**< PE imputation using linear regression >**

Cross Validation

하나의 well을 test well로 두고 나머지 well로 train 하여 accuracy 측정

|  |  |  |
| --- | --- | --- |
| Well Name | R2 | MSE |
| CHURCHMAN BIBLE | 0.5023 | 0.5928 |
| CROSS H CATTLE | 0.7244 | 0.1260 |
| LUKE G U | 0.5322 | 0.2469 |
| NEWBY | 0.3712 | 0.1729 |
| NOLAN | 0.5028 | 0.3821 |
| SHANKLE | 0.5645 | 0.2331 |
| SHRIMPLIN | 0.2779 | 0.5873 |
| Average | **0.4965** | 0.3344 |

**< PE imputation using MLP (layer#=1)>**

Grid Search (Hidden layer sizes / Max Iter )

**H\_grid = [5,30,40,50,60,70,100]; I\_grid = [1000,1500,2000,2500,3000,5000] (random\_state=1004)**

**Best param = {'Hiddenlayersizes': 50, 'MaxIter': 1000}**

|  |  |  |
| --- | --- | --- |
| Test Well Name | R2 | MSE |
| CHURCHMAN BIBLE | 0.5496 | 0.5364 |
| CROSS H CATTLE | 0.6972 | 0.1384 |
| LUKE G U | 0.6469 | 0.1863 |
| NEWBY | 0.4148 | 0.1609 |
| NOLAN | 0.5969 | 0.3097 |
| SHANKLE | 0.5553 | 0.2380 |
| SHRIMPLIN | 0.3109 | 0.5605 |
| Average | **0.5388** | 0.3043 |

**\*** random\_state 지정하여 초기 weight 일정하게 >> 수렴하게되면 결과는 동일 (MaxIter무관)

Hidden layer만 변경했을 때 Hiddenlayersize = 50일 때 최적의 결과

**< PE imputation using MLP (layer#=2)>**

**H1\_grid = [10,20,30,40,50,60,70,80,90,100]; H2\_grid = [10,20,30,40,50,60,70,80,90,100]**

**I\_grid = [1500] (random\_state=1004)**

**Best mse = 0.3095 {'Hiddenlayersizes1': 10, 'Hiddenlayersizes2': 70, 'MaxIter': 1500}**

Best R2 = 0.5256 {'Hiddenlayersizes1': 20, 'Hiddenlayersizes2': 20, 'MaxIter': 1500}

|  |  |  |
| --- | --- | --- |
| Test Well Name | R2 | MSE |
| CHURCHMAN BIBLE | 0.5468 | 0.5398 |
| CROSS H CATTLE | 0.6737 | 0.1492 |
| LUKE G U | 0.6053 | 0.2083 |
| NEWBY | 0.3690 | 0.1736 |
| NOLAN | 0.5094 | 0.3770 |
| SHANKLE | 0.5651 | 0.2328 |
| SHRIMPLIN | 0.4022 | 0.4862 |
| Average | **0.5245** | 0.3095 |

Layer가 1개일때보다 성능이 더 좋지 않다.

**< PE imputation using LSTM>**

LON\_grid = [5,10,15,20]; BS\_grid = [5,8,10,20]

Best mse = 0.3017 {'LON': 20, 'BS': 10, 'LR': 0.001}

Best R2 = **0.5499** {'LON': 20, 'BS': 10, 'LR': 0.001}

|  |  |  |
| --- | --- | --- |
| Test Well Name | R2 | MSE |
| CHURCHMAN BIBLE | 0.5429 | 0.5445 |
| CROSS H CATTLE | 0.7595 | 0.1099 |
| LUKE G U | 0.6299 | 0.1953 |
| NEWBY | 0.3918 | 0.1673 |
| NOLAN | 0.5767 | 0.3253 |
| SHANKLE | 0.5766 | 0.2266 |
| SHRIMPLIN | 0.2792 | 0.5863 |
| Average | **0.5367** | 0.3079 |

Best mse = 0.2987 {'LON': 25, 'BS': 10, 'LR': 0.001}

Best R2 = **0.5449** {'LON': 25, 'BS': 8, 'LR': 0.001}

|  |  |  |
| --- | --- | --- |
| Test Well Name | R2 | MSE |
| CHURCHMAN BIBLE | 0.5452 | 0.5417 |
| CROSS H CATTLE | 0.7344 | 0.1214 |
| LUKE G U | 0.6353 | 0.1924 |
| NEWBY | 0.3102 | 0.1897 |
| NOLAN | 0.5815 | 0.3216 |
| SHANKLE | 0.5788 | 0.2254 |
| SHRIMPLIN | 0.3858 | 0.4996 |
| Average | **0.5387** | 0.2989 |