**Experiment 1**

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| Parameters of SCFSs (before learning) | | | | | | | | | | |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 1 | -25.99 | 21.777 | 1 | 1 |  | 3 | -47.75 | 40.039 | 1 | 1 |
| 2 | 1.5699 | 40.039 | 1 | 1 |  | 4 | 3.050 | 40.039 | 1 | 1 |
|  |  |  |  |  |  | 5 | 51.379 | 40.039 | 1 | 1 |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 6 | -40.160 | 39.1138 | 1 | 1 |  | 9 | -40.160 | 39.228 | 1 | 1 |
| 7 | 2.01 | 39.1138 | 1 | 1 |  | 10 | 1.6399 | 39.228 | 1 | 1 |
| 8 | 42.31 | 39.1138 | 1 | 1 |  | 11 | 42.309 | 39.228 | 1 | 1 |

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| Parameters of SCFSs (after learning) | | | | | | | | | | |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 1 | -27.151 | 21.711 | -1.0082 | 0.5755 |  | 3 | -45.574 | 41.602 | -0.3457 | 1.7550 |
| 2 | 1.1673 | 21.548 | -1.3106 | -3.1046 |  | 4 | 3.2500 | 37.667 | 1.0173 | 0.7493 |
|  |  |  |  |  |  | 5 | 51.786 | 40.031 | -0.5824 | -2.037 |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 6 | -38.440 | 38.789 | -2.3179 | 0.1760 |  | 9 | -40.163 | 40.763 | 0.7976 | 1.5269 |
| 7 | 1.7938 | 39.257 | 0.3551 | -0.2104 |  | 10 | 2.1836 | 38.994 | 1.4226 | 1.5971 |
| 8 | 42.098 | 37.922 | -0.0926 | -0.5539 |  | 11 | 40.265 | 39.991 | -1.7041 | 0.7270 |

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| Layer 1 of aim object | | | | | | |
|  | Center | Spread |  |  |  |  |
| Aim object 1 | -37.27+28.05i | 38.591+38.592i | 0.6972+0.0057i | 0.6065-0.0048i | 1 | 1 |
| Aim object 2 | 21.70-32.79i | 38.591+38.592i | 0.7764-0.0048i | 0.6065-0.0048i | 1 | 1 |
| Aim object 3 | -26.52-37.34i | 38.591+38.592i | 0.7339+0.0044i | 0.6065-0.0048i | 1 | 1 |
| Aim object 4 | -1.49+4.845i | 38.591+38.592i | 0.9920-0.0002i | 0.6065-0.0048i | 1 | 1 |
| Aim object 5 | 26.28+16.211i | 38.591+38.592i | 0.8263-0.0065i | 0.6065-0.0048i | 1 | 1 |
|  | | | | | | |
| Layer 2 of aim object | | | | | | |
|  | Center | Spread |  |  |  |  |
| Aim object 1 | -26.13-38.16i | 38.647+38.676i | 0.7286+0.0043i | 0.6065-0.0048i | 1 | 1 |
| Aim object 2 | 0.4115-0.899i | 38.647+38.676i | 0.9989-0.008i | 0.6065-0.0048i | 1 | 1 |
| Aim object 3 | 29.227-33.53i | 38.647+38.676i | 0.7201-0.0054i | 0.6065-0.0048i | 1 | 1 |
| Aim object 4 | -36.59+27.28i | 38.647+38.676i | 0.7083+0.0058i | 0.6065-0.0048i | 1 | 1 |
| Aim object 5 | 20.98+20.083i | 38.647+38.676i | 0.8442-0.0055i | 0.6065-0.0048i | 1 | 1 |

Parameters of T-S neurons

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|  |  |  | | | | |
| T-S Neuron |  |  |  |  |  |  |
| 1 |  | 2.0395-5.3848i |  | -9.0524-6.9952i |  | 3.4494+1.9258i |
| 2 |  | -3.5206-0.0015i |  | 8.5471+5.5198i |  | -3.0014-1.7148i |
| 3 |  | -2.0707+6.6265i |  | 12.4189+10.2503i |  | -4.4710-2.6868i |
| 4 |  | 1.7830-0.6709i |  | 3.9317+2.6260i |  | -1.3753-0.7992i |
| 5 |  | 5.0225-0.7601i |  | -15.5348-11.1898i |  | 5.2557+3.1568i |
|  |  |  |  |  |  |  |
| T-S Neuron |  |  |  |  |  |  |
| 1 |  | 0.5879+1.3965i |  | 0.6470+0.7692i |  |  |
| 2 |  | -0.5434-1.3130i |  | -0.6755-0.3356i |  |  |
| 3 |  | -0.9983-1.7559i |  | -1.0738-1.1109i |  |  |
| 4 |  | -0.2941-0.4743i |  | -0.3305-0.1391i |  |  |
| 5 |  | 1.2557+2.0699i |  | 1.4454+0.8270i |  |  |

**Experiment 2**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameters of SCFSs (before learning) | | | | | | | | | | |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 1 | -20.819 | 22.142 | 1 | 1 |  | 4 | -96.529 | 99.423 | 1 | 1 |
| 2 | 1 | 22.142 | 1 | 1 |  | 5 | 11.1309 | 99.423 | 1 | 1 |
| 3 | 22.279 | 22.142 |  |  |  | 6 | 116.030 | 99.423 | 1 | 1 |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 7 | -80.859 | 69.730 | 1 | 1 |  | 10 | -89.990 | 97.463 | 1 | 1 |
| 8 | -6.0903 | 69.730 | 1 | 1 |  | 11 | 16.450 | 97.463 | 1 | 1 |
| 9 | 67.699 | 69.730 | 1 | 1 |  | 12 | 122.13 | 97.463 | 1 | 1 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameters of SCFSs (after learning) | | | | | | | | | | |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 1 | -20.626 | 22.568 | -0.1138 | 0.3965 |  | 4 | -96.1416 | 98.9318 | 0.0902 | 1.0506 |
| 2 | 1.2632 | 22.94 | 0.0642 | -0.8716 |  | 5 | 10.8511 | 99.923 | -0.0104 | -0.1816 |
| 3 | 22.7004 | 21.3508 | -0.0995 | 0.7696 |  | 6 | 115.731 | 99.3424 | 1.0059 | -0.6140 |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 7 | -81.1150 | 69.3406 | 0.8026 | 0.4675 |  | 10 | -90.8603 | 97.7838 | 0.9130 | -1.3557 |
| 8 | -6.1430 | 70.3889 | -0.0856 | -0.1363 |  | 11 | 16.6769 | 97.8581 | 0.2443 | -0.2021 |
| 9 | 67.4906 | 68.9186 | 0.5641 | 1.4733 |  | 12 | 122.312 | 97.5916 | 0.3746 | 0.2995 |

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| --- | --- | --- | --- | --- | --- | --- |
| Layer 1 of aim object | | | | | | |
|  | Center | Spread |  |  |  |  |
| Aim object1 | 2.289+75.728i | 70.372+70.461i | 0.7758+0.0002i | 0.6065-0.0026i | 1 | 1 |
| Aim object2 | -80.73-13.92i | 70.372+70.461i | 0.6782+0.0004i | 0.6065-0.0026i | 1 | 1 |
| Aim object3 | -5.273-55.72i | 70.372+70.461i | 0.8269+0.0007i | 0.6065-0.0026i | 1 | 1 |
| Aim object4 | 86.932-3.753i | 70.372+70.461i | 0.7102-0.0042i | 0.6065-0.0026i | 1 | 1 |
|  | | | | | | |
| Layer 2 of aim object | | | | | | |
|  | Center | Spread |  |  |  |  |
| Aim object1 | -78.32-11.75i | 70.215+70.273i | 0.6965+0.0041i | 0.6065-0.0026i | 1 | 1 |
| Aim object2 | -6.222-57.27i | 70.215+70.273i | 0.8154+0.0007i | 0.6065-0.0026i | 1 | 1 |
| Aim object3 | 86.556-2.759i | 70.215+70.273i | 0.7082-0.0042i | 0.6065-0.0026i | 1 | 1 |
| Aim object4 | 4.007+76.399i | 70.215+70.273i | 0.7739+0.0000i | 0.6065-0.0026i | 1 | 1 |

Parameters of T-S neurons

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|  |  |  | | | | |
| T-S Neuron |  |  |  |  |  |  |
| 1 |  | -8.8933+21.1748i |  | -0.0473+0.2050i |  | 0.3066-0.0760i |
| 2 |  | 4.2767-8.3033i |  | 0.1038-0.9027i |  | -0.2468-0.1253i |
| 3 |  | 3.1950-20.3874i |  | 0.1497-0.3524i |  | -0.2981+0.0188i |
| 4 |  | 1.6511+6.5044i |  | -0.1976+1.0459i |  | 0.2140+0.1651i |
|  |  |  |  |  |  |  |
| T-S Neuron |  |  |  |  |  |  |
| 1 |  | -0.3046+0.2505i |  | -0.1724+0.1874i |  |  |
| 2 |  | 0.4220-0.1299i |  | 0.2739-0.2687i |  |  |
| 3 |  | 0.2616-0.2598i |  | 0.1805-0.1850i |  |  |
| 4 |  | -0.3583+0.1379i |  | -0.2853+0.2742i |  |  |

**Experiment 3**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameters of SCFSs (before learning) | | | | | | | | | | |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 1 | -0.46 | 0.3916 | 1 | 1 |  | 4 | -0.45 | 0.4142 | 1 | 1 |
| 2 | -0.01 | 0.3916 | 1 | 1 |  | 5 | -0.01 | 0.4142 | 1 | 1 |
| 3 | 0.48 | 0.3916 | 1 | 1 |  | 6 | 0.48 | 0.4142 | 1 | 1 |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 7 | -0.46 | 0.5035 | 1 | 1 |  | 10 | -0.0593 | 0.0443 | 1 | 1 |
| 8 | 0.04 | 0.5035 | 1 | 1 |  | 11 | 0.0021 | 0.0443 | 1 | 1 |
| 9 | 0.54 | 0.5035 | 1 | 1 |  | 12 | 0.0629 | 0.0443 | 1 | 1 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameters of SCFSs (after learning) | | | | | | | | | | |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 1 | 2.9765 | -1.6301 | 1.5834 | -0.8511 |  | 4 | -5.0333 | 2.7562 | -0.3635 | -2.5482 |
| 2 | 0.5026 | 3.6794 | -0.1864 | -1.1734 |  | 5 | -1.1824 | -1.4152 | 1.1703 | 1.8076 |
| 3 | 3.2602 | -0.0211 | -1.0801 | -0.2908 |  | 6 | -1.3783 | 2.6042 | 1.0701 | 2.5702 |
|  |  | | | |  |  |  | | | |
| SCFS |  |  |  |  |  | SCFS |  |  |  |  |
| 7 | -2.7036 | -2.1496 | 2.0245 | 0.3151 |  | 10 | -0.4478 | -1.9361 | -0.4434 | 3.7227 |
| 8 | -0.3512 | 3.4851 | 0.6020 | 3.0911 |  | 11 | 2.8636 | -1.5492 | 2.0883 | 1.1534 |
| 9 | 2.7400 | -0.0110 | -2.8719 | 4.5186 |  | 12 | 1.1314 | 2.1011 | 2.7887 | 0.0471 |

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| --- | --- | --- | --- | --- | --- | --- |
| Layer 1 of aim object | | | | | | |
|  | Center | Spread |  |  |  |  |
| Aim object1 | 0.651+0.5845i | 1.0626+1.0616i | 0.8177-0.2036i | 0.5819-0.1709i | 1 | 1 |
| Aim object2 | 0.262-0.8087i | 1.0626+1.0616i | 0.8486-0.0850i | 0.5819-0.1709i | 1 | 1 |
| Aim object3 | -0.825+0.384i | 1.0626+1.0616i | 0.7943+0.2490i | 0.5819-0.1709i | 1 | 1 |
|  | | | | | | |
| Layer 2 of aim object | | | | | | |
|  | Center | Spread |  |  |  |  |
| Aim object1 | 0.684+0.5377i | 1.0605+1.0585i | 0.8177-0.2157i | 0.5818-0.1714i | 1 | 1 |
| Aim object2 | -0.813+0.427i | 1.0605+1.0585i | 0.7924+0.2453i | 0.5818-0.1714i | 1 | 1 |
| Aim object3 | 0.220-0.8073i | 1.0605+1.0585i | 0.8511-0.0716i | 0.5818-0.1714i | 1 | 1 |

Parameters of T-S neurons

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|  |  |  | | | | |
| T-S Neuron |  |  |  |  |  |  |
| 1 |  | -0.0142+0.0132i |  | 0.0891-0.0185i |  | -0.0093-0.0139i |
| 2 |  | 0.0021+0.0049i |  | -0.0990+0.0119i |  | 0.0358-0.0296i |
| 3 |  | 0.0075-0.0202i |  | -0.0074+0.0190i |  | -0.0203+0.0236i |
|  |  |  |  |  |  |  |
| T-S Neuron |  |  |  |  |  |  |
| 1 |  | 0.0540+0.0109i |  | 0.0586+0.1004i |  |  |
| 2 |  | -0.0478+0.0813i |  | -0.0281-0.3783i |  |  |
| 3 |  | -0.0109-0.0789i |  | -0.0376+0.1452i |  |  |