表1 基本模型调参参数

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| --- | --- | --- | --- |
| 模型 | 参数 | Score  (Cross Validation) | Train score  (Train DataSet) |
| Lasso | ‘alpha’:0.0005 | 0.12372 | 0.10586 |
| ENet | 'alpha':0.001,  'l1\_ratio':0.5 | 0.12355 | 0.10864 |
| SVR | 'C':1,  'gamma':0.01 | 0.14909 | 0.08747 |
| GBR | 'n\_estimators':400,  'max\_depth':5,  'min\_samples\_split':50, 'min\_samples\_leaf':20 | 0.12475 | 0.07615 |
| RFR | 'n\_estimators':200,  'max\_depth':5,  'min\_samples\_split':50, 'min\_samples\_leaf':10 | 0.17941 | 0.16593 |
| XGB | 'n\_estimators':900,  'max\_depth':4,  'min\_child\_weight':3,  'gamma':0.0,  'subsample':0.8,  'colsample\_bytree':0.6,  'reg\_alpha':0.005,  'reg\_lambda':1 | 0.12081 | 0.00912 |
| LGB | 'n\_estimators':300,  'max\_depth':3,  'num\_leaves':5,  'max\_bin':25,  'min\_data\_in\_leaf':5,  'feature\_fraction':0.5,  'bagging\_fraction':0.9,  'bagging\_freq':20,  'lambda\_l1':0.1,  'lambda\_l2':0.1, | 0.12246 | 0.07824 |

表2 Stacking, Stacking + Averaging

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Index | Base model  (Stacking model) | Meta model | Averaging | Stacking Score  (CV) | Stacking Train score  (TD) | Pubilc Score |
| 1 | 'ENet',  'SVR',  'GBR',  ‘RFR’ | ‘Lasso’ | ‘Stacking1’:0.6  +  ‘XGB’:0.15  +  ‘LGB’:0.25 | 0.12058 | 0.08874 | 0.11915 |
| 2 | 'XGB',  'LGB' | ‘Lasso’ | ‘Stacking1’:0.7  +  ‘Stacking2’:0.3 | 0.11866 | 0.04958 | 0.11961 |
| 3 | 'Lasso',  'ENet',  'GBR',  ‘RFR’,  'XGB',  'LGB' | 'SVR',  ‘C’=1,  ‘gamma’=0.1 |  | 0.11551 | 0.08034 | 0.11817 |
| 4 | 'Lasso',  'SVR',  'GBR',  ‘RFR’,  'XGB',  'LGB' | 'ENet',  ‘alpha’=0.01,  ‘l1\_ratio’=0.1 |  | 0.11811 | 0.06923 | 0.12024 |
| 5 | 'ENet',  'SVR',  'GBR',  ‘RFR’,  'XGB',  'LGB' | ‘Lasso’ |  | 0.11923 | 0.06842 | 0.11966 |
| 6 | 'Lasso',  'SVR',  'GBR',  ‘RFR’,  'XGB' | 'ENet',  ‘alpha’=0.01,  ‘l1\_ratio’=0.1 |  | 0.11825 | 0.06640 |  |
| 7 | 'Lasso',  'SVR',  'GBR',  ‘RFR’,  'LGB' | 'ENet',  ‘alpha’=0.01,  ‘l1\_ratio’=0.1 | ‘Stacking6’:0.5  +  ‘Stacking7’:0.5 | 0.11895 | 0.08224 | 0.12022 |
| 8 | 'Lasso',  'ENet',  'GBR',  ‘RFR’,  'XGB' | 'SVR',  ‘C’=1,  ‘gamma’=0.1 | ‘Stacking8’;  ‘Stacking8’:0.8  +  ‘LGB’:0.2 | 0.11557 | 0.07901 | 0.11772;0.11744 |
| 9 | 'Lasso',  'ENet',  'GBR',  ‘RFR’,  'LGB' | 'SVR',  ‘C’=1,  ‘gamma’=0.1 | ‘Stacking8’:0.95  +  ‘Stacking9’:0.05 | 0.11567 | 0.08866 | 0.11774 |
| 10 | 'Lasso',  'ENet',  'GBR', ‘RFR’ | 'SVR',  ‘C’=1,  ‘gamma’=0.1 | ‘Stacking10’:0.7 +  ‘XGB’:0.15  +  ‘LGB’:0.15 | 0.11626 | 0.09238 | 0.11817 |