665402 -0.007397726
#> [130,] 3.5589682074 6.031888054 6.826086884
#> [131,] 0.6312467555 1.788168225 1.430877442
#> [132,] -1.9709327648 -4.520192730 -5.215371322
#> [133,] 1.3015484193 1.328603450 0.872819853
#> [134,] 1.6967795496 3.203082163 4.638223512
#> [135,] -1.0187746252 -3.197002332 -4.413680007

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```

#> [136,] 1.8465171680 1.062561194 1.948903223
#> [137,] -1.0713816542 -2.905568033 -3.890094423
#> [138,] 1.8255286561 3.215114107 2.952856701
#> [139,] 1.7113034875 3.359744494 4.815698888
#> [140,] -0.1571641985 -1.830592882 -1.026414006
#> [141,] -2.4985441708 -2.610661566 -2.181606157
#> [142,] 0.6301465744 1.121431111 2.393115367
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#> [1842,] 0.7322073889 -1.107641190 -2.011010964
#> [1843,] -1.3441755441 -2.252965089 -3.129218921
#> [1844,] 0.5837955407 1.814612772 3.366874145
#> [1845,] 0.3104137817 0.231120984 1.882139025

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#> [1846,] -0.6106294104 -0.548350931 -0.551538022
#> [1847,]  1.0825508373  0.359367753 -1.100064256
#> [1848,]  2.2517437945  3.880698990  4.870306829
#> [1849,] -0.8073427419 -0.503454220 -0.255810974
#> [1850,] -3.3214861252 -5.708693818 -7.358676817
#> [1851,] -0.6182309131 -0.778011867 -0.926177785
#> [1852,]  2.2843200880  4.041503557  4.790979940
#> [1853,]  0.3226385178  0.179763955 -0.146763559
#> [1854,] -0.0958119430 -1.379768376 -0.745781903
#> [1855,]  0.3027264483  0.317579415  0.826103505
#> [1856,] -0.6813048873 -1.197922252 -0.865392960
#> [1857,] -1.5552316580 -0.108726077  0.580162490
#> [1858,]  1.8434252805  2.495557208  3.011391890
#> [1859,]  1.1415133310  1.884875008  2.017973948
#> [1860,]  1.4678497044  2.984039892  4.117730238
#> [1861,] -1.1385037592 -1.910647206 -2.385610291
#> [1862,] -0.9407788618  0.779195411  0.864213084
#> [1863,]  0.7845731225  0.593961410  0.732943176
#> [1864,]  2.0380340670  3.202267163  3.851403319
#> [1865,] -1.1869352720 -3.534541318 -6.042650193
#> [1866,]  1.3957294537  1.207000566  1.866232997
#> [1867,]  1.0477363703  2.657643193  3.387841135
#> [1868,]  1.9436271479  3.082771024  2.943011739
#> [1869,] -1.8673049283 -3.364208248 -3.256516247
#> [1870,]  1.5305429296  3.144499635  3.516865035
#> [1871,]  0.8390949034  0.573110308  1.064396389
#> [1872,]  0.3191028259 -0.395783886 -1.125317066
#> [1873,] -1.8979206368 -2.042340800 -2.862979534
#> [1874,] -0.0976798723  0.440542027  2.397946271
#> [1875,]  1.8457148089  1.701146410  0.755884695
#> [1876,]  0.0670161332  0.323684528 -0.323927063
#> [1877,]  2.7006715761  3.724918810  2.875885363
#> [1878,]  0.6356926954  0.624842971  0.691034580
#> [1879,] -1.9017728628 -2.467963281 -2.683898387
#> [1880,]  2.1754509493  1.941927211  3.703181805
#> [1881,]  2.2129951642  4.095444029  6.207393439
#> [1882,] -0.6796673040 -0.551404123  1.373123996
#> [1883,]  0.5896516014 -0.203263356 -0.083138426
#> [1884,]  1.1688584773  1.936779232  3.434425539
#> [1885,] -1.7756888279 -1.899654010 -1.291669711
#> [1886,]  0.0045460329  0.086605240 -0.570267092
#> [1887,] -0.0907720502  0.361373867  1.002006838
#> [1888,]  1.2639862037  1.209719168  0.782417781
#> [1889,]  1.3962544268  2.545938732  3.278832971
#> [1890,] -0.0866314264  1.232782612  1.330324359

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#> [1891,] -0.3324690623 -1.223588048 -0.731287997
#> [1892,]  1.2786218630  1.602687532  2.041194587
#> [1893,]  0.4113219116  2.224217951  1.871828977
#> [1894,] -1.6080070685 -1.866575256 -1.184006826
#> [1895,] -1.0398951644 -1.415351122 -2.617451580
#> [1896,] -0.1619996849 -0.465548292 -1.404868011
#> [1897,] -0.0015996774 -0.991945922 -3.987823758
#> [1898,] -0.3845441699 -1.071356875 -2.345743301
#> [1899,] -0.1268220091  0.276698317  2.949087380
#> [1900,] -1.9425346438 -2.111040961 -2.594366213
#> [1901,] -0.3940778932  0.483433545  0.799324919
#> [1902,] -0.2563840300  0.236422419  1.884909701
#> [1903,] -1.2667841495 -2.521859847 -3.082432688
#> [1904,] -0.4038350523 -2.211721780 -2.942850782
#> [1905,] -1.0562452782  0.516112475  1.761941068
#> [1906,]  0.4167555779 -0.067883220  1.410224235
#> [1907,]  0.8893109373  0.196546367 -0.808884642
#> [1908,]  2.1167317887  1.933031610  1.596508183
#> [1909,] -0.4293192201 -0.522043972 -3.353038895
#> [1910,]  1.4592866875  2.524227170  1.866567680
#> [1911,] -0.7704144309 -1.341222878 -2.037027731
#> [1912,] -0.7077634121 -0.169288137 -0.809654681
#> [1913,]  0.3708442224  0.460836648  0.574472312
#> [1914,] -1.1971859483 -0.514915915  0.084362509
#> [1915,] -0.1881103838  1.517997473  2.093172339
#> [1916,] -0.2517465987 -0.462151843 -0.300781950
#> [1917,] -1.1271019779 -1.756956508 -1.840751870
#> [1918,]  1.9509859704  2.422924586  2.172126866
#> [1919,] -0.6253036771 -0.817081085 -1.923125208
#> [1920,]  1.6946841177  2.454879692  3.033769365
#> [1921,]  0.0005261961 -0.729553640 -0.058718380
#> [1922,]  2.0095187997  2.609928788  3.105744217
#> [1923,] -1.1371677961 -0.446315108 -0.220054989
#> [1924,] -1.5865115348 -1.355346713 -1.782744511
#> [1925,]  0.9912700446  1.844096981  1.948029504
#> [1926,]  0.6828155724 -0.108597284 -0.661892455
#> [1927,]  1.0141436957  0.361477320  0.276868448
#> [1928,] -2.1868076817 -3.200969386 -3.879960530
#> [1929,]  1.1855824561  1.371380948  2.174104141
#> [1930,] -1.4681541395 -2.273886595 -1.227362852
#> [1931,] -1.3776940224 -1.726924491 -1.702140346
#> [1932,]  0.1580465423  0.623075915 -1.806975340
#> [1933,] -1.1421408293 -1.867961549 -3.026039644
#> [1934,] -1.8277417425 -1.216943676 -1.213389036
#> [1935,] -1.8428254214 -2.732139534 -4.123046525

```

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#> [1936,] 0.5511750572 1.342770369 1.952112930
#> [1937,] -2.0622887162 -2.635141060 -3.105210570
#> [1938,] -2.1500459099 -5.124060348 -4.841877856
#> [1939,] -1.7754341384 -2.858212470 -3.097657714
#> [1940,] 0.6393953829 -0.824756064 -1.186833208
#> [1941,] -0.8799810973 -1.881505854 -0.919308271
#> [1942,] -0.7817909486 -0.090623736 -0.386402117
#> [1943,] 0.3279460759 0.263358093 1.724529418
#> [1944,] -0.4273120068 1.058851626 1.403624730
#> [1945,] -1.7700312075 -1.981668562 -2.566460864
#> [1946,] -0.3485774706 0.207231881 0.704103680
#> [1947,] 1.0517768787 2.034641390 4.083213967
#> [1948,] -2.1988512007 -0.963917017 1.138479038
#> [1949,] 0.5387487752 1.057814480 2.956226204
#> [1950,] -0.1816142926 -0.643872939 -1.710593984
#> [1951,] -1.6532696513 -4.079300815 -5.374692558
#> [1952,] 0.1573372848 0.897705911 0.503519632
#> [1953,] 0.0669740093 0.511792593 0.609507350
#> [1954,] -0.8338241955 0.374115421 0.383901107
#> [1955,] -0.8544431627 0.327226436 0.090373614
#> [1956,] -1.3052190209 -3.479317790 -4.236889723
#> [1957,] 0.3908294900 -0.764382153 -1.842926885
#> [1958,] -2.4735450302 -3.378823003 -3.917717190
#> [1959,] 2.0012113499 2.599272923 2.792684100
#> [1960,] -1.4713105606 -1.604501291 -2.281149020
#> [1961,] 0.5959266364 0.106950747 0.711511573
#> [1962,] -2.3551765208 -3.369395241 -3.083997579
#> [1963,] 0.4835983454 1.864377471 2.103130025
#> [1964,] -0.5804446670 -0.594878792 -1.520692611
#> [1965,] 2.0731216034 1.172163539 0.615938996
#> [1966,] -0.0748730917 -0.198699829 -0.092937311
#> [1967,] 0.0030181892 1.690494600 2.291511033
#> [1968,] 0.3941931382 0.391623677 -0.237581897
#> [1969,] -0.3786953361 -0.827884626 0.640306665
#> [1970,] 0.0363047436 0.295481468 -1.243342864
#> [1971,] -2.5658824817 -3.195870961 -3.563978327
#> [1972,] 1.5124280265 0.456545466 0.692701975
#> [1973,] 0.5875640121 0.913219950 1.011374665
#> [1974,] -1.9227474579 -3.101965346 -4.025448430
#> [1975,] 0.3906448755 0.020140479 -0.346645936
#> [1976,] -0.7267618249 -0.918146585 -0.765408931
#> [1977,] -1.1267728347 -0.773882366 -1.003888122
#> [1978,] 1.3108190044 1.672563844 3.958969876
#> [1979,] 0.1293144636 0.343913817 1.869083714
#> [1980,] 0.0248654486 0.446291366 -0.127150940

```

```

#> [1981,] -1.1202400186 -1.296962573 -1.154477640
#> [1982,]  1.6762555618  2.185465189  3.327591110
#> [1983,]  0.2098630746  0.844255934  0.289856784
#> [1984,]  0.4801420556  0.893044285  0.277253270
#> [1985,]  0.7254871916 -0.563561117 -0.915652725
#> [1986,]  1.7654946174  2.312313074  2.753821375
#> [1987,] -0.8933879930  0.140976252  0.020467567
#> [1988,] -2.8159676402 -3.811131053 -4.221463213
#> [1989,]  0.4818093968  0.826428387  0.788616619
#> [1990,] -1.4569069646 -3.633436242 -3.489365233
#> [1991,]  0.4137585355 -0.182568589  0.602477942
#> [1992,] -0.3291566019 -1.058891630 -1.819936253
#> [1993,]  0.8981001349  2.464222453  3.028634400
#> [1994,]  0.8763355912  2.076480594  1.220959819
#> [1995,]  1.2061845056  0.962020290  1.160663037
#> [1996,] -1.3531900368 -1.455068046 -0.983696032
#> [1997,] -1.2004023291 -3.255841102 -4.277137962
#> [1998,]  0.2371050212  0.580201283  1.357305784
#> [1999,] -0.5525050394 -0.065386261  0.359972403
#> [2000,]  0.3408727449  1.037329727  0.812564449
#>
#> [[1]][[14]]$value[[1]]$decomposition
#> [1] "svd"
#>
#>
#>
#> [[1]][[14]]$visible
#> [1] TRUE

```

Environment

```
ls()  
#> [1] "i"      "root"   "tex_file"
```

Class

```
#> [[1]]  
#> [1] "character"  
#>  
#> [[2]]  
#> [1] "root_criterion"  
#>  
#> [[3]]  
#> [1] "character"
```

References

R Core Team. (2022). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. <https://www.R-project.org/>