**Table 1.** The best evaluation results of DJIA based on Fig 11

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Optimizer |  | MSE | MAE | MAPE | RSE | R2 |
| VFOSGD\_PF | 0.6 | 1.0240 | 0.6411 | 0.5000 | 3.8827 | 0.0149 |
| 0.8 | 0.9325 | 0.6064 | 0.4484 | 3.3029 | 0.1028 |
| 1.0 | 0.8526 | 0.5739 | 0.4052 | 2.8611 | 0.1797 |
| 1.2 | 0.5599 | 0.4479 | 0.2657 | 1.6767 | 0.4612 |
| 1.25 | 0.7187 | 0.5165 | 0.3367 | 2.2586 | 0.3085 |
| 1.28 | **0.5506** | **0.4384** | **0.2578** | **1.6398** | **0.4702** |
| IFOSGD\_PF | 0.6 | 0.9948 | 0.6342 | 0.4885 | 3.6706 | 0.0429 |
| 0.8 | 0.9922 | 0.6290 | 0.4814 | 3.6711 | 0.0454 |
| 1.0 | 0.9140 | 0.6008 | 0.4404 | 3.1893 | 0.1206 |
| 1.2 | 0.9402 | 0.6082 | 0.4513 | 3.3483 | 0.0954 |
| 1.4 | **0.8677** | **0.5787** | **0.4114** | **2.9433** | **0.1652** |
| 1.6 | 0.9053 | 0.5973 | 0.4356 | 3.1440 | 0.1290 |
| VFOAdam\_PF | 0.6 | 0.4340 | 0.3759 | 0.2291 | 1.2954 | 0.5824 |
| 0.8 | 0.3456 | 0.3607 | 0.2553 | 1.0183 | 0.6674 |
| 1.0 | 0.3126 | **0.3213** | 0.2756 | 0.9571 | 0.6992 |
| 1.2 | 0.3640 | 0.3412 | 0.5299 | 1.0988 | 0.6498 |
| 1.4 | 0.3524 | 0.3519 | **0.2094** | 1.0565 | 0.6609 |
| 1.6 | **0.3098** | 0.3234 | 0.2575 | **0.9521** | **0.7018** |
| 1.8 | 0.5780 | 0.4486 | 0.2764 | 1.7522 | 0.4439 |
| IFOAdam\_PF | 0.6 | 0.3037 | 0.3074 | **0.1700** | 0.9391 | 0.7077 |
| 0.8 | 0.2658 | 0.2944 | 0.1757 | 0.8376 | 0.7442 |
| 1.0 | 0.2250 | 0.2844 | 0.2102 | 0.7261 | 0.7834 |
| 1.2 | 0.2065 | 0.2845 | 0.4465 | 0.6816 | 0.8013 |
| 1.4 | **0.1370** | **0.2685** | 0.1866 | **0.4852** | **0.8681** |
| 1.6 | 0.2316 | 0.3105 | 0.2370 | 0.7463 | 0.7771 |

**Table 2** The best evaluation results of ETTh1 based on Fig 11

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Optimizer |  | MSE | MAE | MAPE | RSE | R2 |
| VFOSGD\_PF | 0.6 | 0.00583 | 0.05384 | 0.30580 | 0.19580 | 0.96396 |
| 0.8 | **0.00577** | **0.05344** | **0.22866** | **0.19465** | **0.96439** |
| 1.0 | 0.00584 | 0.05442 | 0.23568 | 0.19475 | 0.96391 |
| 1.2 | 0.00589 | 0.05483 | 0.24405 | 0.19831 | 0.96361 |
| IFOSGD\_PF | 0.6 | 0.00598 | 0.05469 | 0.20648 | 0.19772 | 0.96309 |
| 0.8 | 0.00596 | 0.05498 | 0.63351 | 0.19926 | 0.96319 |
| 1.0 | 0.00595 | 0.05485 | 0.26811 | 0.19836 | 0.96324 |
| 1.2 | 0.00583 | 0.05397 | 0.21886 | 0.19516 | 0.96397 |
| 1.4 | 0.00604 | 0.05565 | 0.20961 | 0.19888 | 0.96270 |
| 1.6 | **0.00572** | **0.05318** | **0.19378** | **0.19293** | **0.96464** |
| VFOAdam\_PF | 0.6 | 0.01086 | 0.08294 | 0.27169 | 0.28055 | 0.93292 |
| 0.8 | 0.00926 | 0.07336 | **0.25997** | 0.25633 | 0.94283 |
| 1.0 | 0.00938 | 0.07452 | 0.38476 | 0.25576 | 0.94205 |
| 1.2 | **0.00799** | **0.06570** | 0.32738 | **0.23912** | **0.95066** |
| 1.4 | 0.00997 | 0.07775 | 0.63181 | 0.25957 | 0.93842 |
| 1.6 | 0.00904 | 0.07256 | 0.37329 | 0.25080 | 0.94419 |
| 1.8 | 0.00969 | 0.07659 | 0.48250 | 0.26184 | 0.94019 |
| IFOAdam\_PF | 0.6 | 0.01027 | 0.07940 | 0.33771 | 0.27026 | 0.93658 |
| 0.8 | **0.00856** | **0.06907** | 0.35079 | 0.24829 | **0.94711** |
| 1.0 | 0.00880 | 0.07091 | **0.23681** | **0.24421** | 0.94564 |
| 1.2 | 0.00887 | 0.07127 | 0.27112 | 0.24835 | 0.94524 |
| 1.4 | 0.01115 | 0.08465 | 0.27547 | 0.28284 | 0.93117 |
| 1.6 | 0.01137 | 0.08406 | 0.32963 | 0.29298 | 0.92982 |

**Table 3.** The best evaluation results of DJIA based on Fig 12

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Optimizer |  | MSE | MAE | MAPE | RSE | R2 |
| VFOSGD\_PF | 0.6 | 0.00440 | 0.04380 | 0.03171 | 0.06483 | 0.99576 |
| 0.8 | 0.00392 | 0.04161 | 0.03033 | 0.06133 | 0.99622 |
| 1.0 | 0.00292 | 0.03593 | 0.02603 | 0.05299 | 0.99718 |
| 1.2 | **0.00192** | **0.03052** | **0.02481** | **0.04288** | **0.99814** |
| IFOSGD\_PF | 0.6 | 0.00545 | 0.04904 | 0.03570 | 0.07212 | 0.99475 |
| 0.8 | 0.00452 | 0.04443 | 0.03207 | 0.06573 | 0.99564 |
| 1.0 | 0.00429 | 0.04335 | 0.03143 | 0.06407 | 0.99586 |
| 1.2 | 0.00277 | 0.03494 | 0.02505 | 0.05165 | 0.99733 |
| 1.4 | 0.00247 | 0.03319 | 0.02395 | 0.04890 | 0.99761 |
| 1.6 | 0.00219 | 0.03161 | **0.02329** | 0.04606 | 0.99788 |
| 1.8 | **0.00212** | **0.03104** | 0.02338 | **0.04518** | **0.99795** |
| 1.9 | 0.00259 | 0.03456 | 0.02507 | 0.05009 | 0.99750 |
| VFOAdam\_PF | 0.6 | 0.00212 | 0.03000 | 0.02157 | 0.04509 | 0.99795 |
| 0.8 | 0.00191 | 0.02885 | 0.02056 | 0.04295 | 0.99815 |
| 1.0 | 0.00190 | 0.02854 | 0.02035 | 0.04284 | 0.99816 |
| 1.2 | **0.00179** | **0.02736** | **0.01959** | **0.04145** | **0.99827** |
| 1.4 | 0.00196 | 0.02896 | 0.02074 | 0.04347 | 0.99811 |
| IFOAdam\_PF | 0.6 | 0.00191 | 0.02854 | 0.02036 | 0.04294 | 0.99815 |
| 0.8 | 0.00195 | 0.02890 | 0.02067 | 0.04331 | 0.99812 |
| 1.0 | 0.00198 | 0.02962 | 0.02102 | 0.04382 | 0.99809 |
| 1.2 | **0.00182** | **0.02788** | **0.01983** | **0.04193** | **0.99824** |
| 1.4 | 0.00186 | 0.02829 | 0.02024 | 0.04238 | 0.99820 |

**Table 4.** The best evaluation results of ETTh1 based on Fig 12

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Optimizer |  | MSE | MAE | MAPE | RSE | R2 |
| VFOSGD\_PF | 0.6 | 0.01119 | 0.07799 | 0.31175 | 0.26822 | 0.93088 |
| 0.8 | 0.00955 | 0.07224 | 0.93226 | 0.24688 | 0.94102 |
| 1.0 | 0.00743 | 0.06166 | **0.28966** | 0.21779 | 0.95413 |
| 1.2 | **0.00581** | **0.05382** | 0.30446 | **0.19030** | **0.96414** |
| IFOSGD\_PF | 0.6 | 0.01738 | 0.10007 | 0.40768 | 0.32831 | 0.89270 |
| 0.8 | 0.01330 | 0.08607 | 0.31240 | 0.29169 | 0.91789 |
| 1.0 | 0.00873 | 0.06792 | 1.66454 | 0.23643 | 0.94611 |
| 1.2 | 0.00720 | 0.06100 | 0.31028 | 0.21415 | 0.95554 |
| 1.4 | 0.00663 | 0.05801 | 0.29774 | 0.20432 | 0.95906 |
| 1.6 | **0.00661** | **0.05752** | **0.24023** | **0.20388** | **0.95919** |
| VFOAdam\_PF | 0.4 | **0.00716** | 0.06138 | 0.22801 | **0.21073** | **0.95575** |
| 0.6 | 0.00749 | 0.06355 | 0.22687 | 0.21688 | 0.95377 |
| 0.8 | 0.00752 | 0.06312 | **0.25075** | 0.21534 | 0.95359 |
| 1.0 | 0.00734 | **0.06067** | 0.32098 | 0.21600 | 0.95468 |
| 1.2 | 0.00774 | 0.06257 | 0.27945 | 0.22260 | 0.95219 |
| IFOAdam\_PF | 0.4 | **0.00660** | **0.05757** | 0.37348 | **0.20318** | **0.95921** |
| 0.6 | 0.00664 | 0.05786 | 1.53734 | 0.20449 | 0.95902 |
| 0.8 | 0.00725 | 0.06067 | 0.35230 | 0.21253 | 0.95523 |
| 1.0 | 0.00726 | 0.06084 | 0.28327 | 0.21202 | 0.95515 |
| 1.2 | 0.00694 | 0.05908 | **0.26812** | 0.20705 | 0.95711 |
| 1.4 | 0.00730 | 0.06062 | 0.29205 | 0.21370 | 0.95489 |