国泰君安191因子回测-91-100

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1 Alpha91

$$Alpha = ((RANK((CLOSE - MAX(CLOSE, 5))) * RANK(CORR((MEAN(VOLUME, 40)), LOW, 5))) * -1) \quad (1)$$

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dates              long(M) short(M) pnl(M) %ret  %tvr  shrp (IR)    %dd  %win bpmrgn fitness Coverage     %posret %inxret %negret IC
20100104-20101231  10.0    -10.0    1.26   6.53  68.1  2.4(0.152)   4.57 0.56 3.84   0.74    434 X 433    18.77   14.01   -5.71   0.0121
20110101-20111231  10.0    -10.0    0.59   3.02  67.35 1.56(0.099)  6.91 0.53 1.79   0.33    530 X 528    -31.63  -39.34  37.67   0.005
20120101-20121231  10.0    -10.0    0.57   2.91  65.88 1.58(0.1)    3.12 0.52 1.77   0.33    752 X 752    5.15    3.25    0.68    0.0064
20130101-20131231  10.0    -10.0    1.17   6.13  64.69 3.43(0.217)  2.63 0.56 3.79   1.06    1064 X 1063  27.64   19.03   -15.39  0.0107
20140101-20141231  10.0    -10.0    0.59   3.03  63.6  1.56(0.099)  3.44 0.55 1.9    0.34    993 X 996    40.58   35.54   -34.53  0.0064
20150101-20151231  9.99    -10.0    1.23   6.31  66.42 1.57(0.099)  8.91 0.56 3.81   0.48    862 X 864    75.92   46.78   -63.2   0.007
20160101-20161231  10.0    -10.0    0.83   4.25  66.46 2.34(0.148)  5.78 0.57 2.56   0.59    1119 X 1123  -8.07   -15.42  16.56   0.0088
20170101-20171231  10.0    -10.0    0.46   2.33  65.72 1.28(0.081)  2.64 0.56 1.42   0.24    1345 X 1347  -15.6   0.88    20.26   0.004
20180101-20181231  10.0    -10.0    1.45   7.45  64.78 4.99(0.316)  1.33 0.61 4.6    1.69    1552 X 1561  -27.47  -38.75  42.38   0.0124
20190101-20191231  10.0    -10.0    1.5    7.69  64.61 4.47(0.283)  2.14 0.63 4.76   1.54    1744 X 1742  31.27   26.71   -15.87  0.012
20200101-20200331  10.0    -10.0    0.21   4.47  62.29 1.55(0.098)  2.73 0.5  2.88   0.42    1798 X 1797  -7.36   -12.47  16.32   0.0082

20100104-20200331  10.0    -10.0    9.86   4.95  65.68 2.2(0.139)   8.9  0.56 3.01   0.6     1058 X 1059  11.19   4.85    -1.29   0.0085
```

Figure 1: 回测结果

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+---------+---------+---------+---------+--------+--------+----------------------------------+
| Corr    | ISSharpe| SemiOS  | OSSharpe|Fitness | OSdays | ID                               |
+---------+---------+---------+---------+--------+--------+----------------------------------+
| 0.5745  | 4.04    | 5.06    | 3.33    | 1.82   | 175    | 211919_my_233                    |
| 0.4678  | 3.12    | 8.16    | 3.12    | 1.6    | 99     | 214950_pv_model_8_mod_gen6_191114_42|
| 0.3885  | 3.41    | 7.39    | 4.15    | 1.63   | 101    | 214811_pv_model_2_mod_gen6_191114_86|
```

Figure 2: 相关性结果

2 Alpha92

$$Alpha = (MAX(RANK(DECAYLINEAR(DELTA(((CLOSE * 0.35) + (VWAP * 0.65)), 2), 3)),$$
$$TSRANK(DECAYLINEAR(ABS(CORR((MEAN(VOLUME, 180)), CLOSE, 13)), 5), 15)) * -1) \quad (2)$$

```
dates              long(M) short(M) pnl(M) %ret  %tvr  shrp (IR)    %dd   %win bpmrgn fitness Coverage     %posret %inxret %negret IC
20100104-20101231  10.0    -9.99    3.85   19.91 47.6  4.6(0.291)   2.95  0.61 16.73  2.97    142 X 101    32.09   14.01   7.71    0.0398
20110101-20111231  10.0    -10.0    3.36   17.19 44.14 4.93(0.312)  3.99  0.68 15.59  3.08    306 X 189    -21.93  -39.34  56.35   0.0363
20120101-20121231  10.0    -9.99    3.5    17.99 44.13 5.6(0.354)   2.67  0.67 16.3   3.58    481 X 303    21.23   3.25    14.73   0.0384
20130101-20131231  10.01   -9.99    3.17   16.67 43.92 7.0(0.443)   1.17  0.69 15.19  4.31    958 X 965    44.79   19.03   -11.49  0.0282
20140101-20141231  10.01   -9.98    3.13   16.0  42.52 6.89(0.436)  1.1   0.69 15.05  4.23    1233 X 1112  54.27   35.54   -22.4   0.0278
20150101-20151231  10.03   -9.94    4.51   23.26 40.18 2.54(0.161)  19.56 0.67 23.0   1.93    1383 X 1065  92.13   46.78   -46.54  0.0274
20160101-20161231  10.0    -9.99    3.01   15.41 42.82 4.2(0.266)   6.62  0.7  14.4   2.52    1451 X 1179  3.77    -15.42  27.08   0.0285
20170101-20171231  10.0    -10.0    1.21   6.18  42.23 2.9(0.184)   2.71  0.61 5.86   1.11    1487 X 1375  -9.15   0.88    21.53   0.0149
20180101-20181231  10.0    -10.0    1.57   8.1   43.87 3.9(0.247)   2.69  0.63 7.38   1.68    1626 X 1642  -28.78  -38.75  44.97   0.0149
20190101-20191231  10.01   -9.99    1.67   8.58  43.52 4.69(0.297)  1.73  0.61 7.89   2.08    1642 X 1869  33.33   26.71   -16.21  0.0138
20200101-20200331  10.01   -9.99    0.19   4.1   44.12 1.8(0.114)   2.47  0.55 3.7    0.55    1654 X 1930  -8.61   -12.47  16.8    0.0066

20100104-20200331  10.01   -9.99    29.17  14.67 43.5  3.66(0.231)  19.62 0.65 13.47  2.13    1086 X 1003  21.46   4.85    7.84    0.0265
```

Figure 3: 回测结果

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+---------+---------+---------+---------+--------+--------+----------------------------------+
| Corr    | ISSharpe| SemiOS  | OSSharpe|Fitness | OSdays | ID                               |
+---------+---------+---------+---------+--------+--------+----------------------------------+
| 0.8201  | 3.26    | 4.88    | 4.05    | 1.52   | 175    | 211919_my_173                    |
| 0.7177  | 3.41    | 6.33    | 4.76    | 2.66   | 175    | 211919_my_94                     |
| 0.6663  | 2.5     | 4.97    | 1.87    | 1.01   | 100    | 214828_pv_model_3_gen2_191114_42 |
```

Figure 4: 相关性结果

3 Alpha93

$$Alpha = SUM((OPEN >= DELAY(OPEN, 1)?0 : MAX((OPEN - LOW), (OPEN - DELAY(OPEN, 1)))), 20) \tag{3}$$

dates	long(M)	short(M)	pnl(M)	%ret	%tvr	shrp (IR)	%dd	%win	bpmrgn	fitness	Coverage	%posret	%inxret	%negret	IC
20100104-20101231	10.0	-10.0	-2.03	-10.46	7.62	-1.55(-0.098)	21.73	0.37	-54.92	-1.81	551 X 1236	2.93	14.01	-23.85	-0.0035
20110101-20111231	10.0	-10.0	-0.11	-0.55	6.87	-0.12(-0.007)	9.84	0.47	-3.23	-0.03	620 X 1502	-37.22	-39.34	36.11	-0.0001
20120101-20121231	10.0	-10.0	-0.1	-0.51	6.58	-0.11(-0.007)	14.55	0.47	-3.09	-0.03	670 X 1689	3.14	3.25	-4.15	-0.0006
20130101-20131231	10.0	-10.0	-1.26	-6.63	7.59	-1.24(-0.078)	13.84	0.45	-34.93	-1.16	632 X 1814	15.31	19.03	-28.56	-0.0018
20140101-20141231	10.0	-10.0	-0.96	-4.89	8.49	-0.81(-0.051)	11.85	0.45	-23.06	-0.61	810 X 1694	30.01	35.54	-39.81	-0.0015
20150101-20151231	10.0	-10.0	-2.2	-11.24	7.55	-1.11(-0.07)	39.67	0.48	-59.58	-1.36	835 X 1860	56.39	46.78	-78.91	-0.0008
20160101-20161231	10.0	-10.0	-1.45	-7.45	7.26	-1.18(-0.074)	29.39	0.37	-41.06	-1.19	898 X 1960	-29.65	-15.42	14.75	-0.0014
20170101-20171231	10.0	-10.0	0.22	1.14	8.27	0.24(0.015)	7.58	0.48	5.41	0.09	889 X 2339	-19.98	0.88	22.22	0.0003
20180101-20181231	10.0	-10.0	-0.86	-4.42	7.62	-0.83(-0.053)	21.93	0.5	-23.26	-0.63	863 X 2644	-47.19	-38.75	38.33	-0.0006
20190101-20191231	10.0	-10.0	-0.23	-1.23	8.46	-0.23(-0.014)	16.11	0.47	-5.67	-0.09	897 X 2713	23.13	26.71	-25.54	0.0
20200101-20200331	9.99	-10.0	-0.92	-19.8	7.88	-2.98(-0.189)	12.14	0.33	-100.74	-4.73	902 X 2779	-45.28	-12.47	5.6	-0.0048
20100104-20200331	10.0	-10.0	-9.9	-4.97	7.64	-0.81(-0.051)	103.19	0.45	-26.04	-0.65	770 X 1965	-1.37	4.85	-8.57	-0.0011

Figure 5: 回测结果

-0.2607	2.34	3.86	3.81	1.64	146	213024_agen.ZSAlpha_25
-0.2732	2.39	4.49	4.12	1.8	146	213024_agen.ZSAlpha_26
-0.2959	3.71	5.91	3.13	2.41	146	213024_agen.ZSAlpha_14

Figure 6: 相关性结果

4 Alpha94

$$Alpha = SUM((CLOSE > DELAY(CLOSE, 1)?VOLUME : (CLOSE < DELAY(CLOSE, 1)? - VOLUME : 0)), 30) \tag{4}$$

dates	long(M)	short(M)	pnl(M)	%ret	%tvr	shrp (IR)	%dd	%win	bpmrgn	fitness	Coverage	%posret	%inxret	%negret	IC
20100104-20101231	10.0	-10.0	-3.76	-19.42	6.05	-3.71(-0.234)	38.79	0.33	-128.29	-6.64	543 X 1230	-16.58	14.01	-22.26	-0.0169
20110101-20111231	10.0	-10.0	-1.58	-8.07	5.52	-2.28(-0.144)	25.52	0.42	-58.5	-2.75	586 X 1523	-45.35	-39.34	29.2	-0.0083
20120101-20121231	10.0	-10.0	-1.96	-10.1	5.48	-3.4(-0.215)	25.41	0.35	-73.77	-4.62	661 X 1690	-8.6	3.25	-11.61	-0.0114
20130101-20131231	10.0	-10.0	-4.43	-23.25	5.38	-5.92(-0.374)	45.1	0.28	-172.91	-12.31	694 X 1748	-9.48	19.03	-37.03	-0.0175
20140101-20141231	10.0	-10.0	0.43	2.17	6.11	0.38(0.024)	23.59	0.36	14.27	0.23	781 X 1711	56.96	35.54	-52.6	-0.0035
20150101-20151231	10.0	-10.0	-4.52	-23.17	4.74	-3.02(-0.191)	46.5	0.33	-195.37	-6.68	857 X 1811	15.75	46.78	-62.11	-0.0101
20160101-20161231	10.0	-10.0	-2.28	-11.66	5.82	-3.47(-0.219)	24.27	0.39	-80.19	-4.91	918 X 1922	-24.43	-15.42	1.11	-0.0093
20170101-20171231	10.0	-10.0	-0.63	-3.22	5.83	-0.93(-0.059)	11.43	0.48	-22.11	-0.69	960 X 2242	-18.42	0.88	11.98	-0.003
20180101-20181231	10.0	-10.0	-1.72	-8.85	5.58	-2.45(-0.155)	25.21	0.43	-63.41	-3.08	1017 X 2477	-53.13	-38.75	35.43	-0.0057
20190101-20191231	10.0	-10.0	-2.73	-13.97	5.88	-4.85(-0.307)	29.81	0.35	-95.07	-7.47	1061 X 2543	2.91	26.71	-30.84	-0.01
20200101-20200331	10.0	-10.0	-0.72	-15.47	5.16	-4.64(-0.293)	8.61	0.36	-120.02	-8.04	1101 X 2575	-46.35	-12.47	15.41	-0.0095
20100104-20200331	10.0	-10.0	-23.89	-12.0	5.63	-2.68(-0.169)	238.91	0.37	-85.28	-3.91	815 X 1906	-10.83	4.85	-13.16	-0.0095

Figure 7: 回测结果

-0.6865	5.4	4.91	3.16	8.78	136	213518_h388
-0.7292	4.52	4.94	2.6	7.69	175	211919_my_47
-0.7385	2.7	6.47	5.83	1.68	136	213518_h4838

Figure 8: 相关性结果

5 Alpha95

$$Alpha = STD(AMOUNT, 20) \tag{5}$$

dates	long(M)	short(M)	pnl(M)	%ret	%tvr	shrp (IR)	%dd	%win	bpmrgn	fitness	Coverage	%posret	%inxret	%negret	IC
20100104-20101231	10.0	-10.0	-4.23	-21.84	20.35	-3.76(-0.238)	43.53	0.33	-42.92	-3.89	439 X 1093	-21.37	14.01	-22.3	-0.0183
20110101-20111231	10.0	-10.0	-1.19	-6.07	17.82	-1.47(-0.093)	22.42	0.44	-13.63	-0.86	493 X 1326	-40.15	-39.34	27.99	-0.006
20120101-20121231	10.0	-10.0	-2.22	-11.42	16.77	-3.22(-0.203)	26.87	0.37	-27.23	-2.65	569 X 1554	-11.15	3.25	-11.69	-0.0136
20130101-20131231	10.0	-10.0	-4.63	-24.31	15.01	-5.47(-0.346)	47.07	0.29	-64.77	-6.97	629 X 1675	-10.72	19.03	-37.9	-0.02
20140101-20141231	10.0	-10.0	0.81	4.16	16.06	0.75(0.047)	19.33	0.44	10.36	0.38	662 X 1577	61.09	35.54	-52.76	-0.0026
20150101-20151231	10.0	-9.98	-4.79	-24.65	14.99	-3.09(-0.196)	49.47	0.35	-65.6	-3.97	666 X 1516	10.71	46.78	-59.93	-0.0136
20160101-20161231	10.0	-9.98	-2.94	-15.06	16.06	-4.23(-0.267)	34.73	0.38	-37.51	-4.09	750 X 1787	-33.89	-15.42	3.81	-0.0135
20170101-20171231	10.0	-9.99	-1.43	-7.34	15.49	-1.94(-0.123)	18.62	0.43	-18.99	-1.34	826 X 2138	-25.96	0.88	11.27	-0.0065
20180101-20181231	9.99	-10.0	-4.02	-20.66	14.88	-5.74(-0.363)	44.29	0.33	-55.54	-6.76	907 X 2398	-68.63	-38.75	27.29	-0.0143
20190101-20191231	9.99	-10.0	-4.93	-25.28	15.26	-6.87(-0.435)	50.67	0.3	-66.22	-8.84	985 X 2595	-16.21	26.71	-34.32	-0.0182
20200101-20200331	9.99	-10.0	-1.24	-26.74	15.34	-6.39(-0.404)	12.98	0.34	-69.69	-8.43	1020 X 2647	-66.21	-12.47	12.72	-0.0189
20100104-20200331	10.0	-9.99	-30.79	-15.48	16.25	-3.2(-0.203)	308.02	0.37	-38.09	-3.13	700 X 1787	-16.76	4.85	-14.18	-0.0128

Figure 9: 回测结果

	-0.6135	4.52	4.94	2.6	7.69	175	211919_my_47
	-0.6198	6.19	7.06	5.06	4.87	97	215063_qh13
	-0.8211	2.7	6.47	5.83	1.68	136	213518_h4838

Figure 10: 相关性结果

6 Alpha96

$$Alpha = SMA(SMA((CLOSE - TSMIN(LOW, 9))/(TSMAX(HIGH, 9) - TSMIN(LOW, 9)) * 100, 3, 1), 3, 1) \tag{6}$$

dates	long(M)	short(M)	pnl(M)	%ret	%tvr	shrp (IR)	%dd	%win	bpmrgn	fitness	Coverage	%posret	%inxret	%negret	IC
20100104-20101231	10.0	-10.0	-1.02	-5.27	18.18	-1.09(-0.069)	17.71	0.5	-11.61	-0.59	871 X 933	4.09	14.01	-14.64	-0.0097
20110101-20111231	10.0	-10.0	-0.44	-2.24	16.95	-0.54(-0.034)	10.0	0.51	-5.29	-0.2	971 X 1166	-38.23	-39.34	33.74	-0.0084
20120101-20121231	10.0	-10.0	-1.78	-9.13	17.17	-2.37(-0.15)	18.68	0.42	-21.28	-1.73	1105 X 1263	-7.53	3.25	-10.74	-0.0208
20130101-20131231	9.99	-10.01	-1.03	-5.42	17.46	-1.45(-0.092)	13.45	0.45	-12.43	-0.81	1185 X 1261	20.56	19.03	-31.36	-0.01
20140101-20141231	9.97	-10.02	0.01	0.06	16.46	0.02(0.001)	13.18	0.47	0.12	0.0	1236 X 1273	38.16	35.54	-37.9	-0.0024
20150101-20151231	9.91	-10.06	-5.64	-29.07	15.48	-2.56(-0.162)	68.65	0.39	-74.73	-3.51	1366 X 1337	43.31	46.78	-100.08	-0.0257
20160101-20161231	9.87	-10.01	-2.2	-11.3	15.74	-2.41(-0.152)	28.99	0.45	-28.8	-2.04	1347 X 1518	-25.25	-15.42	2.39	-0.0177
20170101-20171231	9.92	-10.0	0.12	0.59	15.59	0.17(0.011)	4.99	0.48	1.56	0.03	1548 X 1699	-21.04	0.88	22.07	-0.003
20180101-20181231	10.0	-10.0	-1.17	-6.03	16.45	-1.6(-0.101)	15.58	0.44	-14.67	-0.97	1687 X 1824	-54.69	-38.75	42.62	-0.0122
20190101-20191231	9.98	-10.0	-2.4	-12.32	18.14	-3.97(-0.251)	24.94	0.43	-27.17	-3.27	1726 X 1889	5.19	26.71	-29.8	-0.0191
20200101-20200331	9.97	-10.0	-0.36	-7.76	18.52	-1.52(-0.096)	9.47	0.48	-16.8	-0.98	1787 X 1901	-27.73	-12.47	12.09	-0.012
20100104-20200331	9.96	-10.01	-15.91	-8.01	16.8	-1.54(-0.097)	165.86	0.45	-19.05	-1.06	1316 X 1428	-4.15	4.85	-11.84	-0.0129

Figure 11: 回测结果

	-0.7636	2.61	4.41	4.35	1.11	99	214982_pv_model_9_mod_gen6_191114_217
	-0.7714	3.61	2.97	3.1	2.97	101	214793_pv_model_1mod_191114_160
	-0.8258	3.48	4.27	2.2	4.56	175	211919_my_11

Figure 12: 相关性结果

7 Alpha97

$$Alpha = STD(VOLUME, 10) \tag{7}$$

```
dates            long(M) short(M) pnl(M) %ret   %tvr   shrp (IR)       %dd    %win  bpmrgn fitness Coverage      %posret %inxret %negret IC
20100104-20101231 10.0   -10.0    -4.23  -21.84 20.35  -3.76(-0.238)   43.53  0.33  -42.92 -3.89   439 X 1093    -21.37  14.01   -22.3   -0.0183
20110101-20111231 10.0   -10.0    -1.19  -6.07  17.82  -1.47(-0.093)   22.42  0.44  -13.63 -0.86   493 X 1326    -40.15  -39.34  27.99   -0.006
20120101-20121231 10.0   -10.0    -2.22  -11.42 16.77  -3.22(-0.203)   26.87  0.37  -27.23 -2.65   569 X 1554    -11.15  3.25    -11.69  -0.0136
20130101-20131231 10.0   -10.0    -4.63  -24.31 15.01  -5.47(-0.346)   47.07  0.29  -64.77 -6.97   629 X 1675    -10.72  19.03   -37.9   -0.02
20140101-20141231 10.0   -10.0    0.81   4.16   16.06  0.75(0.047)     19.33  0.44  10.36  0.38    662 X 1577    61.09   35.54   -52.76  -0.0026
20150101-20151231 10.0   -9.98    -4.79  -24.65 14.99  -3.09(-0.196)   49.47  0.35  -65.6  -3.97   666 X 1516    10.71   46.78   -59.93  -0.0136
20160101-20161231 10.0   -9.98    -2.94  -15.06 16.06  -4.23(-0.267)   34.73  0.38  -37.51 -4.09   750 X 1787    -33.89  -15.42  3.81    -0.0135
20170101-20171231 10.0   -9.99    -1.43  -7.34  15.49  -1.94(-0.123)   18.62  0.43  -18.99 -1.34   826 X 2138    -25.96  0.88    11.27   -0.0065
20180101-20181231 9.99   -10.0    -4.02  -20.66 14.88  -5.74(-0.363)   44.29  0.33  -55.54 -6.76   907 X 2398    -68.63  -38.75  27.29   -0.0143
20190101-20191231 9.99   -10.0    -4.93  -25.28 15.26  -6.87(-0.435)   50.67  0.3   -66.22 -8.84   985 X 2595    -16.21  26.71   -34.32  -0.0182
20200101-20200331 9.99   -10.0    -1.24  -26.74 15.34  -6.39(-0.404)   12.98  0.34  -69.69 -8.43   1020 X 2647   -66.21  -12.47  12.72   -0.0189

20100104-20200331 10.0   -9.99    -30.79 -15.48 16.25  -3.2(-0.203)    308.02 0.37  -38.09 -3.13   700 X 1787    -16.76  4.85    -14.18  -0.0128
```

Figure 13: 回测结果

```
| -0.6135 | 4.52  | 4.94  | 2.6   | 7.69  | 175   | 211919_my_47
| -0.6198 | 6.19  | 7.06  | 5.06  | 4.87  | 97    | 215063_qh13
| -0.8211 | 2.7   | 6.47  | 5.83  | 1.68  | 136   | 213518_h4838
```

Figure 14: 相关性结果

8 Alpha98

$$
\begin{aligned}
Alpha = &((((DELTA((SUM(CLOSE, 100)/100), 100)/DELAY(CLOSE, 100)) < 0.05) || \\
&((DELTA((SUM(CLOSE, 100)/100), 100)/DELAY(CLOSE, 100)) == 0.05))? \\
&(-1 * (CLOSE - TSMIN(CLOSE, 100))) : (-1 * DELTA(CLOSE, 3)))
\end{aligned} \tag{8}
$$

```
dates            long(M) short(M) pnl(M) %ret   %tvr   shrp (IR)       %dd    %win  bpmrgn fitness Coverage      %posret %inxret %negret IC
20100104-20101231 10.0   -10.0    3.25   16.76  45.0   2.9(0.183)      6.13   0.62  14.9   1.77    1116 X 563    23.67   14.01   9.86    0.0048
20110101-20111231 9.99   -10.0    0.21   1.05   34.02  0.18(0.012)     11.35  0.58  1.25   0.03    1409 X 607    -30.14  -39.34  32.24   0.0007
20120101-20121231 10.0   -10.0    1.22   6.26   21.17  1.15(0.073)     11.92  0.59  11.84  0.62    1616 X 676    6.71    3.25    5.82    0.0022
20130101-20131231 10.0   -9.98    1.29   6.75   25.02  1.02(0.065)     16.48  0.55  10.82  0.53    1645 X 792    34.13   19.03   -20.65  0.0021
20140101-20141231 10.01  -9.88    3.32   16.49  43.44  2.75(0.174)     10.58  0.66  15.66  1.69    1658 X 817    48.81   35.54   -15.19  0.0058
20150101-20151231 10.01  -9.98    2.17   10.48  57.98  0.83(0.053)     31.0   0.57  7.68   0.35    1562 X 1057   96.0    46.78   -74.06  0.0004
20160101-20161231 10.0   -9.99    3.66   18.77  19.04  3.02(0.191)     12.17  0.64  39.4   3.0     1938 X 869    -10.54  -15.42  48.1    0.0044
20170101-20171231 10.0   -9.99    1.67   8.53   25.29  1.56(0.099)     8.46   0.59  13.56  0.91    2156 X 926    -15.85  0.88    33.02   0.0025
20180101-20181231 9.99   -10.0    4.06   20.68  26.93  3.29(0.208)     3.36   0.61  31.0   2.88    2496 X 954    -27.35  -38.75  69.09   0.0046
20190101-20191231 10.0   -9.99    2.41   12.33  31.02  1.61(0.102)     12.11  0.59  15.94  1.02    2469 X 1101   33.1    26.71   -8.4    0.0028
20200101-20200331 10.02  -9.94    1.03   21.96  31.95  3.69(0.234)     3.71   0.64  27.85  3.06    2499 X 1137   -13.05  -12.47  57.84   0.0055

20100104-20200331 10.0   -9.98    24.27  12.06  32.88  1.71(0.108)     31.03  0.6   14.84  1.03    1823 X 844    15.18   4.85    9.22    0.0031
```

Figure 15: 回测结果

```
+---------+----------+---------+----------+---------+---------+-------------------+
| Corr    | ISSharpe | SemiOS  | OSSharpe |Fitness  | OSdays  | ID                |
+---------+----------+---------+----------+---------+---------+-------------------+
| 0.5812  | 2.39     | 4.49    | 4.12     | 1.8     | 146     | 213024_agen.ZSAlpha_26|
| 0.4374  | 3.43     | 4.55    | 3.86     | 2.38    | 175     | 211919_my_199     |
| 0.3855  | 3.71     | 5.91    | 3.13     | 2.41    | 146     | 213024_agen.ZSAlpha_14|
```

Figure 16: 相关性结果

9 Alpha99

$$Alpha = (-1 * RANK(COVIANCE(RANK(CLOSE), RANK(VOLUME), 5))) \qquad (9)$$

```
dates              long(M) short(M) pnl(M)  %ret   %tvr   shrp (IR)    %dd    %win  bpmrgn fitness Coverage      %posret %inxret %negret IC
20100104-20101231  10.0    -10.0    2.4     12.4   59.25  5.23(0.331)  2.11   0.6   8.37   2.39    830 X 828     24.05   14.01   0.74    0.0218
20110101-20111231  10.0    -10.0    2.73    13.99  59.61  7.78(0.492)  0.58   0.67  9.39   3.77    979 X 980     -22.27  -39.34  50.25   0.0266
20120101-20121231  10.0    -10.0    2.64    13.59  58.76  7.8(0.493)   1.38   0.68  9.25   3.75    1114 X 1113   18.09   3.25    9.08    0.027
20130101-20131231  10.0    -10.0    2.54    13.33  56.57  7.13(0.451)  0.89   0.69  9.43   3.46    1167 X 1166   40.12   19.03   -13.45  0.0232
20140101-20141231  10.0    -9.99    2.4     12.23  57.57  6.52(0.412)  1.86   0.64  8.5    3.0     1137 X 1142   50.17   35.54   -25.73  0.0199
20150101-20151231  9.95    -9.98    2.86    14.62  59.53  3.67(0.232)  4.07   0.63  9.87   1.82    1126 X 1130   87.9    46.78   -58.34  0.0182
20160101-20161231  9.98    -9.98    2.68    13.74  56.87  7.16(0.453)  1.73   0.7   9.67   3.52    1287 X 1292   2.24    -15.42  25.25   0.0248
20170101-20171231  9.98    -9.97    3.13    16.05  57.96  8.67(0.549)  1.09   0.73  11.08  4.56    1496 X 1504   -4.42   0.88    36.56   0.0296
20180101-20181231  9.98    -9.98    2.56    13.19  56.39  7.04(0.445)  1.66   0.69  9.35   3.4     1662 X 1670   -26.11  -38.75  52.53   0.0223
20190101-20191231  9.98    -9.99    2.73    14.02  55.73  7.9(0.5)     0.97   0.68  10.07  3.96    1790 X 1803   33.75   26.71   -5.69   0.0219
20200101-20200331  9.97    -10.0    0.05    1.08   55.72  0.4(0.026)   2.84   0.43  0.78   0.06    1825 X 1849   -10.39  -12.47  12.53   0.0031

20100104-20200331  9.99    -9.99    26.71   13.42  57.78  6.05(0.382)  4.05   0.67  9.3    2.91    1272 X 1277   19.59   4.85    7.27    0.0231
```

Figure 17: 回测结果

```
+----------+----------+----------+----------+---------+----------+--------------------+
| Corr     | ISSharpe | SemiOS   | OSSharpe |Fitness  | OSdays   | ID                 |
+----------+----------+----------+----------+---------+----------+--------------------+
| 0.7776   | 4.92     | 7.75     | 2.55     | 2.24    | 175      | 211930_h_ori40     |
| 0.763    | 6.95     | 10.61    | 2.62     | 3.58    | 129      | 213793_v1v2_191003_22|
| 0.7148   | 4.31     | 5.92     | 4.14     | 1.74    | 175      | 211930_h_ori42     |
```

Figure 18: 相关性结果

10 Alpha100

$$Alpha = STD(VOLUME, 20) \qquad (10)$$

```
dates              long(M) short(M) pnl(M)  %ret    %tvr   shrp (IR)     %dd     %win  bpmrgn  fitness Coverage     %posret %inxret %negret  IC
20100104-20101231  10.0    -10.0    -3.81   -19.68  14.26  -3.5(-0.221)  39.17   0.35  -55.18  -4.11   386 X 915    -16.1   14.01   -23.25   -0.0184
20110101-20111231  10.0    -10.0    -1.71   -8.76   12.19  -2.32(-0.146) 26.03   0.43  -28.73  -1.96   433 X 1126   -44.65  -39.34  27.14    -0.0092
20120101-20121231  10.0    -10.0    -2.45   -12.6   10.82  -3.78(-0.239) 28.91   0.34  -46.55  -4.08   527 X 1397   -12.48  3.25    -12.72   -0.0142
20130101-20131231  10.0    -10.0    -4.73   -24.84  8.0    -5.89(-0.372) 48.4    0.28  -124.19 -10.38  623 X 1625   -11.72  19.03   -37.97   -0.0204
20140101-20141231  10.0    -10.0    0.66    3.38    9.18   0.6(0.038)    19.1    0.39  14.7    0.37    649 X 1512   57.25   35.54   -50.49   -0.0033
20150101-20151231  10.0    -10.0    -4.39   -22.49  8.24   -2.66(-0.168) 45.67   0.33  -109.16 -4.4    637 X 1398   17.19   46.78   -62.18   -0.0127
20160101-20161231  10.0    -10.0    -2.76   -14.12  9.01   -4.32(-0.273) 34.31   0.35  -62.68  -5.4    738 X 1712   -30.77  -15.42  2.54     -0.0134
20170101-20171231  10.0    -10.0    -1.32   -6.76   8.56   -2.04(-0.129) 16.97   0.47  -31.62  -1.82   825 X 2060   -23.98  0.88    10.45    -0.0065
20180101-20181231  10.0    -10.0    -3.1    -15.93  8.37   -4.63(-0.293) 37.53   0.35  -76.1   -6.39   922 X 2327   -60.34  -38.75  28.46    -0.0117
20190101-20191231  10.0    -10.0    -3.78   -19.37  8.4    -5.74(-0.363) 41.13   0.32  -92.2   -8.71   1011 X 2542  -5.17   26.71   -33.54   -0.0143
20200101-20200331  9.99    -10.0    -0.99   -21.36  7.88   -6.0(-0.379)  10.55   0.31  -108.44 -9.88   1047 X 2602  -58.42  -12.47  15.67    -0.015

20100104-20200331  10.0    -10.0    -28.37  -14.25  9.66   -3.02(-0.191) 283.7   0.36  -58.99  -3.67   684 X 1684   -14.09  4.85    -14.41   -0.0124
```

Figure 19: 回测结果

```
| -0.6007 | 3.42 | 3.63 | nan  | 2.8  | 97  | 215063_qh35   |
| -0.6179 | 4.52 | 4.94 | 2.6  | 7.69 | 175 | 211919_my_47  |
| -0.8014 | 2.7  | 6.47 | 5.83 | 1.68 | 136 | 213518_h4838  |
```

Figure 20: 相关性结果