Electronic Supplementary Material (ESI) for Molecular BioSystems.


# Supplementary

# (Fig.S1-S4, Table S1-S9)

## Figure S1-S4

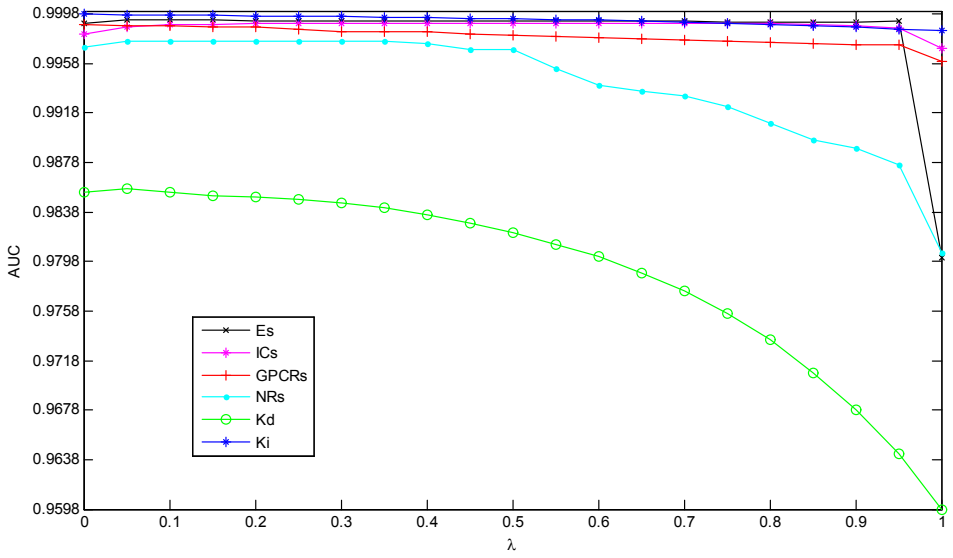


Figure S1 The relationship between the parameter $\lambda$ and AUC for LPMIHN algorithm on the six binary drug-target datasets

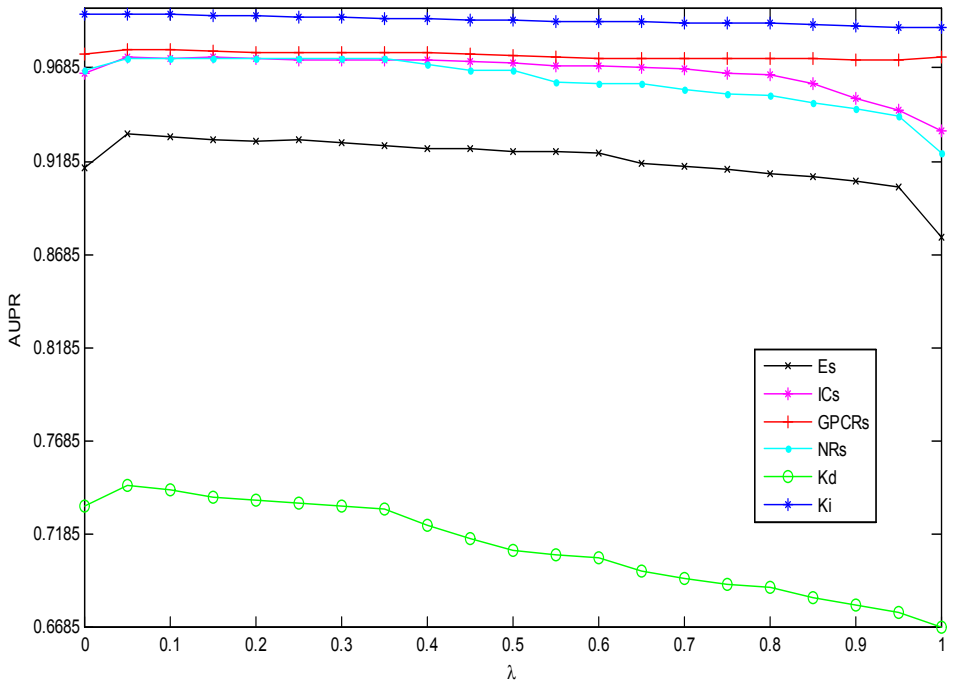


Figure S2 The relationship between the parameter $\lambda$ and AUPR for LPMIHN algorithm on the six

binary drug-target datasets

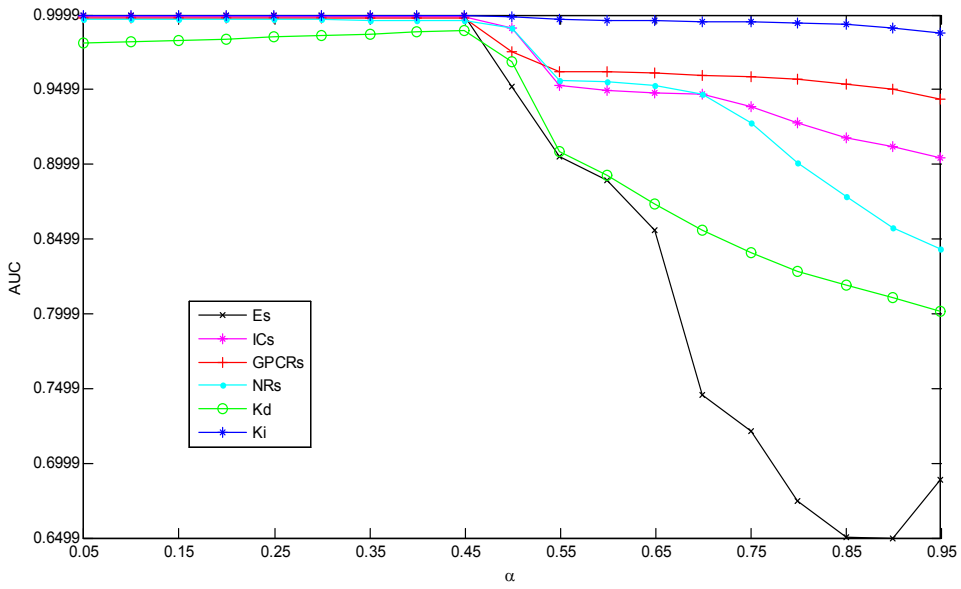


Figure S3 The relationship between the parameter $\alpha$ and AUC for LPMIHN algorithm on the six binary drug-target datasets

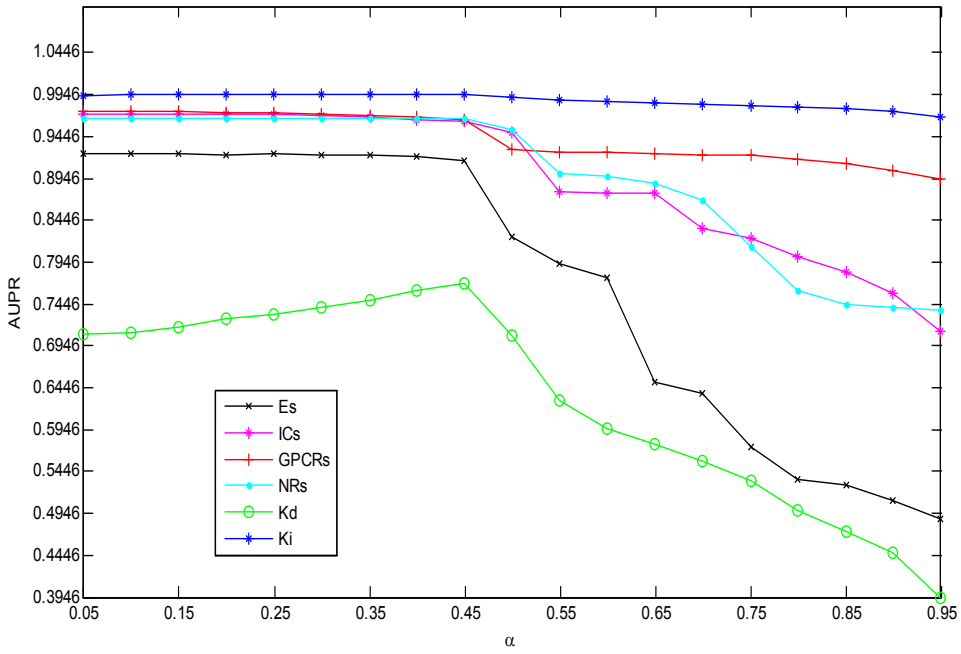


Figure S4 The relationship between the parameter $\alpha$ and AUPR for LPMIHN algorithm on the six binary drug-target datasets

# Tables S1-S6

Table S1 Average results of LPMIHN-SS, LPMIHN-GO, LPMIHN-PPI and LPMIHN-IP on the four benchmark datasets in 10 CV test repeating 30 times

| Dataset | AUC | | | | AUPR | | | | FPR (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SS | GO | PPI | IP | SS | GO | PPI | IP | SS | GO | PPI | IP |
| Es | 0.950±0.001 | 0.941±0.002 | 0.955±0.003 | 0.988±0.001 | 0.698±0.003 | 0.565±0.002 | 0.588±0.010 | 0.695±0.003 | 0.45±0.006 | 0.50±0. 004 | 0.50±0. 01 | 0.45±0. 002 |
| ICs | 0.982±0.006 | 0.972±0.007 | 0.982±0.003 | 0.995±0.004 | 0.815±0.006 | 0.767±0.004 | 0.884±0.002 | 0.86±0.005 | 0.99±0.03 | 1.13±0.02 | 0.75±0.01 | 0.86±0.03 |
| GPCRs | 0.967±0.002 | 0.965±0.002 | 0.975±0.003 | 0.987±0.002 | 0.915±0.005 | 0.912±0.005 | 0.932±0.004 | 0.934±0.004 | 0.37±0.02 | 0.38±0.02 | 0.38±0.03 | 0.34±0.02 |
| NRs | 0.962±0.01 | 0.961±0.01 | 0.94±0.01 | 0.964±0.007 | 0.913±0.02 | 0.907±0.02 | 0.886±0.014 | 0.913±0.02 | 0.93±0.2 | 1.04±0.17 | 1.03±0.14 | 0.99±0.2 |

Notes: SS, GO, PPI and IP represent the LPMIHN-SS, LPMIHN-GO, LPMIHN-PPI and LPMIHN-IP, respectively.

TableS2 Results of DBSI, TBSI, NBI, NRWRH and LPMIHN methods on the four benchmark datasets in terms of average AUC values with 10CV test repeating 30 times

| | Es | ICs | GPCRs | NRs |
|---|---|---|---|---|
| DBSI | 0.781±0.018 | 0.709±0.025 | 0.755±0.033 | 0.789±0.084 |
| TBSI | 0.903±0.016 | 0.905±0.018 | 0.745±0.044 | 0.528±0.139 |
| NBI | 0.975±0.006 | 0.976±0.007 | 0.946±0.019 | 0.838±0.087 |
| NRWRH | 0.953±0.003 | 0.971±0.005 | 0.942±0.003 | 0.867±0.013 |
| LPMIHN | 0.994±0.002 | 0.997±0.002 | 0.986±0.002 | 0.965±0.006 |

Table S3 Results of BLM-NII, NRWRH and LPMIHN methods on the four benchmark datasets in terms of average AUC values with 10CV test repeating 10 times

| | Es | ICs | GPCRs | NRs |
|---|---|---|---|---|
| BLM-NII | 0.984±0.001 | 0.987±0.001 | 0.978±0.001 | 0.959±0.006 |
| NRWRH | 0.952±0.004 | 0.972±0.008 | 0.941±0.003 | 0.871±0.008 |
| LPMIHN | 0.995±0.002 | 0.996±0.0002 | 0.986±0.003 | 0.964±0.008 |

Table S4 Results of NetlabRLS, NRWRH and LPMIHN methods on the four benchmark datasets in terms of average AUC values with 10CV test repeating 5 times

| | Es | ICs | GPCRs | NRs |
|---|---|---|---|---|
| NetlabRLS | 0.956±0.003 | 0.947±0.003 | 0.931±0.003 | 0.856±0.018 |
| NRWRH | 0.954±0.004 | 0.971±0.001 | 0.943±0.002 | 0.868±0.009 |
| LPMIHN | 0.992±0.002 | 0.997±0.0002 | 0.987±0.001 | 0.966±0.005 |

Table S5 Results of KBMF2K, NetCBP, NRWRH and LPMIHN methods on the four benchmark datasets in terms of average AUC values with 5CV test repeating 5 times

| | Es | ICs | GPCRs | NRs |
|---|---|---|---|---|
| KBMF2K | 0.832 | 0.799 | 0.857 | 0.824 |
| NetCBP | 0.983 | 0.986 | 0.971 | 0.888 |
| NRWRH | 0.950±0.001 | 0.969±0.002 | 0.935±0.005 | 0.866±0.02 |
| LPMIHN | 0.976±0.002 | 0.991±0.001 | 0.964±0.002 | 0.94±0.007 |

Table S6 Top 50 predicted potential drug-target interactions for Enzymes (Es). Some are verified manually in the latest online versions of ChEMBL(Marked as 'C'), KEGG DRUG(Marked as 'K'), Drugbank(Marked as 'D') and SuperTarget (Marked as 'S') datasets

| Drug ID | Gene ID | Verified |
|---|---|---|
| D00097 | hsa:5743 | CD |
| D00449 | hsa:5742 | C |
| D00947 | hsa:4129 | C |
| D05458 | hsa:4128 | D |
| D00005 | hsa:4128 | D |
| D00733 | hsa:43 | |
| D01118 | hsa:43 | C |
| D00437 | hsa:1559 | CD |
| D00567 | hsa:1557 | |
| D00126 | hsa:1557 | D |
| D00537 | hsa:759 | |
| D00703 | hsa:762 | |
| D01977 | hsa:22954 | |
| D03218 | hsa:22954 | |
| D03252 | hsa:22954 | |
| D03350 | hsa:22954 | |
| D04023 | hsa:22954 | |
| D04024 | hsa:22954 | |
| D04025 | hsa:22954 | |
| D00593 | hsa:1557 | C |
| D00283 | hsa:1559 | D |
| D00542 | hsa:1571 | CDK |
| D03670 | hsa:1610 | |
| D00139 | hsa:1543 | DK |
| D00293 | hsa:1559 | D |
| D00410 | hsa:1543 | |
| D00217 | hsa:1576 | K |
| D00533 | hsa:1559 | C |
| D00536 | hsa:1559 | C |
| D00454 | hsa:1576 | |
| D01441 | hsa:22954 | |
| D00487 | hsa:590 | D |
| D00994 | hsa:590 | D |
| D00995 | hsa:590 | C |
| D00998 | hsa:590 | C |
| D01001 | hsa:590 | |
| D01228 | hsa:590 | |
| D02068 | hsa:590 | D |
| D02173 | hsa:590 | D |
| D02418 | hsa:590 | C |

| | | |
|---|---|---|
| D02558 | hsa:590 | K |
| D03751 | hsa:590 | C |
| D03823 | hsa:590 | |
| D03826 | hsa:590 | |
| D04292 | hsa:590 | D |
| D00300 | hsa:1576 | |
| D01164 | hsa:1576 | D |
| D02342 | hsa:1576 | |
| D02671 | hsa:1576 | |
| D00217 | hsa:1610 | |

Table S7 Top 50 predicted potential drug-target interactions for Ion Channels. Some are verified manually in the latest online versions of ChEMBL(Marked as 'C'), KEGG DRUG(Marked as 'K'), Drugbank(Marked as 'D') and SuperTarget(Marked as 'S') datasets.

| Drug ID | Gene ID | Verified |
|---|---|---|
| D05453 | hsa:3738 | |
| D02207 | hsa:3782 | |
| D02356 | hsa:6323 | |
| D00616 | hsa:9312 | |
| D03830 | hsa:9312 | |
| D00619 | hsa:9312 | |
| D02356 | hsa:3776 | |
| D00775 | hsa:3778 | |
| D00799 | hsa:3782 | |
| D01448 | hsa:3782 | |
| D02234 | hsa:3782 | |
| D02356 | hsa:3767 | D |
| D02356 | hsa:1080 | |
| D03742 | hsa:6530 | D |
| D00294 | hsa:3767 | K |
| D00480 | hsa:3781 | |
| D00791 | hsa:3781 | |
| D00812 | hsa:3781 | |
| D00816 | hsa:3781 | |
| D01242 | hsa:3781 | |
| D02163 | hsa:3781 | |
| D00228 | hsa:6531 | D |
| D00394 | hsa:6531 | D |
| D00640 | hsa:6336 | |
| D00332 | hsa:6323 | |
| D00512 | hsa:6323 | DK |
| D02356 | hsa:2554 | |
| D00294 | hsa:2554 | |
| D00542 | hsa:3736 | |
| D00538 | hsa:6331 | |
| D00648 | hsa:3758 | |
| D02360 | hsa:6530 | C |
| D02362 | hsa:6530 | D |
| D02356 | hsa:6326 | |
| D00438 | hsa:779 | |
| D01828 | hsa:3758 | |
| D01599 | hsa:3758 | |
| D01799 | hsa:3758 | |
| D01854 | hsa:3758 | |
| D00294 | hsa:3776 | |

| | | |
|---|---|---|
| D00607 | hsa:6531 | |
| D01603 | hsa:6531 | |
| D02237 | hsa:6531 | |
| D02566 | hsa:6531 | C |
| D00294 | hsa:2741 | |
| D02356 | hsa:2741 | |
| D00552 | hsa:6331 | |
| D00542 | hsa:6323 | |
| D00649 | hsa:8911 | |
| D00437 | hsa:6323 | |

Table S8 Top 50 predicted potential drug-target interactions for G-protein coupled receptors. Some are verified manually in the latest online versions of ChEMBL(Marked as 'C'), KEGG DRUG(Marked as 'K'), Drugbank(Marked as 'D') and SuperTarget(Marked as 'S') datasets.

| Drug ID | Gene ID | Verified |
|---|---|---|
| D02910 | hsa:154 | |
| D00454 | hsa:152 | D |
| D02358 | hsa:154 | CD |
| D04625 | hsa:154 | CK |
| D00283 | hsa:152 | D |
| D02614 | hsa:154 | |
| D00683 | hsa:153 | |
| D00684 | hsa:153 | D |
| D00687 | hsa:153 | S |
| D00688 | hsa:153 | S |
| D01386 | hsa:153 | K |
| D02147 | hsa:153 | D |
| D02359 | hsa:153 | |
| D05792 | hsa:153 | C |
| D00283 | hsa:11255 | |
| D00760 | hsa:1128 | |
| D00765 | hsa:1128 | |
| D00513 | hsa:152 | C |
| D00110 | hsa:4988 | |
| D00332 | hsa:135 | C |
| D00437 | hsa:152 | D |
| D00255 | hsa:152 | C |
| D00726 | hsa:1129 | |
| D01713 | hsa:152 | |
| D02356 | hsa:152 | |
| D02327 | hsa:1129 | |
| D00613 | hsa:1813 | |

| | | |
|---|---|---|
| D00110 | hsa:1813 | |
| D00525 | hsa:1129 | K |
| D00715 | hsa:1129 | K |
| D01103 | hsa:1129 | K |
| D01118 | hsa:1129 | K |
| D01269 | hsa:1129 | D |
| D01297 | hsa:1129 | |
| D00604 | hsa:148 | C |
| D00604 | hsa:147 | |
| D00283 | hsa:4543 | |
| D00283 | hsa:1814 | CD |
| D00454 | hsa:4543 | |
| D00095 | hsa:155 | K |
| D00270 | hsa:152 | |
| D00136 | hsa:152 | |
| D00318 | hsa:3269 | |
| D00235 | hsa:155 | |
| D00598 | hsa:155 | |
| D00601 | hsa:155 | |
| D00632 | hsa:155 | |
| D00635 | hsa:155 | |
| D00645 | hsa:155 | |
| D02342 | hsa:155 | |

Table S9 Top 50 predicted potential drug-target interactions for Nuclear receptors. Some are verified manually in the latest online versions of ChEMBL(Marked as 'C'), KEGG DRUG(Marked as 'K'), Drugbank(Marked as 'D') and SuperTarget(Marked as 'S') datasets.

| Drug ID | Gene ID | Verified |
|---|---|---|
| D00585 | hsa:2099 | C |
| D00182 | hsa:2099 | C |
| D00951 | hsa:2099 | D |
| D00690 | hsa:2099 | |
| D01217 | hsa:2099 | |
| D00577 | hsa:5241 | |
| D00105 | hsa:5241 | |
| D01161 | hsa:5241 | |
| D02217 | hsa:5241 | |
| D04066 | hsa:5241 | |
| D00327 | hsa:5241 | |
| D00066 | hsa:2100 | |
| D00950 | hsa:2100 | |
| D00954 | hsa:2100 | |

| | | |
|---|---|---|
| D01294 | hsa:2100 | |
| D02367 | hsa:2100 | |
| D00067 | hsa:5241 | |
| D00312 | hsa:5241 | |
| D00554 | hsa:5241 | |
| D00898 | hsa:5241 | |
| D00962 | hsa:5241 | |
| D00327 | hsa:2100 | |
| D00067 | hsa:2100 | K |
| D00312 | hsa:2100 | K |
| D00554 | hsa:2100 | CK |
| D00898 | hsa:2100 | CK |
| D00962 | hsa:2100 | K |
| D00075 | hsa:2099 | C |
| D00462 | hsa:2099 | |
| D00586 | hsa:2099 | C |
| D00956 | hsa:2099 | |
| D00961 | hsa:2099 | |
| D00965 | hsa:2099 | |
| D00066 | hsa:367 | K |
| D00950 | hsa:367 | D |
| D00954 | hsa:367 | D |
| D01294 | hsa:367 | C |
| D02367 | hsa:367 | |
| D00577 | hsa:367 | |
| D00316 | hsa:6096 | |
| D00088 | hsa:5241 | |
| D00246 | hsa:5241 | |
| D01387 | hsa:5241 | |
| D01689 | hsa:5241 | |
| D00066 | hsa:2908 | |
| D00950 | hsa:2908 | C |
| D00954 | hsa:2908 | C |
| D01294 | hsa:2908 | C |
| D02367 | hsa:2908 | |
| D00105 | hsa:367 | |