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Running Genetic Algorithm...

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=== GENETIC ALGORITHM OPTIMIZATION ===

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[Initialization]

- Population size: 60

- Generations: 40

- Crossover rate: 80%

- Mutation rate: 20%

- Search space: 176 features

- Target: Minimize MSE using XGBoost

[Evolution Progress]

Gen 01/40 | Best MSE: 11389.617206 | Avg MSE: 12455.794315

Gen 06/40 | Best MSE: 11213.547655 | Avg MSE: 11308.956723

Gen 11/40 | Best MSE: 11022.984427 | Avg MSE: 11107.394039

Gen 16/40 | Best MSE: 10940.017894 | Avg MSE: 10988.549778

Gen 21/40 | Best MSE: 10940.017894 | Avg MSE: 10940.017894

Gen 26/40 | Best MSE: 10940.017894 | Avg MSE: 10940.017894

Gen 31/40 | Best MSE: 10940.017894 | Avg MSE: 10940.017894

Gen 36/40 | Best MSE: 10940.017894 | Avg MSE: 10940.017894

Gen 40/40 | Best MSE: 10940.017894 | Avg MSE: 10940.017894

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=== OPTIMIZATION RESULTS ===

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▶ Best MSE achieved: 10940.017894

▶ Time elapsed: 1104.67 seconds

▶ Features selected: 102/176 (42.0% reduction)

▶ Selected features:

1. District

2. Neighborhood

3. m² (Gross)

4. Number of rooms

5. Building Age

6. Floor location

7. Number of floors

8. Number of bathrooms

9. Balcony

10. Using status

11. Available for Loan

12. Swap

13. Front West

14. Front South

15. ADSL

16. Smart House

17. Alarm (Thief)

18. Alarm (Fire)

19. Elevator

20. Balcony.1

21. Dishwasher

22. Refrigerator

23. Wall paper

24. Shower

25. Dressing room

26. Closet

27. Video intercom

28. Hilton Bathroom

29. Intercom System

30. Insulating glass

31. Plasterboard

32. Cellar

33. Air conditioning

34. Tub

35. Laminate Floor

36. Marley

37. Furniture

38. Kitchen (Built-in)

39. Kitchen (Laminate)

40. Kitchen Natural Gas

41. Blinds

42. Ceramic Floor

43. Set Top Cooker

44. Spot Lighting

45. Thermosiphon

46. Cloakroom

47. Face Recognition & Fingerprint

48. Washing Machine

49. Washing machine

50. Steel door

51. Fireplace

52. Elevator.1

53. Bath

54. Booster

55. Thermal Insulation

56. Generator

57. Cable TV

58. Closed Garage

59. Doorman

60. Playground

61. Sound insulation

62. Siding

63. Water tank

64. Tennis court

65. Parking Lot

66. Bathroom

67. Wide Corridor

68. Kitchen

69. Park

70. Socket / Electric Switch

71. Handle / Railing

72. Toilet

73. Swimming pool

74. The mall

75. Next to sea shore

76. The church

77. Market

78. Police station

79. Gym

80. Fire Department

81. Highway

82. Bosphorus Bridges

83. Street

84. Sea bus

85. Filled

86. E-5

87. Airport

88. Metro

89. Metrobus

90. Minibus

91. Bus stop

92. Coast

93. TEM

94. Tram

95. Scaffolding

96. Throat

97. Pool

98. City

99. Garage / Shop Top

100. Entrance floor

101. Rerse Duplex

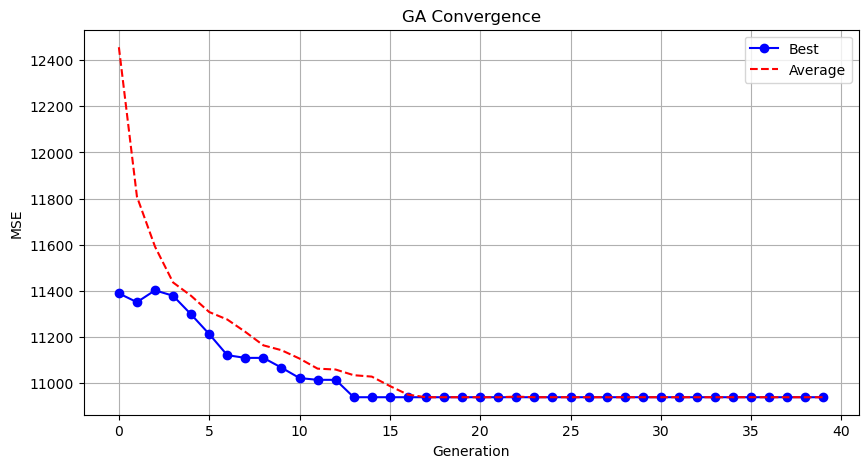
102. Roof Duplex

▶ Convergence progress:

- Initial MSE: 11389.6172

- Final MSE: 10940.0179

- Improvement: 3.9%



Genetic Algorithm completed successfully with MSE: 10940.0179

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Running Particle Swarm Optimization...

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=== PARTICLE SWARM OPTIMIZATION ===

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[Initialization]

- Swarm size: 60 particles

- Iterations: 40

- Cognitive weight: 0.5

- Social weight: 0.5

- Inertia weight: 0.5

- Search space: 176 features

- Target: Minimize MSE using XGBoost

[Optimization Progress]

No constraints given.

Iteration 1: Best MSE = 15099.645980

Best after iteration 1: [0.6871811 0.35100314 0.88198424 0.63944297 0.52624657 0.63895567

0.56238974 0.65709942 0.08284341 0.890428 0.63830452 0.14231804

0.39464272 0.77710052 0.28779189 0.39159375 0.49163325 0.11732242

0.64825993 0.65073226 0.52112224 0.0868414 0.57335739 0.18672259

0.98161607 0.94844316 0.22103597 0.41990268 0.1685304 0.43037934

0.01723726 0.38634767 0.09140023 0.29025286 0.51269674 0.09981133

0.43815917 0.15291056 0.11238932 0.76903324 0.21617446 0.81569065

0.99870266 0.35084916 0.19611761 0.24300403 0.56128227 0.74466438

0.26155696 0.0111789 0.428325 0.69829083 0.1111765 0.42182827

0.74279629 0.99660986 0.11592687 0.95683849 0.057193 0.74428696

0.02944555 0.52149941 0.02222946 0.53824792 0.93399756 0.89061702

0.63132126 0.61601109 0.08450825 0.9460813 0.97960309 0.68453096

0.02570755 0.76959509 0.09567822 0.97710166 0.95719768 0.05349057

0.5667135 0.80728754 0.78822612 0.41696106 0.56164404 0.87050222

0.91718084 0.68421081 0.96213439 0.87395377 0.03905046 0.41815951

0.90548544 0.86807654 0.80867069 0.73729588 0.82826166 0.23924902

0.36353996 0.17327697 0.55699141 0.80867773 0.71749066 0.3076056

0.38077564 0.15773403 0.91405804 0.4971738 0.8944589 0.00111136

0.62895142 0.11691871 0.31825056 0.79942701 0.02014694 0.29412858

0.73657342 0.3955182 0.92349362 0.87539779 0.29467411 0.0124468

0.78210517 0.65269996 0.60107414 0.6543106 0.790924 0.11112307

0.48708126 0.16727687 0.98305779 0.64617018 0.62056006 0.86332528

0.08897239 0.61900291 0.02305142 0.91600704 0.94152455 0.70008024

0.46650464 0.58826291 0.48594588 0.62247933 0.38991845 0.20694092

0.79899017 0.63511809 0.81194706 0.12405346 0.91114877 0.03613

0.80922477 0.74758312 0.60709233 0.7371276 0.46561454 0.21066843

0.57151736 0.99299464 0.65190194 0.97245167 0.6567901 0.87991937

0.33114952 0.63744376 0.84498822 0.10038272 0.28881585 0.16248761

0.2500619 0.55409364 0.58313152 0.39203528 0.19234633 0.57364207

0.51261242 0.45983784] 11324.293534666967

New best for swarm at iteration 2: [1. 0. 0.99021529 0.5138884 1. 0.71045653

0.62656667 0.74565553 0.51582951 0.58343679 0.6399245 0.28523424

1. 0.88096128 0.75741945 0.94383762 0.94738307 0.30735136

0.34305668 0.75666538 0.4136522 0.46645958 0.95440227 0.68481377

0.74620917 0. 0.57143877 0.11949303 0.31007485 0.14493226

0.6583115 0.52739909 0.52135987 0. 0.56868039 0.00395712

0.04529517 0. 0.52357487 0.92229672 0. 0.20139825

1. 0.68761989 0.75603095 0. 0. 0.77004432

0.32057872 0.52612105 0.2092981 0.89287915 0.74057645 0.21980164

0.33459842 0.52414312 0.13330912 0.88511938 0.68089824 1.

0. 0.79120991 0. 1. 0.14326026 0.18996113

0.09598455 0.91790499 0.67398654 0.98427477 0.4836151 0.33225798

0.29747271 1. 0.07472991 1. 1. 0.42197609

1. 0.11590527 0.13851874 0.33920902 1. 1.

0.9851231 0.46248897 1. 1. 0.73301908 0.54889766

0.68418894 0.27531833 0.43693535 0.25426576 0.70581135 0.15901823

0.52773605 0.22823899 0.55547883 0.65775478 1. 0.24200623

0.52775985 0.78560044 0.26034766 0.02320235 0.22492938 0.51069652

0. 0.58369902 0.44116945 0.6663799 0.43147629 0.69833575

0.3443246 0.28591778 0.58240928 0.72459545 0.19430033 0.

0.14208612 0.35370205 0.03668547 0.80167527 1. 0.

0. 0.87605881 0.28471816 0.74241603 0.65217853 0.74496406

0.25673298 1. 0.24544237 1. 1. 0.18156267

0.44368049 0.27417001 0. 1. 0.50922829 0.

0.82037364 0.81429042 1. 0.92984641 0.4544557 0.27932985

1. 0.32468997 0.30828399 0.69352062 0.45725577 0.44263004

0.36482773 0.45779127 0.25574858 0.72581493 0.84027057 0.85246414

0.50439041 0.06151771 0.73684737 0.23584024 0.60346862 0.78523312

0.56138724 0.8312131 0.27391046 0.6623358 0. 0.91590352

0.0477886 0.90320452] 11287.200797716634

Best after iteration 2: [1. 0. 0.99021529 0.5138884 1. 0.71045653

0.62656667 0.74565553 0.51582951 0.58343679 0.6399245 0.28523424

1. 0.88096128 0.75741945 0.94383762 0.94738307 0.30735136

0.34305668 0.75666538 0.4136522 0.46645958 0.95440227 0.68481377

0.74620917 0. 0.57143877 0.11949303 0.31007485 0.14493226

0.6583115 0.52739909 0.52135987 0. 0.56868039 0.00395712

0.04529517 0. 0.52357487 0.92229672 0. 0.20139825

1. 0.68761989 0.75603095 0. 0. 0.77004432

0.32057872 0.52612105 0.2092981 0.89287915 0.74057645 0.21980164

0.33459842 0.52414312 0.13330912 0.88511938 0.68089824 1.

0. 0.79120991 0. 1. 0.14326026 0.18996113

0.09598455 0.91790499 0.67398654 0.98427477 0.4836151 0.33225798

0.29747271 1. 0.07472991 1. 1. 0.42197609

1. 0.11590527 0.13851874 0.33920902 1. 1.

0.9851231 0.46248897 1. 1. 0.73301908 0.54889766

0.68418894 0.27531833 0.43693535 0.25426576 0.70581135 0.15901823

0.52773605 0.22823899 0.55547883 0.65775478 1. 0.24200623

0.52775985 0.78560044 0.26034766 0.02320235 0.22492938 0.51069652

0. 0.58369902 0.44116945 0.6663799 0.43147629 0.69833575

0.3443246 0.28591778 0.58240928 0.72459545 0.19430033 0.

0.14208612 0.35370205 0.03668547 0.80167527 1. 0.

0. 0.87605881 0.28471816 0.74241603 0.65217853 0.74496406

0.25673298 1. 0.24544237 1. 1. 0.18156267

0.44368049 0.27417001 0. 1. 0.50922829 0.

0.82037364 0.81429042 1. 0.92984641 0.4544557 0.27932985

1. 0.32468997 0.30828399 0.69352062 0.45725577 0.44263004

0.36482773 0.45779127 0.25574858 0.72581493 0.84027057 0.85246414

0.50439041 0.06151771 0.73684737 0.23584024 0.60346862 0.78523312

0.56138724 0.8312131 0.27391046 0.6623358 0. 0.91590352

0.0477886 0.90320452] 11287.200797716634

New best for swarm at iteration 3: [1. 0.257817 0.91959061 0.12244359 1. 0.89384253

0.9084536 0.85089583 0.57208948 0.39195218 0.49163312 0.63935157

1. 0.87211565 0.81156533 0.00208312 0.7066364 0.62097654

0.79590695 1. 0.90622698 0.06905185 0.83329996 0.

0.9102713 0.84488206 0.30779697 0.41433585 0.02500219 0.00336758

0.34272057 0.27393824 0.66806717 0.20737118 0.8041667 0.08103029

0.71825094 0.20381459 0.64225111 0.81233962 0.10707107 0.22114139

0.71371585 0.36244274 0.64651716 0.03301383 0.07550987 0.64243956

0.11232445 0.66646982 0.27506556 0.5104619 0.5798848 0.43661543

0.49130801 0.46037993 0. 0.67694409 0.62755647 0.31118954

0.37705938 0.45576284 0. 0.31892716 0.83686287 0.36327691

0.20684834 0.6741757 0.12129138 0.09287987 1. 0.14098492

0.26370311 0.17403897 0. 1. 1. 0.02209659

0.95440064 1. 0.19173922 0. 0.75839428 0.87450021

1. 0.8604512 0.85883118 0.74069418 0.01187679 0.67375665

0.3606246 0.81753181 0.6662284 0.94727677 0.94906218 0.27822583

0.28849256 0. 0.25272418 0.94466604 0.93793222 0.42748129

0.09368802 0.27022349 0.73691918 0.5634314 0.90605216 0.19242836

0.18381498 0.89981652 0.52694356 0.76274437 0.59769216 0.13865946

1. 0.82837906 0.81781796 0.73987709 0.71798798 0.45657917

0.86837705 0.472036 0.89302397 0.84127737 0.4315053 0.71663798

0.49940361 0.15140231 0.69286415 0. 0.98862025 0.89178562

0. 1. 0. 1. 1. 0.178711

0.37682257 0.36009526 0.71732665 1. 0.92555673 0.

0.75588884 0.4341294 0.94785143 0.49334125 0.37715944 0.

0.6564209 1. 0.21666722 0.96486736 0.16660784 1.

0.1026833 0.40612317 0.97319875 1. 0.44788333 0.84749053

0.16822532 0.3679541 0.78348482 0. 0.27230662 0.27285957

0.1122148 0.64146059 0.91248592 1. 0. 0.29035911

0.0433053 0.70280365] 11274.92573059692

New best for swarm at iteration 3: [1.00000000e+00 9.26025757e-02 1.00000000e+00 6.14456422e-01

1.00000000e+00 8.39227169e-01 8.24862763e-01 9.04282847e-01

4.54712609e-01 5.79857892e-01 7.05769632e-01 3.16210715e-01

1.00000000e+00 9.37156494e-01 6.94352008e-01 8.23390297e-01

8.34218165e-01 4.40377338e-01 4.06340820e-01 9.76996293e-01

4.44811917e-01 3.50662225e-01 9.84601921e-01 3.53524487e-01

7.89869547e-01 2.10475455e-01 4.11725902e-01 1.04008164e-01

1.46877884e-01 1.47962382e-01 5.43563610e-01 4.18351900e-01

4.08726715e-01 1.57920379e-02 6.35299295e-01 0.00000000e+00

1.24858431e-01 1.61258240e-02 4.70571086e-01 9.34699616e-01

0.00000000e+00 3.03444602e-01 1.00000000e+00 7.15586629e-01

7.30129686e-01 0.00000000e+00 6.77683713e-05 8.32465890e-01

1.67999101e-01 5.15462917e-01 2.99396341e-01 9.12289335e-01

6.66950131e-01 1.56459112e-01 3.13646542e-01 6.11578350e-01

9.21933707e-02 1.00000000e+00 5.70769540e-01 9.66015705e-01

7.01005695e-02 6.75975606e-01 0.00000000e+00 6.60040609e-01

3.50705558e-01 2.44753640e-01 1.48125441e-01 8.02872070e-01

3.58534283e-01 5.95440526e-01 6.57759219e-01 4.49800241e-01

1.90504369e-01 7.84019184e-01 4.32478142e-02 1.00000000e+00

1.00000000e+00 2.18613917e-01 1.00000000e+00 3.49344106e-01

1.34538459e-01 3.35507584e-01 1.00000000e+00 1.00000000e+00

1.00000000e+00 6.28847807e-01 1.00000000e+00 1.00000000e+00

5.39453295e-01 5.26290257e-01 7.72486958e-01 3.56787044e-01

5.95607808e-01 5.14326423e-01 6.88891752e-01 1.17171770e-01

5.89673565e-01 1.38608923e-01 5.46235455e-01 6.75718013e-01

1.00000000e+00 2.47334617e-01 4.66815604e-01 5.30306244e-01

2.52862967e-01 1.09871963e-01 3.84015241e-01 3.86695696e-01

0.00000000e+00 5.70054830e-01 4.35319864e-01 6.55471748e-01

3.53187933e-01 4.69654269e-01 4.86033956e-01 2.71571273e-01

5.78322067e-01 7.06664205e-01 3.38155620e-01 0.00000000e+00

2.52327442e-01 3.14800237e-01 2.31171726e-02 8.13641457e-01

1.00000000e+00 2.49249447e-01 6.21786068e-02 5.63121350e-01

3.58170263e-01 6.57126635e-01 7.98248746e-01 7.75588906e-01

1.68937151e-01 1.00000000e+00 1.10961102e-01 1.00000000e+00

1.00000000e+00 2.03394628e-01 3.52331533e-01 3.62560947e-01

1.81882755e-01 1.00000000e+00 5.88344893e-01 0.00000000e+00

7.93084586e-01 6.79353100e-01 1.00000000e+00 9.23243891e-01

5.16200883e-01 0.00000000e+00 1.00000000e+00 4.40424261e-01

3.36100651e-01 7.87117226e-01 2.72226297e-01 4.30240390e-01

2.22039206e-01 4.87239198e-01 2.07802580e-01 8.94518143e-01

7.40544096e-01 8.82286549e-01 2.76319636e-01 2.00831240e-01

7.48943017e-01 8.05895482e-02 4.86704570e-01 6.34380566e-01

6.14085177e-01 9.05454657e-01 5.35625060e-01 7.01049363e-01

0.00000000e+00 6.61087853e-01 1.71268486e-02 8.27661590e-01] 11223.944389870821

Best after iteration 3: [1.00000000e+00 9.26025757e-02 1.00000000e+00 6.14456422e-01

1.00000000e+00 8.39227169e-01 8.24862763e-01 9.04282847e-01

4.54712609e-01 5.79857892e-01 7.05769632e-01 3.16210715e-01

1.00000000e+00 9.37156494e-01 6.94352008e-01 8.23390297e-01

8.34218165e-01 4.40377338e-01 4.06340820e-01 9.76996293e-01

4.44811917e-01 3.50662225e-01 9.84601921e-01 3.53524487e-01

7.89869547e-01 2.10475455e-01 4.11725902e-01 1.04008164e-01

1.46877884e-01 1.47962382e-01 5.43563610e-01 4.18351900e-01

4.08726715e-01 1.57920379e-02 6.35299295e-01 0.00000000e+00

1.24858431e-01 1.61258240e-02 4.70571086e-01 9.34699616e-01

0.00000000e+00 3.03444602e-01 1.00000000e+00 7.15586629e-01

7.30129686e-01 0.00000000e+00 6.77683713e-05 8.32465890e-01

1.67999101e-01 5.15462917e-01 2.99396341e-01 9.12289335e-01

6.66950131e-01 1.56459112e-01 3.13646542e-01 6.11578350e-01

9.21933707e-02 1.00000000e+00 5.70769540e-01 9.66015705e-01

7.01005695e-02 6.75975606e-01 0.00000000e+00 6.60040609e-01

3.50705558e-01 2.44753640e-01 1.48125441e-01 8.02872070e-01

3.58534283e-01 5.95440526e-01 6.57759219e-01 4.49800241e-01

1.90504369e-01 7.84019184e-01 4.32478142e-02 1.00000000e+00

1.00000000e+00 2.18613917e-01 1.00000000e+00 3.49344106e-01

1.34538459e-01 3.35507584e-01 1.00000000e+00 1.00000000e+00

1.00000000e+00 6.28847807e-01 1.00000000e+00 1.00000000e+00

5.39453295e-01 5.26290257e-01 7.72486958e-01 3.56787044e-01

5.95607808e-01 5.14326423e-01 6.88891752e-01 1.17171770e-01

5.89673565e-01 1.38608923e-01 5.46235455e-01 6.75718013e-01

1.00000000e+00 2.47334617e-01 4.66815604e-01 5.30306244e-01

2.52862967e-01 1.09871963e-01 3.84015241e-01 3.86695696e-01

0.00000000e+00 5.70054830e-01 4.35319864e-01 6.55471748e-01

3.53187933e-01 4.69654269e-01 4.86033956e-01 2.71571273e-01

5.78322067e-01 7.06664205e-01 3.38155620e-01 0.00000000e+00

2.52327442e-01 3.14800237e-01 2.31171726e-02 8.13641457e-01

1.00000000e+00 2.49249447e-01 6.21786068e-02 5.63121350e-01

3.58170263e-01 6.57126635e-01 7.98248746e-01 7.75588906e-01

1.68937151e-01 1.00000000e+00 1.10961102e-01 1.00000000e+00

1.00000000e+00 2.03394628e-01 3.52331533e-01 3.62560947e-01

1.81882755e-01 1.00000000e+00 5.88344893e-01 0.00000000e+00

7.93084586e-01 6.79353100e-01 1.00000000e+00 9.23243891e-01

5.16200883e-01 0.00000000e+00 1.00000000e+00 4.40424261e-01

3.36100651e-01 7.87117226e-01 2.72226297e-01 4.30240390e-01

2.22039206e-01 4.87239198e-01 2.07802580e-01 8.94518143e-01

7.40544096e-01 8.82286549e-01 2.76319636e-01 2.00831240e-01

7.48943017e-01 8.05895482e-02 4.86704570e-01 6.34380566e-01

6.14085177e-01 9.05454657e-01 5.35625060e-01 7.01049363e-01

0.00000000e+00 6.61087853e-01 1.71268486e-02 8.27661590e-01] 11223.944389870821

New best for swarm at iteration 4: [0.84598929 0.28743601 1. 0.45909461 0.69710932 0.50735463

0.86430171 0.83670984 0.42753346 0.60859155 0.63977243 0.21452388

0.873902 1. 0.80968979 0.61988306 0.76405803 0.24476879

0.24683856 0.74010077 0.39083549 0.60794339 0.93179769 0.77544698

0.92554709 0.31272636 0.18426087 0.0930324 0.34027077 0.11857248

0.31447625 0.23585708 0.41267649 0.2973502 0.88553673 0.16893749

0.79405853 0.25661815 0.32149607 0.73538128 0.11738454 0.80729131

0.60971643 0.73917824 0.48513699 0.1174752 0.63861922 0.60557139

0.07132857 0.25706858 0.65525561 0.88293418 0.18612615 0.53385576

0.36288584 0.39054293 0.61755848 0.89564813 0.36058506 1.

0.53684448 0.50359495 0.2550362 0.73467975 0.44676324 0.50908565

0.68837825 0.54132332 0.26582014 1. 0.73419411 0.55753302

0. 0.55854402 0.05510004 0.92615078 0.77069015 0.04108148

0.76718208 0.17277281 0.56974683 0.55096457 0.84229144 1.

0.50286794 0.80447788 1. 0. 0.54921817 0.33838934

0.76216783 0.54780807 0.68903736 0.60588746 0.97050864 0.55155776

0.20595942 0.08583733 0.82196915 0.81495416 0.91701452 0.41538888

0.54643108 0.26209431 0.35956373 0.21555073 0.60280123 0.11409009

0.05342229 0.18344067 0.15624286 0.67095654 0.15896476 0.65409063

0.27953633 0.15190509 0.94728214 0.60203062 0.11917281 0.1703612

0.15371607 0.18651907 0.0785559 0.71897283 1. 0.14477923

0.24952366 0.28983621 0.7941159 0.65254082 0.07226561 0.87951599

0.41388859 0.5969394 0.08011098 1. 0.87599676 0.47809687

0.51176305 0.10180391 0.39010631 1. 0.35701478 0.

0.9615732 0.57332642 0.89442934 0.90509635 0.7628154 0.25921846

1. 0.76462157 0.84162841 0.7289706 0.82699141 0.04045781

0.12743351 0.89622309 0.48522233 0.8801738 0.91273197 1.

0.77127533 0.22471913 0.92078836 0.41784105 0.49239765 0.29120028

0.30455371 0.87028087 0.59288866 0.93452889 0. 0.50237958

0.30475563 0.62806693] 11083.912203227103

Iteration 5: Best MSE = 12198.680622

Best after iteration 4: [0.84598929 0.28743601 1. 0.45909461 0.69710932 0.50735463

0.86430171 0.83670984 0.42753346 0.60859155 0.63977243 0.21452388

0.873902 1. 0.80968979 0.61988306 0.76405803 0.24476879

0.24683856 0.74010077 0.39083549 0.60794339 0.93179769 0.77544698

0.92554709 0.31272636 0.18426087 0.0930324 0.34027077 0.11857248

0.31447625 0.23585708 0.41267649 0.2973502 0.88553673 0.16893749

0.79405853 0.25661815 0.32149607 0.73538128 0.11738454 0.80729131

0.60971643 0.73917824 0.48513699 0.1174752 0.63861922 0.60557139

0.07132857 0.25706858 0.65525561 0.88293418 0.18612615 0.53385576

0.36288584 0.39054293 0.61755848 0.89564813 0.36058506 1.

0.53684448 0.50359495 0.2550362 0.73467975 0.44676324 0.50908565

0.68837825 0.54132332 0.26582014 1. 0.73419411 0.55753302

0. 0.55854402 0.05510004 0.92615078 0.77069015 0.04108148

0.76718208 0.17277281 0.56974683 0.55096457 0.84229144 1.

0.50286794 0.80447788 1. 0. 0.54921817 0.33838934

0.76216783 0.54780807 0.68903736 0.60588746 0.97050864 0.55155776

0.20595942 0.08583733 0.82196915 0.81495416 0.91701452 0.41538888

0.54643108 0.26209431 0.35956373 0.21555073 0.60280123 0.11409009

0.05342229 0.18344067 0.15624286 0.67095654 0.15896476 0.65409063

0.27953633 0.15190509 0.94728214 0.60203062 0.11917281 0.1703612

0.15371607 0.18651907 0.0785559 0.71897283 1. 0.14477923

0.24952366 0.28983621 0.7941159 0.65254082 0.07226561 0.87951599

0.41388859 0.5969394 0.08011098 1. 0.87599676 0.47809687

0.51176305 0.10180391 0.39010631 1. 0.35701478 0.

0.9615732 0.57332642 0.89442934 0.90509635 0.7628154 0.25921846

1. 0.76462157 0.84162841 0.7289706 0.82699141 0.04045781

0.12743351 0.89622309 0.48522233 0.8801738 0.91273197 1.

0.77127533 0.22471913 0.92078836 0.41784105 0.49239765 0.29120028

0.30455371 0.87028087 0.59288866 0.93452889 0. 0.50237958

0.30475563 0.62806693] 11083.912203227103

New best for swarm at iteration 5: [0.93086615 0.31213141 0.9477356 0.60743872 0.83921784 0.79390697

0.95243836 0.84772982 0.43693704 0.62683611 0.65692514 0.3990307

0.93201746 0.88103959 0.69716739 0.94580204 0.78198382 0.26657059

0.26101947 0.79240005 0.34991034 0.57692094 0.36934666 0.64749322

1. 0.25883967 0.24871305 0.38145085 0.3443501 0.22495122

0.45406879 0.62327733 0.44653609 0.2435835 0.74893194 0.09768895

0.53944758 0.31091433 0.27345837 0.73883896 0.02407284 0.04089352

0.72763005 0.89656283 0.45730666 0.10358871 0.33150566 0.53109715

0.12477999 0.17557535 0.31487556 0.81441702 0.73489586 0.43498215

0.32713387 0.48643902 0.32878789 0.9467109 0.32597837 0.73641787

0.30658604 0.73586245 0.03214895 0.67909276 0.31520154 0.41369046

0.6885259 0.61957345 0.55146297 0.68851551 0.93189391 0.58301081

0. 0.705795 0.01056601 0.93061797 0.73419952 0.07380629

0.96578739 0.06828504 0.32095901 0.45448659 0.86534864 1.

0.61081558 0.73035056 1. 0.58282886 0.69556116 0.39005839

0.62268214 0.43873515 0.74260346 0.70723674 0.94009611 0.38286762

0.3170131 0.3300664 0.84041127 0.72076128 0.42978077 0.28763604

0.62498716 0.26592755 0.11963495 0.06034692 0.56784601 0.22760784

0.09702161 0.19113875 0.46428562 0.47259394 0.25239739 0.60476177

0.32209668 0.0510324 0.9067997 0.94752198 0.18574358 0.10507803

0.36955491 0.37079112 0.07033348 0.77915365 0.72620069 0.11707918

0.18516901 0.3413987 0.63436828 0.80025407 0.43965767 0.76354605

0.26911221 0.68626597 0.21332476 0.95475152 0.85356272 0.3461092

0.49938232 0.12803806 0.6276181 0.96441283 0.25720627 0.

0.85462402 0.62861475 0.98789877 0.91262003 0.44971201 0.31895664

1. 0.59311221 0.78104315 0.64376176 0.6614825 0.22375794

0.29707183 0.66019733 0.37953608 0.80532405 0.70586096 0.98075962

0.4073625 0.07252084 0.9117686 0.28269379 0.46391788 0.45333422

0.45828088 0.90317485 0.62947471 0.89620695 0. 0.35264421

0.25933549 0.61297475] 11071.584944744634

Best after iteration 5: [0.93086615 0.31213141 0.9477356 0.60743872 0.83921784 0.79390697

0.95243836 0.84772982 0.43693704 0.62683611 0.65692514 0.3990307

0.93201746 0.88103959 0.69716739 0.94580204 0.78198382 0.26657059

0.26101947 0.79240005 0.34991034 0.57692094 0.36934666 0.64749322

1. 0.25883967 0.24871305 0.38145085 0.3443501 0.22495122

0.45406879 0.62327733 0.44653609 0.2435835 0.74893194 0.09768895

0.53944758 0.31091433 0.27345837 0.73883896 0.02407284 0.04089352

0.72763005 0.89656283 0.45730666 0.10358871 0.33150566 0.53109715

0.12477999 0.17557535 0.31487556 0.81441702 0.73489586 0.43498215

0.32713387 0.48643902 0.32878789 0.9467109 0.32597837 0.73641787

0.30658604 0.73586245 0.03214895 0.67909276 0.31520154 0.41369046

0.6885259 0.61957345 0.55146297 0.68851551 0.93189391 0.58301081

0. 0.705795 0.01056601 0.93061797 0.73419952 0.07380629

0.96578739 0.06828504 0.32095901 0.45448659 0.86534864 1.

0.61081558 0.73035056 1. 0.58282886 0.69556116 0.39005839

0.62268214 0.43873515 0.74260346 0.70723674 0.94009611 0.38286762

0.3170131 0.3300664 0.84041127 0.72076128 0.42978077 0.28763604

0.62498716 0.26592755 0.11963495 0.06034692 0.56784601 0.22760784

0.09702161 0.19113875 0.46428562 0.47259394 0.25239739 0.60476177

0.32209668 0.0510324 0.9067997 0.94752198 0.18574358 0.10507803

0.36955491 0.37079112 0.07033348 0.77915365 0.72620069 0.11707918

0.18516901 0.3413987 0.63436828 0.80025407 0.43965767 0.76354605

0.26911221 0.68626597 0.21332476 0.95475152 0.85356272 0.3461092

0.49938232 0.12803806 0.6276181 0.96441283 0.25720627 0.

0.85462402 0.62861475 0.98789877 0.91262003 0.44971201 0.31895664

1. 0.59311221 0.78104315 0.64376176 0.6614825 0.22375794

0.29707183 0.66019733 0.37953608 0.80532405 0.70586096 0.98075962

0.4073625 0.07252084 0.9117686 0.28269379 0.46391788 0.45333422

0.45828088 0.90317485 0.62947471 0.89620695 0. 0.35264421

0.25933549 0.61297475] 11071.584944744634

Best after iteration 6: [0.93086615 0.31213141 0.9477356 0.60743872 0.83921784 0.79390697

0.95243836 0.84772982 0.43693704 0.62683611 0.65692514 0.3990307

0.93201746 0.88103959 0.69716739 0.94580204 0.78198382 0.26657059

0.26101947 0.79240005 0.34991034 0.57692094 0.36934666 0.64749322

1. 0.25883967 0.24871305 0.38145085 0.3443501 0.22495122

0.45406879 0.62327733 0.44653609 0.2435835 0.74893194 0.09768895

0.53944758 0.31091433 0.27345837 0.73883896 0.02407284 0.04089352

0.72763005 0.89656283 0.45730666 0.10358871 0.33150566 0.53109715

0.12477999 0.17557535 0.31487556 0.81441702 0.73489586 0.43498215

0.32713387 0.48643902 0.32878789 0.9467109 0.32597837 0.73641787

0.30658604 0.73586245 0.03214895 0.67909276 0.31520154 0.41369046

0.6885259 0.61957345 0.55146297 0.68851551 0.93189391 0.58301081

0. 0.705795 0.01056601 0.93061797 0.73419952 0.07380629

0.96578739 0.06828504 0.32095901 0.45448659 0.86534864 1.

0.61081558 0.73035056 1. 0.58282886 0.69556116 0.39005839

0.62268214 0.43873515 0.74260346 0.70723674 0.94009611 0.38286762

0.3170131 0.3300664 0.84041127 0.72076128 0.42978077 0.28763604

0.62498716 0.26592755 0.11963495 0.06034692 0.56784601 0.22760784

0.09702161 0.19113875 0.46428562 0.47259394 0.25239739 0.60476177

0.32209668 0.0510324 0.9067997 0.94752198 0.18574358 0.10507803

0.36955491 0.37079112 0.07033348 0.77915365 0.72620069 0.11707918

0.18516901 0.3413987 0.63436828 0.80025407 0.43965767 0.76354605

0.26911221 0.68626597 0.21332476 0.95475152 0.85356272 0.3461092

0.49938232 0.12803806 0.6276181 0.96441283 0.25720627 0.

0.85462402 0.62861475 0.98789877 0.91262003 0.44971201 0.31895664

1. 0.59311221 0.78104315 0.64376176 0.6614825 0.22375794

0.29707183 0.66019733 0.37953608 0.80532405 0.70586096 0.98075962

0.4073625 0.07252084 0.9117686 0.28269379 0.46391788 0.45333422

0.45828088 0.90317485 0.62947471 0.89620695 0. 0.35264421

0.25933549 0.61297475] 11071.584944744634

Best after iteration 7: [0.93086615 0.31213141 0.9477356 0.60743872 0.83921784 0.79390697

0.95243836 0.84772982 0.43693704 0.62683611 0.65692514 0.3990307

0.93201746 0.88103959 0.69716739 0.94580204 0.78198382 0.26657059

0.26101947 0.79240005 0.34991034 0.57692094 0.36934666 0.64749322

1. 0.25883967 0.24871305 0.38145085 0.3443501 0.22495122

0.45406879 0.62327733 0.44653609 0.2435835 0.74893194 0.09768895

0.53944758 0.31091433 0.27345837 0.73883896 0.02407284 0.04089352

0.72763005 0.89656283 0.45730666 0.10358871 0.33150566 0.53109715

0.12477999 0.17557535 0.31487556 0.81441702 0.73489586 0.43498215

0.32713387 0.48643902 0.32878789 0.9467109 0.32597837 0.73641787

0.30658604 0.73586245 0.03214895 0.67909276 0.31520154 0.41369046

0.6885259 0.61957345 0.55146297 0.68851551 0.93189391 0.58301081

0. 0.705795 0.01056601 0.93061797 0.73419952 0.07380629

0.96578739 0.06828504 0.32095901 0.45448659 0.86534864 1.

0.61081558 0.73035056 1. 0.58282886 0.69556116 0.39005839

0.62268214 0.43873515 0.74260346 0.70723674 0.94009611 0.38286762

0.3170131 0.3300664 0.84041127 0.72076128 0.42978077 0.28763604

0.62498716 0.26592755 0.11963495 0.06034692 0.56784601 0.22760784

0.09702161 0.19113875 0.46428562 0.47259394 0.25239739 0.60476177

0.32209668 0.0510324 0.9067997 0.94752198 0.18574358 0.10507803

0.36955491 0.37079112 0.07033348 0.77915365 0.72620069 0.11707918

0.18516901 0.3413987 0.63436828 0.80025407 0.43965767 0.76354605

0.26911221 0.68626597 0.21332476 0.95475152 0.85356272 0.3461092

0.49938232 0.12803806 0.6276181 0.96441283 0.25720627 0.

0.85462402 0.62861475 0.98789877 0.91262003 0.44971201 0.31895664

1. 0.59311221 0.78104315 0.64376176 0.6614825 0.22375794

0.29707183 0.66019733 0.37953608 0.80532405 0.70586096 0.98075962

0.4073625 0.07252084 0.9117686 0.28269379 0.46391788 0.45333422

0.45828088 0.90317485 0.62947471 0.89620695 0. 0.35264421

0.25933549 0.61297475] 11071.584944744634

Best after iteration 8: [0.93086615 0.31213141 0.9477356 0.60743872 0.83921784 0.79390697

0.95243836 0.84772982 0.43693704 0.62683611 0.65692514 0.3990307

0.93201746 0.88103959 0.69716739 0.94580204 0.78198382 0.26657059

0.26101947 0.79240005 0.34991034 0.57692094 0.36934666 0.64749322

1. 0.25883967 0.24871305 0.38145085 0.3443501 0.22495122

0.45406879 0.62327733 0.44653609 0.2435835 0.74893194 0.09768895

0.53944758 0.31091433 0.27345837 0.73883896 0.02407284 0.04089352

0.72763005 0.89656283 0.45730666 0.10358871 0.33150566 0.53109715

0.12477999 0.17557535 0.31487556 0.81441702 0.73489586 0.43498215

0.32713387 0.48643902 0.32878789 0.9467109 0.32597837 0.73641787

0.30658604 0.73586245 0.03214895 0.67909276 0.31520154 0.41369046

0.6885259 0.61957345 0.55146297 0.68851551 0.93189391 0.58301081

0. 0.705795 0.01056601 0.93061797 0.73419952 0.07380629

0.96578739 0.06828504 0.32095901 0.45448659 0.86534864 1.

0.61081558 0.73035056 1. 0.58282886 0.69556116 0.39005839

0.62268214 0.43873515 0.74260346 0.70723674 0.94009611 0.38286762

0.3170131 0.3300664 0.84041127 0.72076128 0.42978077 0.28763604

0.62498716 0.26592755 0.11963495 0.06034692 0.56784601 0.22760784

0.09702161 0.19113875 0.46428562 0.47259394 0.25239739 0.60476177

0.32209668 0.0510324 0.9067997 0.94752198 0.18574358 0.10507803

0.36955491 0.37079112 0.07033348 0.77915365 0.72620069 0.11707918

0.18516901 0.3413987 0.63436828 0.80025407 0.43965767 0.76354605

0.26911221 0.68626597 0.21332476 0.95475152 0.85356272 0.3461092

0.49938232 0.12803806 0.6276181 0.96441283 0.25720627 0.

0.85462402 0.62861475 0.98789877 0.91262003 0.44971201 0.31895664

1. 0.59311221 0.78104315 0.64376176 0.6614825 0.22375794

0.29707183 0.66019733 0.37953608 0.80532405 0.70586096 0.98075962

0.4073625 0.07252084 0.9117686 0.28269379 0.46391788 0.45333422

0.45828088 0.90317485 0.62947471 0.89620695 0. 0.35264421

0.25933549 0.61297475] 11071.584944744634

New best for swarm at iteration 9: [0.92299835 0.35934582 0.93048476 0.60820097 0.7260094 0.77314916

0.95251662 0.85878582 0.43500692 0.62015926 0.63936931 0.40557859

0.90335304 0.89224855 0.7333237 0.91862897 0.75286487 0.30425118

0.2989463 0.80596336 0.31637895 0.52571323 0.47063978 0.70136887

0.93793054 0.33536161 0.28137328 0.43084168 0.3594973 0.2332106

0.49281967 0.59756453 0.46927022 0.2487952 0.52668998 0.0669237

0.53840987 0.24778049 0.27483443 0.69495784 0.01874886 0.12575979

0.82293138 0.9075369 0.50163374 0.25015311 0.22940112 0.56274265

0.16927425 0.21410884 0.34463515 0.80670905 0.78141132 0.43330205

0.38807552 0.48673253 0.33329136 0.95875225 0.40903631 0.75385407

0.29734986 0.71085839 0.03735478 0.68055063 0.29247634 0.4161398

0.6827256 0.67949415 0.53652467 0.66639998 0.8899903 0.55753895

0.0380759 0.72165818 0.07332029 0.91166578 0.83841347 0.22848273

0.96873889 0.06317321 0.34340193 0.47489588 0.92352813 0.99750359

0.62288243 0.73298498 1. 0.57278424 0.64356387 0.39678496

0.6125332 0.44342259 0.73529277 0.68228956 0.85016211 0.32078085

0.31347479 0.30698681 0.86849346 0.74469537 0.36285762 0.2869142

0.55466052 0.2538337 0.13619003 0.15643471 0.54289102 0.24148513

0.11635674 0.29055649 0.44117233 0.47669296 0.26774235 0.60374364

0.40441274 0.08067268 0.90484458 0.89707151 0.20595592 0.13389333

0.34895775 0.37858212 0.09698867 0.7818521 0.66782387 0.11908795

0.34130119 0.3491742 0.64978574 0.77378866 0.44682751 0.75326235

0.20565608 0.69767369 0.21349979 1. 0.8907642 0.39166499

0.42667244 0.26860229 0.5794031 0.94030454 0.25792824 0.0334543

0.86347178 0.63318981 0.95112332 0.88840583 0.46578984 0.36584355

1. 0.52774279 0.76928518 0.65406938 0.61691649 0.19039518

0.32406654 0.65518688 0.36382046 0.79852628 0.69802203 1.

0.37160902 0.07189909 0.88138421 0.27616315 0.45118785 0.44202406

0.40664286 0.9148397 0.62763492 0.88444712 0.00222058 0.3869579

0.25425026 0.57056403] 11048.363412458868

Iteration 10: Best MSE = 11183.251516

Best after iteration 9: [0.92299835 0.35934582 0.93048476 0.60820097 0.7260094 0.77314916

0.95251662 0.85878582 0.43500692 0.62015926 0.63936931 0.40557859

0.90335304 0.89224855 0.7333237 0.91862897 0.75286487 0.30425118

0.2989463 0.80596336 0.31637895 0.52571323 0.47063978 0.70136887

0.93793054 0.33536161 0.28137328 0.43084168 0.3594973 0.2332106

0.49281967 0.59756453 0.46927022 0.2487952 0.52668998 0.0669237

0.53840987 0.24778049 0.27483443 0.69495784 0.01874886 0.12575979

0.82293138 0.9075369 0.50163374 0.25015311 0.22940112 0.56274265

0.16927425 0.21410884 0.34463515 0.80670905 0.78141132 0.43330205

0.38807552 0.48673253 0.33329136 0.95875225 0.40903631 0.75385407

0.29734986 0.71085839 0.03735478 0.68055063 0.29247634 0.4161398

0.6827256 0.67949415 0.53652467 0.66639998 0.8899903 0.55753895

0.0380759 0.72165818 0.07332029 0.91166578 0.83841347 0.22848273

0.96873889 0.06317321 0.34340193 0.47489588 0.92352813 0.99750359

0.62288243 0.73298498 1. 0.57278424 0.64356387 0.39678496

0.6125332 0.44342259 0.73529277 0.68228956 0.85016211 0.32078085

0.31347479 0.30698681 0.86849346 0.74469537 0.36285762 0.2869142

0.55466052 0.2538337 0.13619003 0.15643471 0.54289102 0.24148513

0.11635674 0.29055649 0.44117233 0.47669296 0.26774235 0.60374364

0.40441274 0.08067268 0.90484458 0.89707151 0.20595592 0.13389333

0.34895775 0.37858212 0.09698867 0.7818521 0.66782387 0.11908795

0.34130119 0.3491742 0.64978574 0.77378866 0.44682751 0.75326235

0.20565608 0.69767369 0.21349979 1. 0.8907642 0.39166499

0.42667244 0.26860229 0.5794031 0.94030454 0.25792824 0.0334543

0.86347178 0.63318981 0.95112332 0.88840583 0.46578984 0.36584355

1. 0.52774279 0.76928518 0.65406938 0.61691649 0.19039518

0.32406654 0.65518688 0.36382046 0.79852628 0.69802203 1.

0.37160902 0.07189909 0.88138421 0.27616315 0.45118785 0.44202406

0.40664286 0.9148397 0.62763492 0.88444712 0.00222058 0.3869579

0.25425026 0.57056403] 11048.363412458868

Best after iteration 10: [0.92299835 0.35934582 0.93048476 0.60820097 0.7260094 0.77314916

0.95251662 0.85878582 0.43500692 0.62015926 0.63936931 0.40557859

0.90335304 0.89224855 0.7333237 0.91862897 0.75286487 0.30425118

0.2989463 0.80596336 0.31637895 0.52571323 0.47063978 0.70136887

0.93793054 0.33536161 0.28137328 0.43084168 0.3594973 0.2332106

0.49281967 0.59756453 0.46927022 0.2487952 0.52668998 0.0669237

0.53840987 0.24778049 0.27483443 0.69495784 0.01874886 0.12575979

0.82293138 0.9075369 0.50163374 0.25015311 0.22940112 0.56274265

0.16927425 0.21410884 0.34463515 0.80670905 0.78141132 0.43330205

0.38807552 0.48673253 0.33329136 0.95875225 0.40903631 0.75385407

0.29734986 0.71085839 0.03735478 0.68055063 0.29247634 0.4161398

0.6827256 0.67949415 0.53652467 0.66639998 0.8899903 0.55753895

0.0380759 0.72165818 0.07332029 0.91166578 0.83841347 0.22848273

0.96873889 0.06317321 0.34340193 0.47489588 0.92352813 0.99750359

0.62288243 0.73298498 1. 0.57278424 0.64356387 0.39678496

0.6125332 0.44342259 0.73529277 0.68228956 0.85016211 0.32078085

0.31347479 0.30698681 0.86849346 0.74469537 0.36285762 0.2869142

0.55466052 0.2538337 0.13619003 0.15643471 0.54289102 0.24148513

0.11635674 0.29055649 0.44117233 0.47669296 0.26774235 0.60374364

0.40441274 0.08067268 0.90484458 0.89707151 0.20595592 0.13389333

0.34895775 0.37858212 0.09698867 0.7818521 0.66782387 0.11908795

0.34130119 0.3491742 0.64978574 0.77378866 0.44682751 0.75326235

0.20565608 0.69767369 0.21349979 1. 0.8907642 0.39166499

0.42667244 0.26860229 0.5794031 0.94030454 0.25792824 0.0334543

0.86347178 0.63318981 0.95112332 0.88840583 0.46578984 0.36584355

1. 0.52774279 0.76928518 0.65406938 0.61691649 0.19039518

0.32406654 0.65518688 0.36382046 0.79852628 0.69802203 1.

0.37160902 0.07189909 0.88138421 0.27616315 0.45118785 0.44202406

0.40664286 0.9148397 0.62763492 0.88444712 0.00222058 0.3869579

0.25425026 0.57056403] 11048.363412458868

Best after iteration 11: [0.92299835 0.35934582 0.93048476 0.60820097 0.7260094 0.77314916

0.95251662 0.85878582 0.43500692 0.62015926 0.63936931 0.40557859

0.90335304 0.89224855 0.7333237 0.91862897 0.75286487 0.30425118

0.2989463 0.80596336 0.31637895 0.52571323 0.47063978 0.70136887

0.93793054 0.33536161 0.28137328 0.43084168 0.3594973 0.2332106

0.49281967 0.59756453 0.46927022 0.2487952 0.52668998 0.0669237

0.53840987 0.24778049 0.27483443 0.69495784 0.01874886 0.12575979

0.82293138 0.9075369 0.50163374 0.25015311 0.22940112 0.56274265

0.16927425 0.21410884 0.34463515 0.80670905 0.78141132 0.43330205

0.38807552 0.48673253 0.33329136 0.95875225 0.40903631 0.75385407

0.29734986 0.71085839 0.03735478 0.68055063 0.29247634 0.4161398

0.6827256 0.67949415 0.53652467 0.66639998 0.8899903 0.55753895

0.0380759 0.72165818 0.07332029 0.91166578 0.83841347 0.22848273

0.96873889 0.06317321 0.34340193 0.47489588 0.92352813 0.99750359

0.62288243 0.73298498 1. 0.57278424 0.64356387 0.39678496

0.6125332 0.44342259 0.73529277 0.68228956 0.85016211 0.32078085

0.31347479 0.30698681 0.86849346 0.74469537 0.36285762 0.2869142

0.55466052 0.2538337 0.13619003 0.15643471 0.54289102 0.24148513

0.11635674 0.29055649 0.44117233 0.47669296 0.26774235 0.60374364

0.40441274 0.08067268 0.90484458 0.89707151 0.20595592 0.13389333

0.34895775 0.37858212 0.09698867 0.7818521 0.66782387 0.11908795

0.34130119 0.3491742 0.64978574 0.77378866 0.44682751 0.75326235

0.20565608 0.69767369 0.21349979 1. 0.8907642 0.39166499

0.42667244 0.26860229 0.5794031 0.94030454 0.25792824 0.0334543

0.86347178 0.63318981 0.95112332 0.88840583 0.46578984 0.36584355

1. 0.52774279 0.76928518 0.65406938 0.61691649 0.19039518

0.32406654 0.65518688 0.36382046 0.79852628 0.69802203 1.

0.37160902 0.07189909 0.88138421 0.27616315 0.45118785 0.44202406

0.40664286 0.9148397 0.62763492 0.88444712 0.00222058 0.3869579

0.25425026 0.57056403] 11048.363412458868

New best for swarm at iteration 12: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 12: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 13: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Iteration 15: Best MSE = 11215.115517

Best after iteration 14: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 15: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 16: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 17: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 18: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Iteration 20: Best MSE = 11194.929498

Best after iteration 19: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 20: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 21: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 22: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 23: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Iteration 25: Best MSE = 11216.536742

Best after iteration 24: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 25: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 26: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 27: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 28: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Iteration 30: Best MSE = 11157.867578

Best after iteration 29: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 30: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 31: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 32: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 33: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Iteration 35: Best MSE = 11157.867578

Best after iteration 34: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 35: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 36: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 37: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 38: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Iteration 40: Best MSE = 11129.595518

Best after iteration 39: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

3.50865267e-01 3.78695234e-01 1.04227503e-01 7.94288697e-01

6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

2.26620247e-01 6.93432655e-01 2.36063065e-01 9.93846166e-01

8.79897572e-01 3.89178535e-01 4.59246193e-01 2.37582116e-01

5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Best after iteration 40: [9.26666792e-01 3.53417720e-01 9.44378242e-01 6.25590159e-01

7.77024759e-01 8.16856756e-01 9.63472058e-01 8.57972869e-01

4.19933423e-01 6.26113142e-01 6.47448854e-01 4.13941562e-01

9.10163175e-01 8.82867346e-01 7.24820222e-01 9.27419155e-01

7.48639278e-01 2.95531698e-01 3.00145051e-01 8.10880375e-01

3.14733796e-01 5.35515680e-01 4.00593650e-01 6.92912543e-01

9.51395404e-01 3.28249587e-01 2.87682728e-01 4.70251179e-01

3.64425812e-01 2.47197401e-01 4.89014266e-01 6.26566380e-01

4.76175766e-01 2.46941830e-01 4.96638745e-01 9.03663346e-02

5.45081145e-01 2.64989375e-01 2.86088562e-01 7.05333751e-01

5.03769050e-03 5.75428632e-02 8.01495063e-01 9.08429692e-01

5.05188921e-01 1.74130869e-01 2.10001140e-01 5.45263020e-01

1.45007974e-01 2.10321928e-01 3.44320218e-01 8.05201597e-01

8.02410253e-01 4.28585676e-01 3.87535213e-01 4.75770314e-01

3.12119310e-01 9.55645502e-01 3.68065780e-01 7.01694242e-01

2.96953635e-01 7.11709047e-01 3.91892123e-02 6.84012528e-01

2.88523014e-01 4.10104669e-01 6.91527693e-01 6.61354880e-01

5.35664011e-01 7.23338877e-01 9.01835110e-01 5.58281534e-01

3.22741981e-02 7.27454374e-01 6.56384950e-02 9.26250854e-01

7.80744424e-01 2.35666981e-01 1.00000000e+00 5.77075292e-02

3.46062444e-01 4.74325059e-01 9.33905255e-01 9.99423597e-01

6.10844065e-01 7.22204885e-01 1.00000000e+00 5.62177414e-01

6.65896119e-01 3.99307603e-01 6.10557975e-01 4.41203895e-01

7.37905039e-01 6.83548934e-01 8.81572393e-01 3.14814532e-01

3.15625501e-01 3.20250818e-01 8.89839810e-01 7.40220682e-01

3.50407618e-01 2.88142127e-01 6.18382359e-01 2.38722613e-01

1.00439808e-01 1.64959530e-01 5.42046387e-01 2.45461999e-01

1.18209306e-01 2.85542345e-01 4.66395261e-01 4.56158914e-01

2.54561826e-01 6.03673956e-01 4.04737794e-01 7.31928596e-02

9.05940632e-01 9.18860545e-01 2.07713730e-01 1.58144703e-01

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6.60581211e-01 1.20951407e-01 2.89678846e-01 3.49365813e-01

6.45803666e-01 7.65855396e-01 4.47688580e-01 7.56468903e-01

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5.92941317e-01 9.59232791e-01 2.44777625e-01 2.29741490e-02

8.69043714e-01 6.34193621e-01 9.54981136e-01 9.03512081e-01

4.53902302e-01 3.65022423e-01 1.00000000e+00 5.49219363e-01

7.73087664e-01 6.49321574e-01 6.11018320e-01 1.96824683e-01

3.26898655e-01 6.29327058e-01 3.62820762e-01 8.11493659e-01

6.96344305e-01 1.00000000e+00 3.47037060e-01 6.54565534e-02

8.91787746e-01 2.83249219e-01 4.19388683e-01 4.42266834e-01

4.06446114e-01 9.24539468e-01 7.10478297e-01 8.85060789e-01

6.22622635e-04 3.81878558e-01 2.46441093e-01 6.03385445e-01] 11022.286470237383

Stopping search: maximum iterations reached --> 40

==================================================

=== OPTIMIZATION RESULTS ===

==================================================

▶ Best MSE achieved: 11022.286470

▶ Time elapsed: 1044.90 seconds

▶ Features selected: 87/176 (50.6% reduction)

▶ Selected features (with weights):

1. District (weight: 0.927)

2. m² (Gross) (weight: 0.944)

3. m² (Net) (weight: 0.626)

4. Number of rooms (weight: 0.777)

5. Building Age (weight: 0.817)

6. Floor location (weight: 0.963)

7. Number of floors (weight: 0.858)

8. Number of bathrooms (weight: 0.626)

9. Balcony (weight: 0.647)

10. Using status (weight: 0.910)

11. Available for Loan (weight: 0.883)

12. From who (weight: 0.725)

13. Swap (weight: 0.927)

14. Front West (weight: 0.749)

15. Front North (weight: 0.811)

16. Wood Joinery (weight: 0.536)

17. Alarm (Thief) (weight: 0.693)

18. Alarm (Fire) (weight: 0.951)

19. Balcony.1 (weight: 0.627)

20. Refrigerator (weight: 0.545)

21. Parents' Bathroom (weight: 0.705)

22. Dressing room (weight: 0.801)

23. Closet (weight: 0.908)

24. Video intercom (weight: 0.505)

25. Insulating glass (weight: 0.545)

26. Air conditioning (weight: 0.805)

27. Tub (weight: 0.802)

28. Kitchen (Laminate) (weight: 0.956)

29. PVC Joinery (weight: 0.702)

30. Parquet Floor (weight: 0.712)

31. Set Top Cooker (weight: 0.684)

32. Thermosiphon (weight: 0.692)

33. Cloakroom (weight: 0.661)

34. Wi-Fi (weight: 0.536)

35. Face Recognition & Fingerprint (weight: 0.723)

36. Washing Machine (weight: 0.902)

37. Washing machine (weight: 0.558)

38. Steel door (weight: 0.727)

39. Fireplace (weight: 0.926)

40. Elevator.1 (weight: 0.781)

41. Security (weight: 1.000)

42. Generator (weight: 0.934)

43. Cable TV (weight: 0.999)

44. Closed Garage (weight: 0.611)

45. Doorman (weight: 0.722)

46. Nursery (weight: 1.000)

47. With Private Pool (weight: 0.562)

48. Car park (weight: 0.666)

49. Sauna (weight: 0.611)

50. Siding (weight: 0.738)

51. Sports Area (weight: 0.684)

52. Water tank (weight: 0.882)

53. Swimming Pool (Open) (weight: 0.890)

54. Swimming Pool (Indoor) (weight: 0.740)

55. Bathroom (weight: 0.618)

56. Kitchen (weight: 0.542)

57. The mall (weight: 0.604)

58. Cemevi (weight: 0.906)

59. Next to sea shore (weight: 0.919)

60. The church (weight: 0.794)

61. High school (weight: 0.661)

62. The health clinic (weight: 0.646)

63. District Market (weight: 0.766)

64. Unirsity (weight: 0.756)

65. Fire Department (weight: 0.693)

66. Highway (weight: 0.994)

67. Eurasia Tunnel (weight: 0.880)

68. Filled (weight: 0.593)

69. E-5 (weight: 0.959)

70. Metro (weight: 0.869)

71. Metrobus (weight: 0.634)

72. Minibus (weight: 0.955)

73. Bus stop (weight: 0.904)

74. Cable car (weight: 1.000)

75. Tram (weight: 0.549)

76. Railway station (weight: 0.773)

77. Trolley bus (weight: 0.649)

78. Scaffolding (weight: 0.611)

79. Nature (weight: 0.629)

80. Pool (weight: 0.811)

81. Park & ​​Green Area (weight: 0.696)

82. City (weight: 1.000)

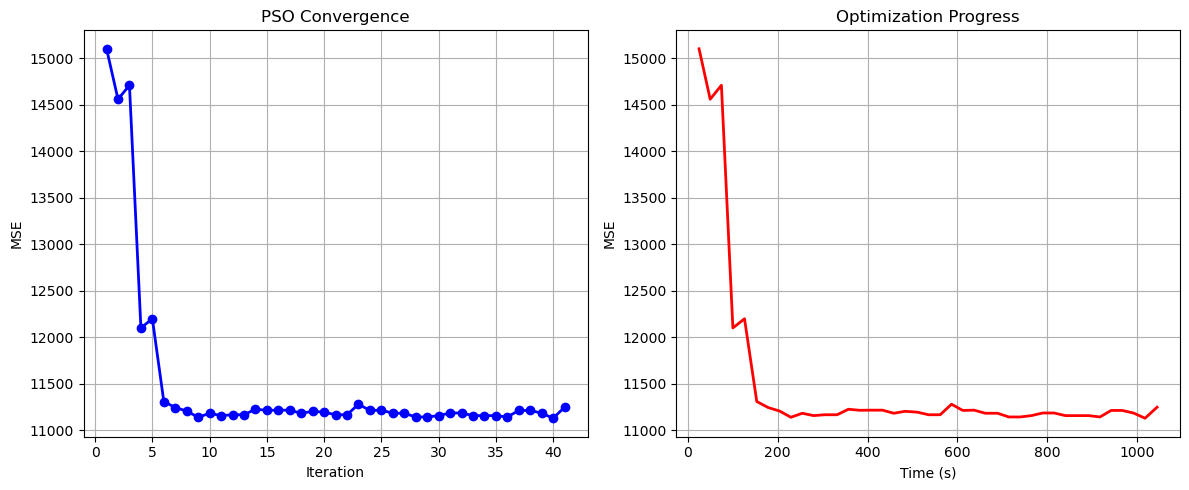
83. Garden Duplex (weight: 0.892)

84. Entrance floor (weight: 0.925)

85. Floor Duplex (weight: 0.710)

86. Private Entry (weight: 0.885)

87. Roof Duplex (weight: 0.603)



Particle Swarm Optimization completed successfully with MSE: 11022.2865

==================================================

Running Whale Optimization...

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==================================================

=== WHALE OPTIMIZATION ALGORITHM ===

==================================================

[Initialization]

- Population: 60 whales

- Max iterations: 40

- Spiral coefficient (b): 1.0

- Search space: 176 features

- Target: Minimize MSE using XGBoost

[Optimization Progress]

Iter 40/40 | Best MSE: 11063.349108

==================================================

=== OPTIMIZATION RESULTS ===

==================================================

▶ Best MSE achieved: 11063.349108

▶ Time elapsed: 1408.20 seconds

▶ Features selected: 173/176 (1.7% reduction)

▶ Selected features:

1. District

2. Neighborhood

3. m² (Gross)

4. m² (Net)

5. Number of rooms

6. Building Age

7. Floor location

8. Number of floors

9. Heating

10. Number of bathrooms

11. Balcony

12. Furnished

13. Using status

14. Available for Loan

15. From who

16. Swap

17. Front West

18. Front East

19. Front South

20. Front North

21. ADSL

22. Wood Joinery

23. Smart House

24. Alarm (Thief)

25. Alarm (Fire)

26. Alaturka Toilet

27. Aluminum joinery

28. American Door

29. American kitchen

30. Built-in on

31. Elevator

32. Balcony.1

33. Barbecue

34. Household appliances

35. Painted

36. Dishwasher

37. Refrigerator

38. Wall paper

39. Shower

40. Parents' Bathroom

41. Fiber Internet

42. On

43. Dressing room

44. Closet

45. Video intercom

46. Hilton Bathroom

47. Intercom System

48. Insulating glass

49. Jacuzzi

50. Plasterboard

51. Cellar

52. Air conditioning

53. Tub

54. Laminate Floor

55. Marley

56. Furniture

57. Kitchen (Built-in)

58. Kitchen (Laminate)

59. Kitchen Natural Gas

60. PVC Joinery

61. Blinds

62. Parquet Floor

63. Ceramic Floor

64. Set Top Cooker

65. Spot Lighting

66. Terrace

67. Thermosiphon

68. Cloakroom

69. Wi-Fi

70. Face Recognition & Fingerprint

71. Washing Machine

72. Washing machine

73. Laundry room

74. Steel door

75. Water heater

76. Fireplace

77. Elevator.1

78. Steam room

79. Security

80. Bath

81. Booster

82. Thermal Insulation

83. Generator

84. Cable TV

85. Closed Garage

86. Doorman

87. Nursery

88. With Private Pool

89. Car park

90. Playground

91. Sauna

92. Sound insulation

93. Siding

94. Water tank

95. Tennis court

96. Satellite

97. Fire escape

98. Swimming Pool (Indoor)

99. Parking Lot

100. Elevator.2

101. Bathroom

102. Wide Corridor

103. Entrance / Ramp

104. Stairs

105. Kitchen

106. Room door

107. Park

108. Socket / Electric Switch

109. Handle / Railing

110. Toilet

111. Swimming pool

112. The mall

113. municipality

114. Mosque

115. Cemevi

116. Next to sea shore

117. Pharmacy

118. Amusement center

119. Fair

120. Hospital

121. Synagogue

122. The church

123. High school

124. Market

125. Park.1

126. Police station

127. The health clinic

128. District Market

129. Gym

130. Unirsity

131. Primary School-Secondary School

132. Fire Department

133. Town center

134. Highway

135. Eurasia Tunnel

136. Bosphorus Bridges

137. Street

138. Sea bus

139. E-5

140. Airport

141. Marmaray

142. Metro

143. Metrobus

144. Minibus

145. Bus stop

146. Coast

147. TEM

148. Cable car

149. Tram

150. Railway station

151. Trolley bus

152. Scaffolding

153. Throat

154. Sea

155. Nature

156. Lake

157. Pool

158. Park & ​​Green Area

159. City

160. Mezzanine

161. Mezzanine Duplex

162. Garden Duplex

163. Garden Floor

164. Garden

165. Top floor

166. Garage / Shop Top

167. Entrance floor

168. Floor Duplex

169. Private Entry

170. Rerse Duplex

171. Triplex

172. Ground floor

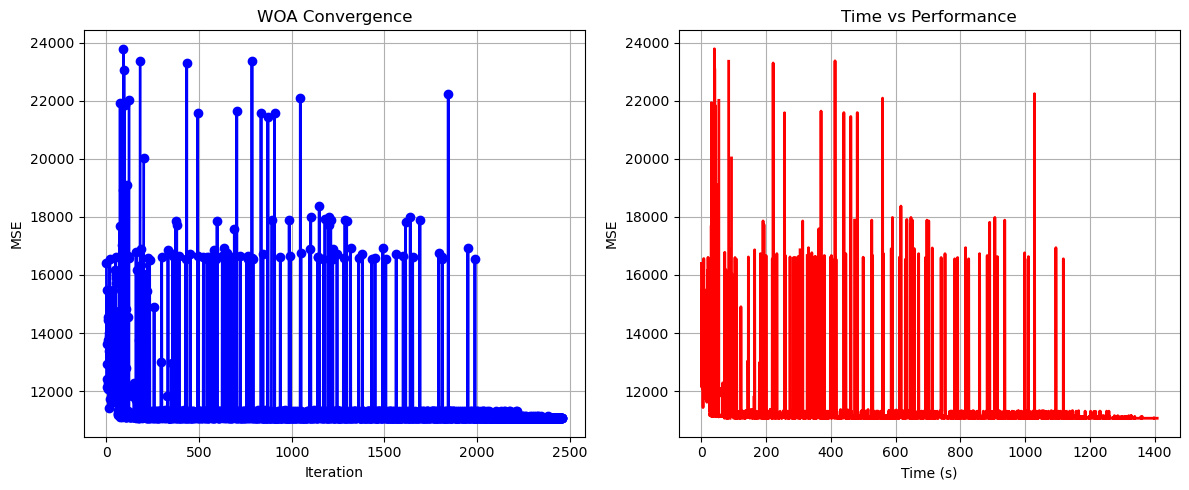
173. Roof Duplex

▶ Convergence progress:

- Initial MSE: 16397.7041

- Final MSE: 11063.3491

- Improvement: 32.5%



Whale Optimization completed successfully with MSE: 11063.3491

==================================================

Running Squid Game Optimizer...

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=== SQUID GAME OPTIMIZER (SGO) ===

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[Initialization]

- Players: 60 (30 offensive, 30 defensive)

- Max games: 40

- Search space: 176 features

- Target: Minimize MSE using XGBoost

==================================================

=== OPTIMIZATION RESULTS ===

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▶ Best MSE achieved: 10939.258387

▶ Time elapsed: 923.80 seconds

▶ Features selected: 71/176 (59.7% reduction)

▶ Selected features:

1. District

2. Neighborhood

3. m² (Gross)

4. Number of rooms

5. Building Age

6. Floor location

7. Number of floors

8. Heating

9. Number of bathrooms

10. Balcony

11. Using status

12. Available for Loan

13. Front North

14. Wood Joinery

15. Smart House

16. Alaturka Toilet

17. American Door

18. Built-in on

19. Elevator

20. Refrigerator

21. Wall paper

22. Fiber Internet

23. On

24. Intercom System

25. Insulating glass

26. Tub

27. Laminate Floor

28. Marley

29. Furniture

30. Kitchen (Laminate)

31. Ceramic Floor

32. Set Top Cooker

33. Thermosiphon

34. Face Recognition & Fingerprint

35. Fireplace

36. Security

37. Generator

38. Cable TV

39. Closed Garage

40. With Private Pool

41. Car park

42. Playground

43. Tennis court

44. Swimming Pool (Indoor)

45. Elevator.2

46. Toilet

47. Swimming pool

48. The mall

49. Next to sea shore

50. Pharmacy

51. Amusement center

52. Fair

53. The health clinic

54. District Market

55. Gym

56. Unirsity

57. Primary School-Secondary School

58. Town center

59. Eurasia Tunnel

60. Bosphorus Bridges

61. Street

62. E-5

63. Marmaray

64. Railway station

65. Trolley bus

66. Throat

67. Nature

68. Garden Duplex

69. Top floor

70. Rerse Duplex

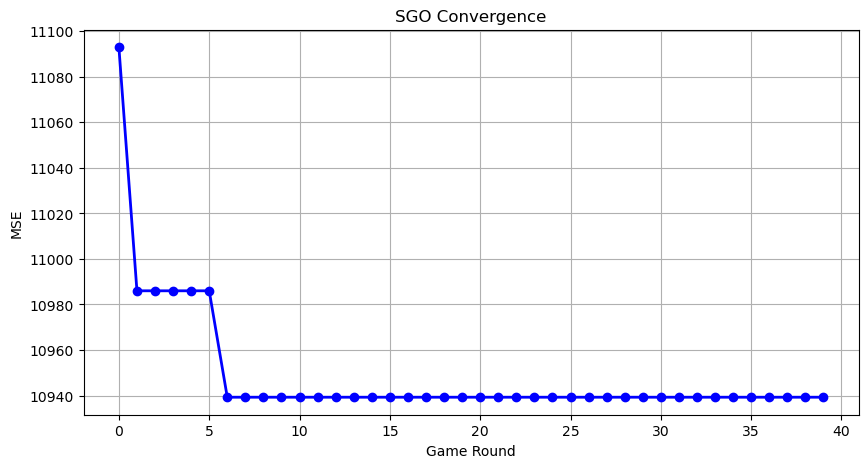
71. Ground floor

▶ Convergence progress:

- Initial MSE: 11093.0200

- Final MSE: 10939.2584

- Improvement: 1.4%



Squid Game Optimizer completed successfully with MSE: 10939.2584

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Running PSH-Hyptrite...

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=== PSH-HYPTRITE OPTIMIZATION ===

==================================================

[Initialization]

- Search points: 60

- Max iterations: 40

- Initial radius: 0.5 (adaptive)

- Hypersphere samples: 3 per point

- Search space: 176 features

- Target: Minimize MSE using XGBoost

[Optimization Progress]

Iter 40/40 | Best MSE: 11050.233424 | Radius: 0.0125

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=== OPTIMIZATION RESULTS ===

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▶ Best MSE achieved: 11050.233424

▶ Time elapsed: 3111.95 seconds

▶ Features selected: 93/176 (47.2% reduction)

▶ Selected features (with weights):

1. District (weight: 0.629)

2. Neighborhood (weight: 0.658)

3. m² (Gross) (weight: 0.992)

4. m² (Net) (weight: 0.902)

5. Number of rooms (weight: 0.621)

6. Building Age (weight: 0.853)

7. Floor location (weight: 0.529)

8. Number of floors (weight: 0.808)

9. Heating (weight: 0.599)

10. Number of bathrooms (weight: 0.649)

11. Using status (weight: 0.797)

12. Front West (weight: 0.879)

13. Front East (weight: 0.598)

14. Front North (weight: 1.000)

15. Wood Joinery (weight: 0.618)

16. Smart House (weight: 0.890)

17. Alarm (Fire) (weight: 0.850)

18. Aluminum joinery (weight: 0.658)

19. American Door (weight: 0.551)

20. Built-in on (weight: 0.857)

21. Barbecue (weight: 0.606)

22. Dishwasher (weight: 0.523)

23. Wall paper (weight: 0.699)

24. Shower (weight: 0.917)

25. Fiber Internet (weight: 0.741)

26. On (weight: 0.796)

27. Video intercom (weight: 0.802)

28. Intercom System (weight: 0.729)

29. Jacuzzi (weight: 0.936)

30. Cellar (weight: 0.657)

31. Air conditioning (weight: 0.734)

32. Tub (weight: 1.000)

33. Marley (weight: 0.906)

34. Kitchen (Built-in) (weight: 0.568)

35. Kitchen Natural Gas (weight: 0.901)

36. Blinds (weight: 0.793)

37. Ceramic Floor (weight: 0.739)

38. Set Top Cooker (weight: 0.605)

39. Cloakroom (weight: 0.745)

40. Wi-Fi (weight: 0.794)

41. Face Recognition & Fingerprint (weight: 0.755)

42. Laundry room (weight: 0.528)

43. Steel door (weight: 0.932)

44. Water heater (weight: 0.991)

45. Elevator.1 (weight: 0.590)

46. Steam room (weight: 0.945)

47. Security (weight: 0.544)

48. Booster (weight: 0.747)

49. Thermal Insulation (weight: 0.698)

50. Cable TV (weight: 1.000)

51. Doorman (weight: 0.684)

52. With Private Pool (weight: 0.504)

53. Siding (weight: 0.683)

54. Sports Area (weight: 0.886)

55. Water tank (weight: 0.787)

56. Satellite (weight: 0.893)

57. Entrance / Ramp (weight: 0.731)

58. Kitchen (weight: 0.627)

59. Toilet (weight: 0.998)

60. municipality (weight: 0.734)

61. Fair (weight: 0.771)

62. Synagogue (weight: 0.906)

63. The church (weight: 0.716)

64. Market (weight: 0.980)

65. Park.1 (weight: 0.608)

66. Police station (weight: 0.578)

67. The health clinic (weight: 0.944)

68. District Market (weight: 0.615)

69. Gym (weight: 0.667)

70. Unirsity (weight: 0.945)

71. Primary School-Secondary School (weight: 0.645)

72. Fire Department (weight: 1.000)

73. Eurasia Tunnel (weight: 0.862)

74. Street (weight: 0.970)

75. Filled (weight: 0.815)

76. E-5 (weight: 0.542)

77. Airport (weight: 0.852)

78. Marmaray (weight: 0.569)

79. Metro (weight: 0.763)

80. Scaffolding (weight: 0.990)

81. Sea (weight: 0.754)

82. Lake (weight: 0.562)

83. Pool (weight: 0.949)

84. City (weight: 0.554)

85. Mezzanine (weight: 0.595)

86. Mezzanine Duplex (weight: 0.655)

87. Garden Duplex (weight: 0.888)

88. Garden (weight: 0.703)

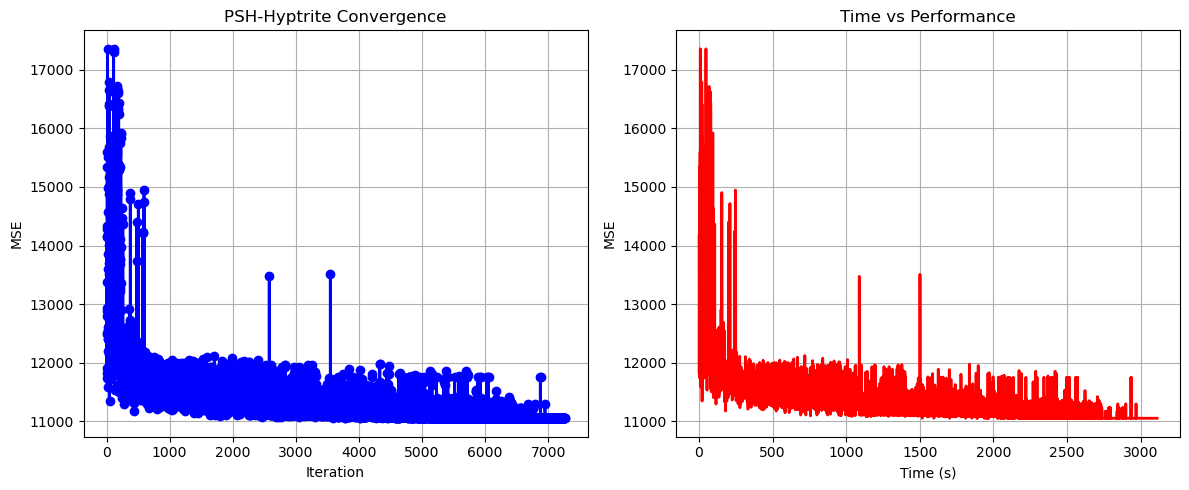
89. Top floor (weight: 0.715)

90. Garage / Shop Top (weight: 0.654)

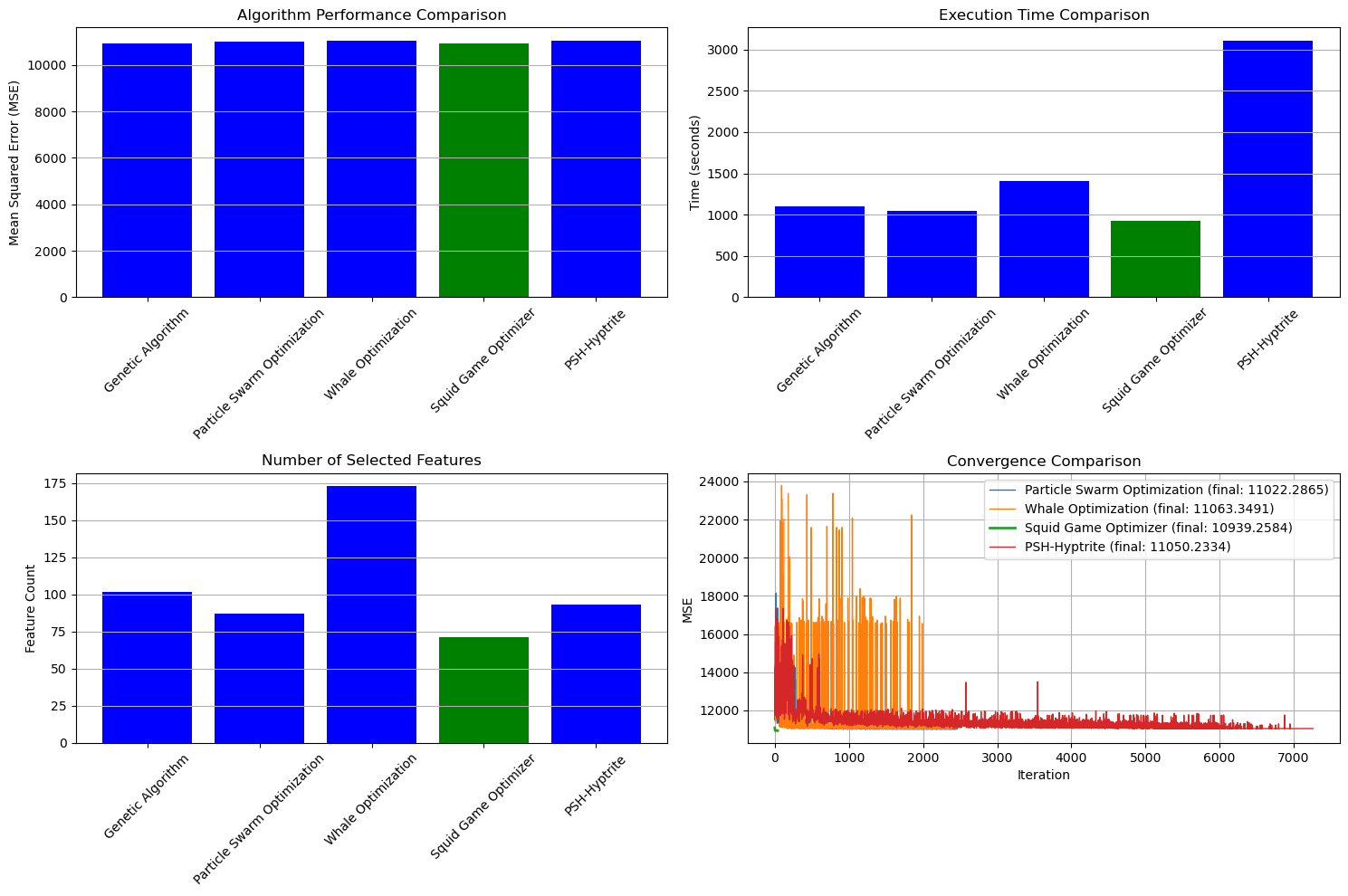
91. Floor Duplex (weight: 0.741)

92. Triplex (weight: 0.502)

93. Roof Duplex (weight: 1.000)



PSH-Hyptrite completed successfully with MSE: 11050.2334



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FINAL RESULTS SUMMARY

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🏆 Best Algorithm: Squid Game Optimizer

📉 Best MSE Achieved: 10939.258387

⏱️ Execution Time: 923.80 seconds

🔢 Features Selected: 71

Selected Features:

1. District

2. Neighborhood

3. m² (Gross)

4. Number of rooms

5. Building Age

6. Floor location

7. Number of floors

8. Heating

9. Number of bathrooms

10. Balcony

11. Using status

12. Available for Loan

13. Front North

14. Wood Joinery

15. Smart House

16. Alaturka Toilet

17. American Door

18. Built-in on

19. Elevator

20. Refrigerator

21. Wall paper

22. Fiber Internet

23. On

24. Intercom System

25. Insulating glass

26. Tub

27. Laminate Floor

28. Marley

29. Furniture

30. Kitchen (Laminate)

31. Ceramic Floor

32. Set Top Cooker

33. Thermosiphon

34. Face Recognition & Fingerprint

35. Fireplace

36. Security

37. Generator

38. Cable TV

39. Closed Garage

40. With Private Pool

41. Car park

42. Playground

43. Tennis court

44. Swimming Pool (Indoor)

45. Elevator.2

46. Toilet

47. Swimming pool

48. The mall

49. Next to sea shore

50. Pharmacy

51. Amusement center

52. Fair

53. The health clinic

54. District Market

55. Gym

56. Unirsity

57. Primary School-Secondary School

58. Town center

59. Eurasia Tunnel

60. Bosphorus Bridges

61. Street

62. E-5

63. Marmaray

64. Railway station

65. Trolley bus

66. Throat

67. Nature

68. Garden Duplex

69. Top floor

70. Rerse Duplex

71. Ground floor

[ ]:

[ ]: