

IRWNRLMF OUTPUT SUMMARY

RW parameters: $W_q=0.8, W_u=0.4, r_q=0.8, r_u=0.4$

NRLMF parameters: $r=20, c=5, K_1=5, \lambda_1=2, \lambda_p=2, \alpha=1, \beta=1, \gamma=0.01, K_2=5$

CVS-1: 10-fold cross validation on rows(represents RNAs) in the interaction matrix. The rows were randomly split into 10 equal sets. For each such set:

1. Entries of rows in that set are made 0
2. IRWNRLMF is performed with this set of RNAs as the negative RNA set
3. ROC curve and PR curve are drawn taking the negative RNA set as the test set

[Jump to CVS-1 average results](#)

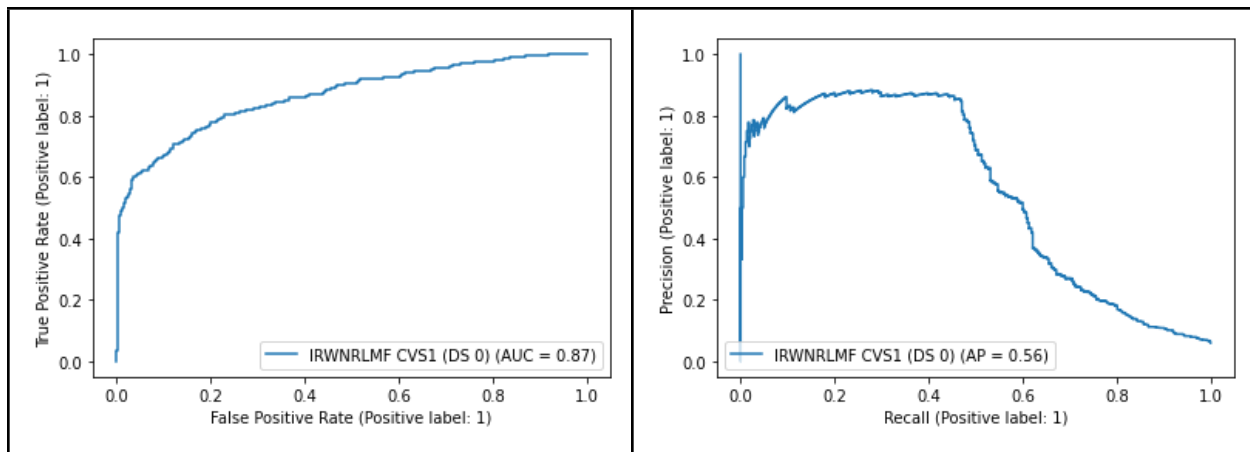
+++ IRWNRLMF CVS-1: Dataset-0 +++

Negative RNA set=

[41, 795, 648, 51, 314, 555, 85, 115, 548, 90, 805, 675, 279, 133, 636, 662, 79, 768, 868, 606, 345, 739, 579, 855, 881, 682, 14, 230, 127, 853, 355, 383, 39, 922, 244, 113, 236, 568, 501, 275, 488, 669, 329, 680, 55, 700, 178, 421, 538, 298, 981, 495, 181, 444, 740, 418, 285, 296, 45, 604, 420, 630, 760, 741, 765, 796, 534, 325, 558, 754, 608, 882, 778, 242, 451, 129, 524, 158, 409, 303, 823, 511, 40, 553, 121, 626, 138, 820, 717, 185, 223, 38, 428, 977, 144, 476, 153, 60, 482]

AUROC=0.8663847994160181

AUPR=0.5562158822828673



IRWNRLMF CVS-1 ROC Curve DS-0

IRWNRLMF CVS-1 PR Curve DS-0

+++ IRWNRLMF CVS-1: Dataset-1 +++

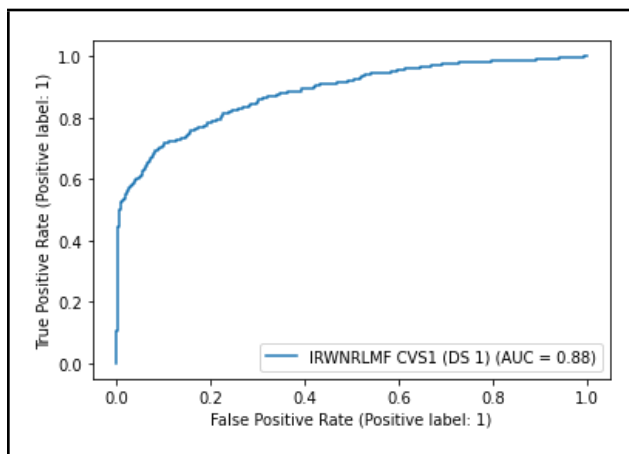
Negative RNA set=

[59, 78, 797, 893, 491, 99, 632, 318, 52, 199, 905, 519, 749, 635, 123, 753, 179, 381, 446, 126, 767, 17, 356, 622, 215, 156, 175, 205, 137, 657, 132, 416, 824, 667, 970, 987, 845, 423, 769, 114, 592, 429, 200, 88, 932,

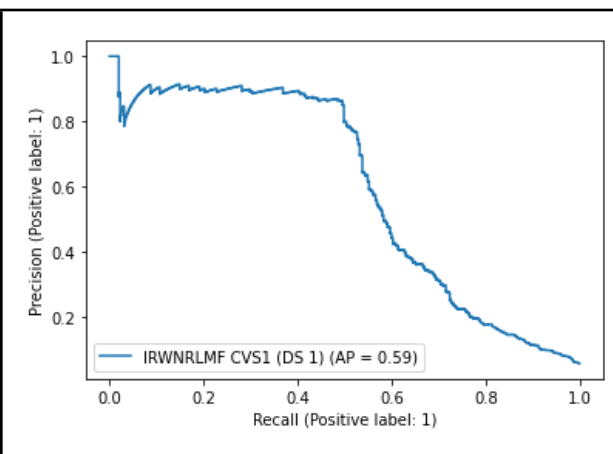
426, 928, 436, 260, 707, 150, 500, 980, 344, 589, 33, 320, 98, 730, 983,
798, 278, 645, 417, 697, 763, 521, 168, 918, 266, 453, 629, 770, 956, 874,
209, 352, 16, 74, 371, 163, 456, 889, 317, 673, 292, 503, 340, 312, 725,
110, 29, 419, 706, 595, 574, 986, 44, 396]

AUROC=0.8819114990898408

AUPR=0.5926651889498512



IRWNRLMF CVS-1 ROC Curve DS-1



IRWNRLMF CVS-1 PR Curve DS-1

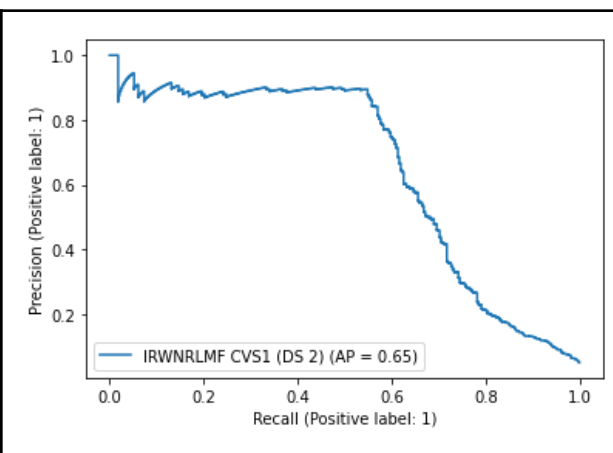
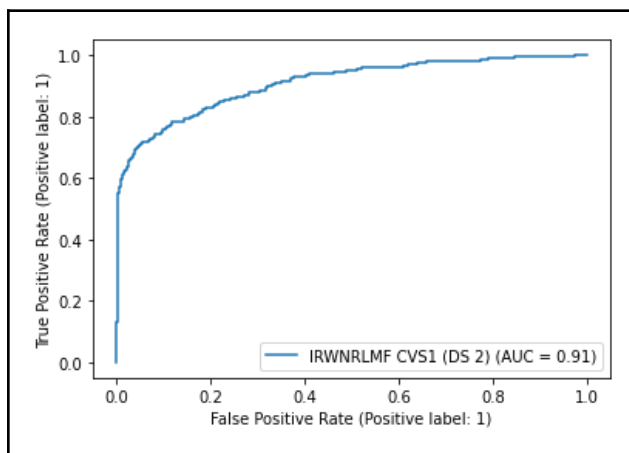
+++ IRWNRLMF CVS-1: Dataset-2 +++

Negative RNA set=

[910, 294, 257, 527, 935, 672, 478, 985, 427, 390, 406, 591, 148, 972,
134, 929, 391, 369, 880, 231, 50, 342, 87, 497, 26, 698, 290, 597, 750,
614, 844, 357, 618, 164, 48, 670, 336, 452, 508, 118, 393, 483, 644, 6,
224, 170, 439, 968, 651, 399, 580, 687, 807, 225, 842, 718, 964, 830, 576,
313, 712, 61, 627, 962, 378, 238, 270, 624, 886, 557, 167, 676, 77, 346,
546, 349, 119, 896, 879, 745, 375, 904, 139, 960, 600, 963, 210, 808, 734,
726, 384, 794, 339, 198, 737, 875, 777, 898, 971]

AUROC=0.9089748170227534

AUPR=0.6490160220979847



IRWNRLMF CVS-1 ROC Curve DS-2

IRWNRLMF CVS-1 PR Curve DS-2

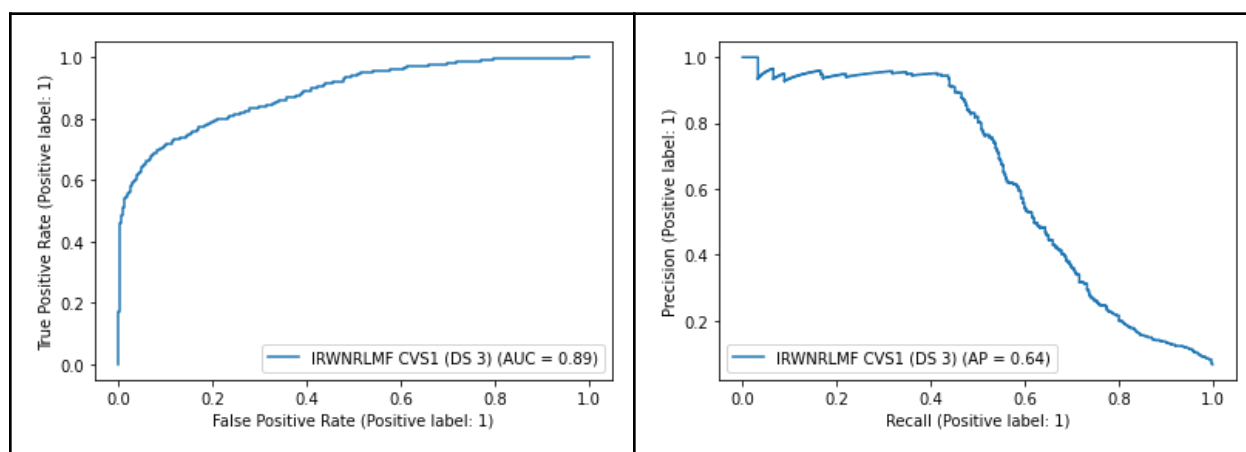
+++ IRWNRLMF CVS-1: Dataset-3 +++

Negative RNA set=

[908, 713, 177, 58, 18, 36, 654, 316, 510, 665, 322, 887, 191, 561, 442, 68, 64, 81, 793, 817, 291, 828, 738, 227, 268, 540, 974, 685, 490, 723, 463, 748, 773, 402, 188, 596, 686, 293, 319, 184, 530, 642, 564, 825, 404, 337, 76, 485, 496, 368, 701, 392, 756, 517, 911, 489, 160, 509, 920, 659, 832, 803, 702, 533, 289, 736, 385, 850, 601, 714, 333, 71, 3, 693, 410, 57, 751, 20, 347, 380, 75, 407, 678, 364, 897, 360, 477, 136, 683, 10, 719, 869, 650, 398, 274, 258, 955, 923, 967]

AUROC=0.8865851043718093

AUPR=0.6401208833953368



IRWNRLMF CVS-1 ROC Curve DS-3

IRWNRLMF CVS-1 PR Curve DS-3

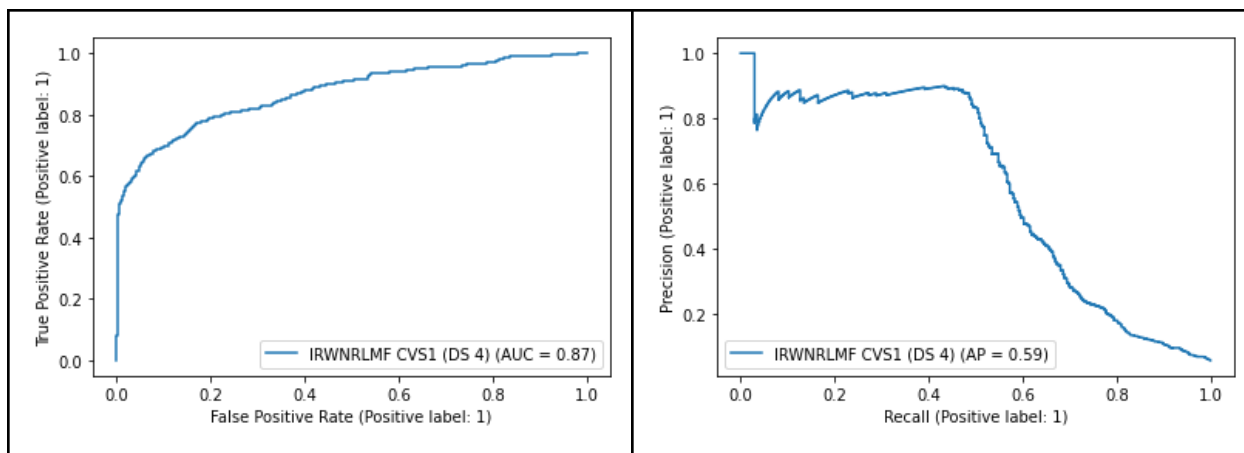
+++ IRWNRLMF CVS-1: Dataset-4 +++

Negative RNA set=

[906, 162, 512, 916, 359, 716, 598, 628, 166, 762, 152, 27, 934, 901, 467, 810, 565, 806, 379, 186, 502, 790, 699, 400, 473, 552, 663, 72, 666, 942, 708, 780, 433, 228, 688, 480, 23, 633, 696, 21, 822, 124, 157, 273, 247, 102, 264, 927, 173, 171, 776, 2, 250, 338, 771, 569, 457, 567, 249, 382, 843, 394, 220, 689, 913, 572, 722, 206, 15, 811, 846, 363, 47, 255, 812, 865, 69, 13, 131, 438, 728, 373, 189, 324, 479, 387, 514, 232, 374, 958, 447, 315, 469, 671, 7, 425, 226, 265, 321]

AUROC=0.872447925632639

AUPR=0.5916930333556554



IRWNRLMF CVS-1 ROC Curve DS-4

IRWNRLMF CVS-1 PR Curve DS-4

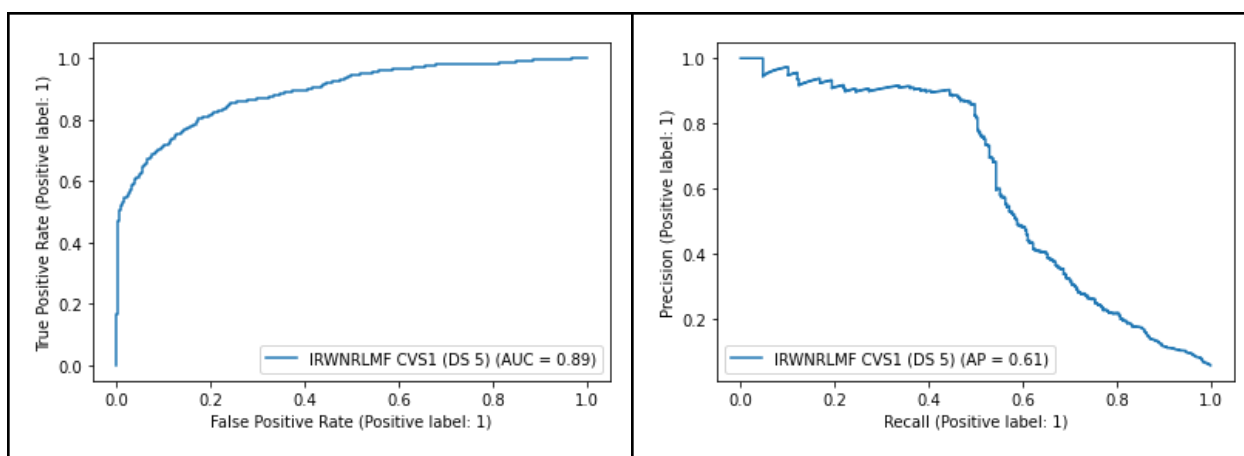
+++ IRWNRLMF CVS-1: Dataset-5 +++

Negative RNA set=

[612, 775, 610, 570, 755, 839, 306, 938, 193, 656, 103, 826, 358, 801, 590, 108, 422, 1, 116, 703, 24, 341, 89, 613, 30, 554, 251, 833, 891, 646, 494, 705, 563, 125, 207, 802, 197, 243, 621, 562, 222, 783, 903, 233, 281, 376, 142, 543, 141, 464, 603, 877, 940, 212, 262, 208, 545, 924, 70, 311, 239, 900, 731, 520, 412, 930, 348, 791, 945, 631, 607, 878, 836, 180, 829, 952, 19, 800, 254, 176, 989, 86, 544, 899, 787, 195, 466, 155, 885, 652, 461, 586, 299, 328, 766, 437, 245, 715, 435]

AUROC=0.8923836279674368

AUPR=0.6148617776393579



IRWNRLMF CVS-1 ROC Curve DS-5

IRWNRLMF CVS-1 PR Curve DS-5

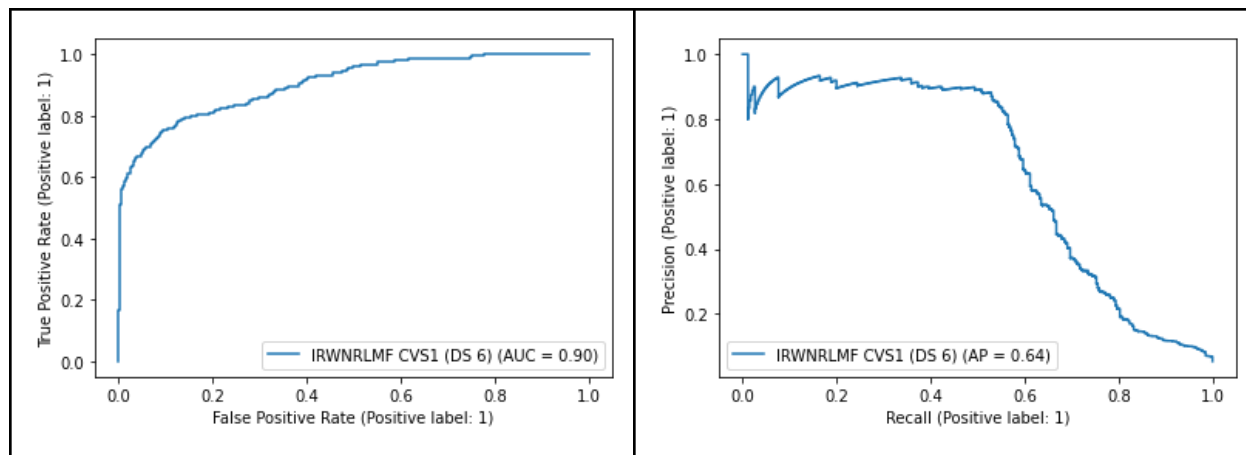
+++ IRWNRLMF CVS-1: Dataset-6 +++

Negative RNA set=

[0, 513, 895, 440, 909, 792, 764, 484, 12, 190, 335, 581, 735, 744, 605, 458, 747, 403, 786, 863, 277, 547, 757, 367, 411, 733, 804, 174, 269, 535, 710, 308, 276, 943, 487, 187, 902, 936, 742, 784, 684, 498, 531, 861, 252, 388, 815, 42, 594, 5, 984, 625, 821, 873, 122, 146, 493, 84, 862, 106, 858, 841, 104, 949, 235, 256, 472, 819, 470, 246, 386, 194, 213, 743, 661, 37, 31, 432, 370, 172, 272, 660, 301, 165, 53, 25, 101, 912, 550, 196, 532, 253, 107, 602, 83, 840, 240, 468, 504]

AUROC=0.9047325668092453

AUPR=0.6414861080646395



IRWNRLMF CVS-1 ROC Curve DS-6

IRWNRLMF CVS-1 PR Curve DS-6

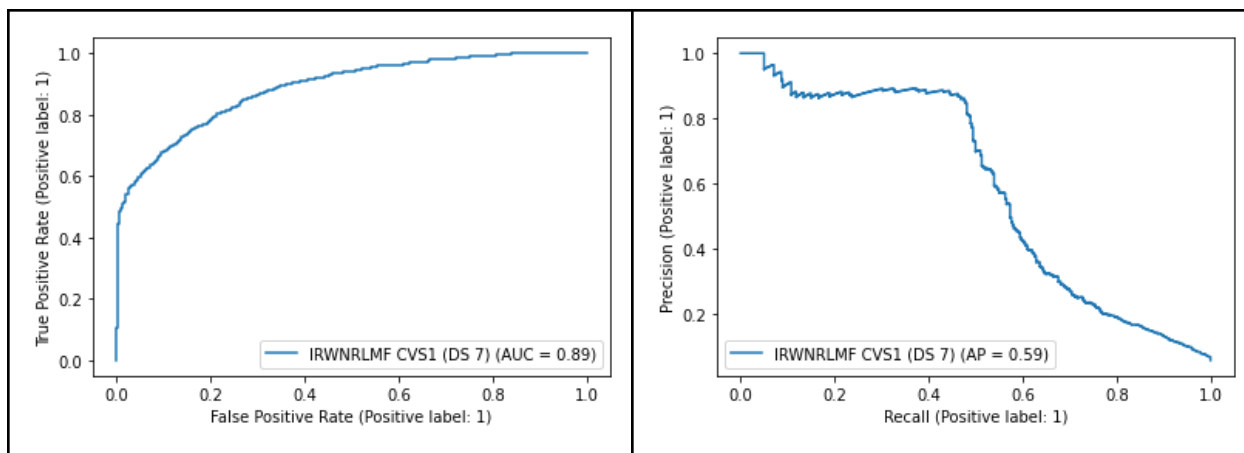
+++ IRWNRLMF CVS-1: Dataset-7 +++

Negative RNA set=

[837, 692, 523, 831, 818, 761, 720, 46, 681, 785, 690, 691, 577, 639, 587, 413, 838, 183, 921, 56, 588, 854, 976, 192, 111, 234, 507, 82, 516, 219, 655, 377, 105, 332, 888, 637, 323, 54, 724, 649, 859, 926, 695, 947, 876, 782, 334, 870, 448, 397, 539, 948, 286, 975, 809, 857, 248, 263, 529, 408, 933, 515, 35, 599, 727, 63, 431, 326, 62, 471, 302, 159, 573, 851, 182, 860, 414, 424, 395, 154, 443, 582, 241, 455, 327, 653, 449, 445, 522, 259, 11, 94, 151, 8, 944, 774, 872, 218, 732]

AUROC=0.8870493266409814

AUPR=0.5881875885594052



IRWNRLMF CVS-1 ROC Curve DS-7

IRWNRLMF CVS-1 PR Curve DS-7

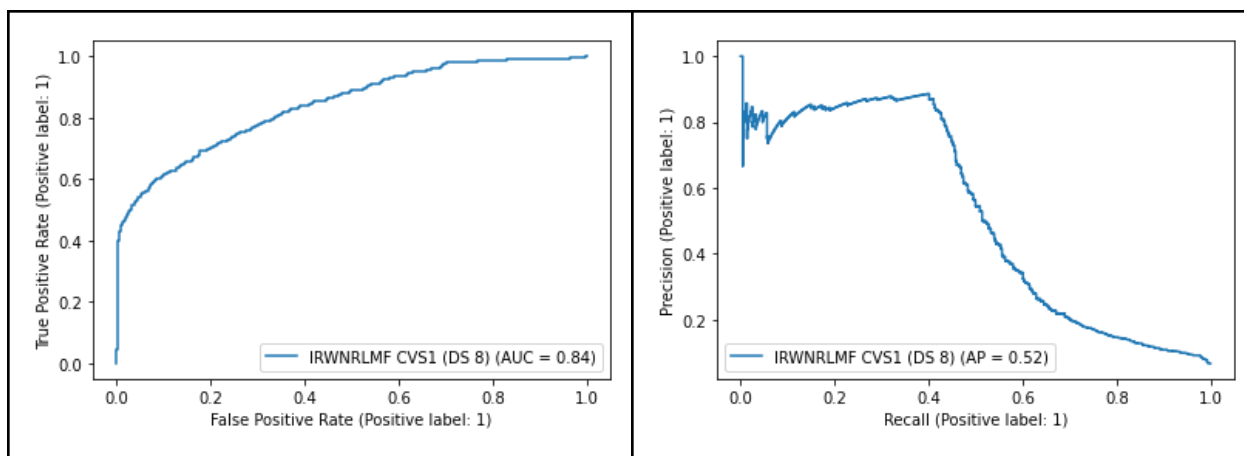
+++ IRWNRLMF CVS-1: Dataset-8 +++

Negative RNA set=

[145, 640, 267, 475, 309, 372, 465, 288, 961, 620, 161, 434, 430, 641, 729, 638, 931, 287, 282, 280, 100, 362, 616, 867, 204, 43, 95, 835, 583, 330, 93, 350, 34, 135, 366, 890, 950, 295, 361, 759, 969, 499, 946, 73, 307, 907, 450, 441, 169, 526, 609, 575, 486, 221, 283, 214, 459, 140, 894, 49, 67, 405, 847, 551, 973, 866, 619, 149, 979, 117, 988, 305, 611, 623, 849, 571, 584, 271, 143, 566, 201, 746, 300, 128, 454, 474, 941, 788, 9, 351, 506, 541, 401, 664, 536, 643, 66, 109, 556]

AUROC=0.8416251598706737

AUPR=0.5188277669127906



IRWNRLMF CVS-1 ROC Curve DS-8

IRWNRLMF CVS-1 PR Curve DS-8

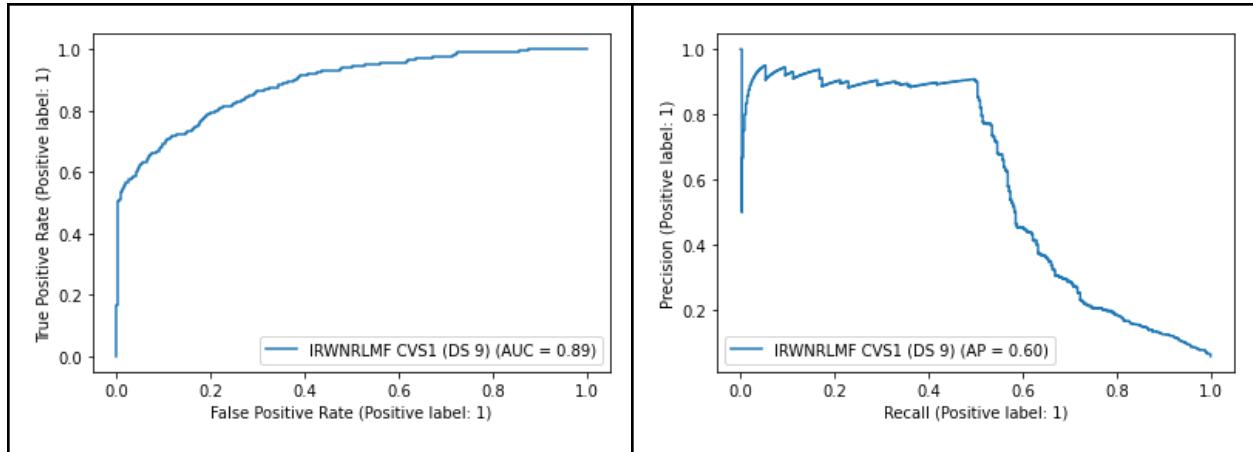
+++ IRWNRLMF CVS-1: Dataset-9 +++

Negative RNA set=

[677, 593, 92, 704, 965, 462, 112, 147, 816, 310, 389, 549, 96, 304, 647, 848, 559, 585, 721, 615, 120, 937, 284, 97, 957, 709, 91, 978, 22, 674, 752, 827, 814, 492, 202, 4, 884, 799, 966, 871, 856, 331, 217, 481, 237, 919, 28, 953, 528, 537, 216, 864, 883, 211, 668, 542, 578, 525, 415, 353, 261, 915, 982, 617, 758, 65, 781, 789, 365, 658, 460, 779, 959, 925, 917, 694, 939, 229, 834, 679, 343, 518, 711, 203, 297, 634, 914, 951, 130, 892, 772, 560, 852, 505, 813, 80, 354, 954, 32]

AUROC=0.8879397217994073

AUPR=0.600955102151874



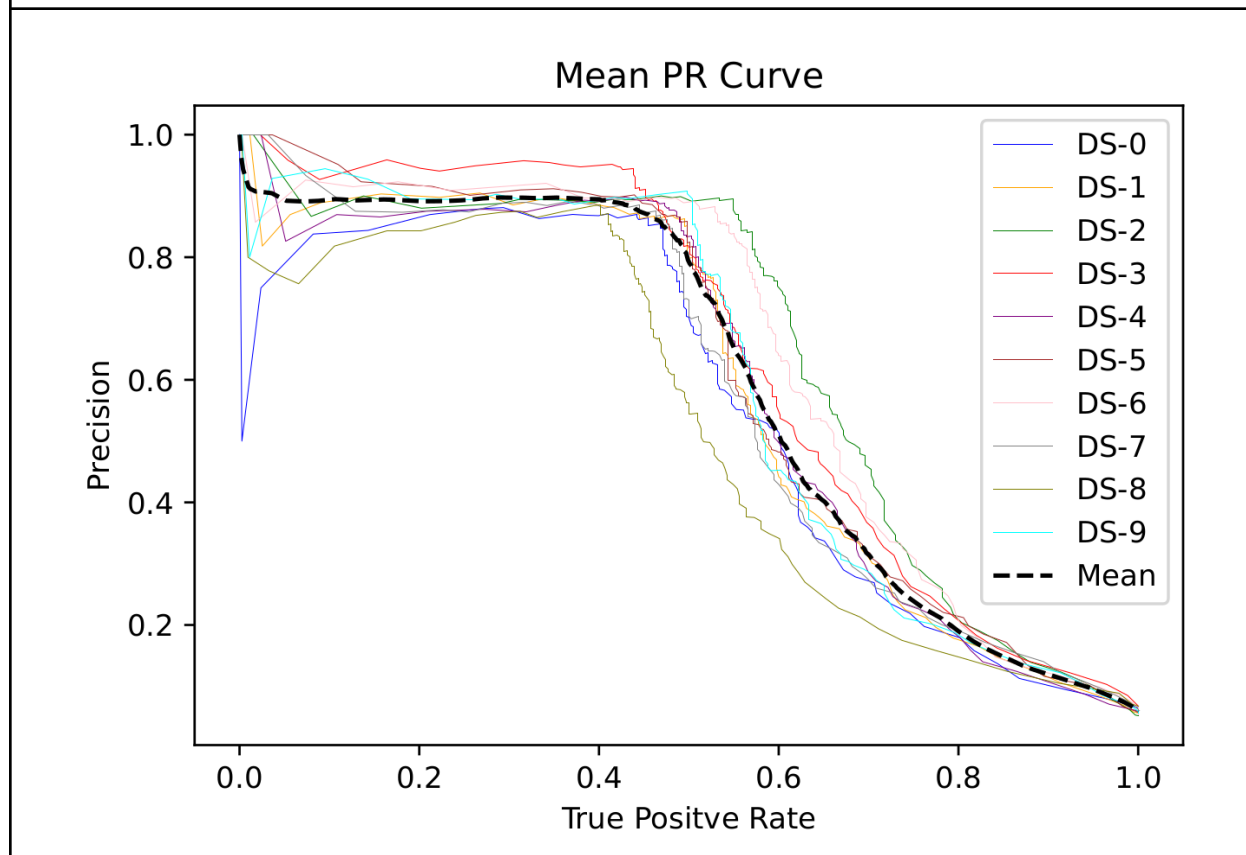
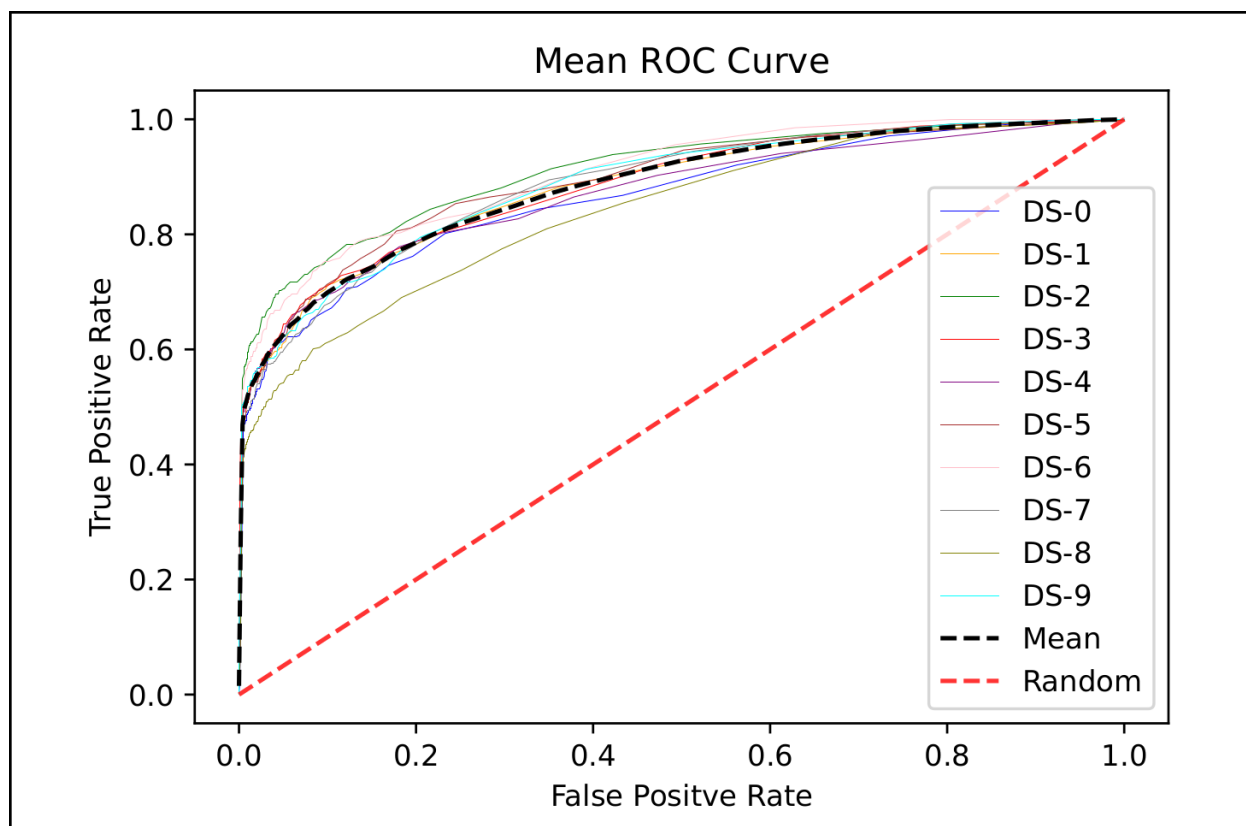
IRWNRLMF CVS-1 ROC Curve DS-9

IRWNRLMF CVS-1 PR Curve DS-9

AVERAGE RESULTS CVS-1:

AUROC (arithmetic mean) = **0.8830034548620805**

AUPR (arithmetic mean) = **0.5994029353409763**

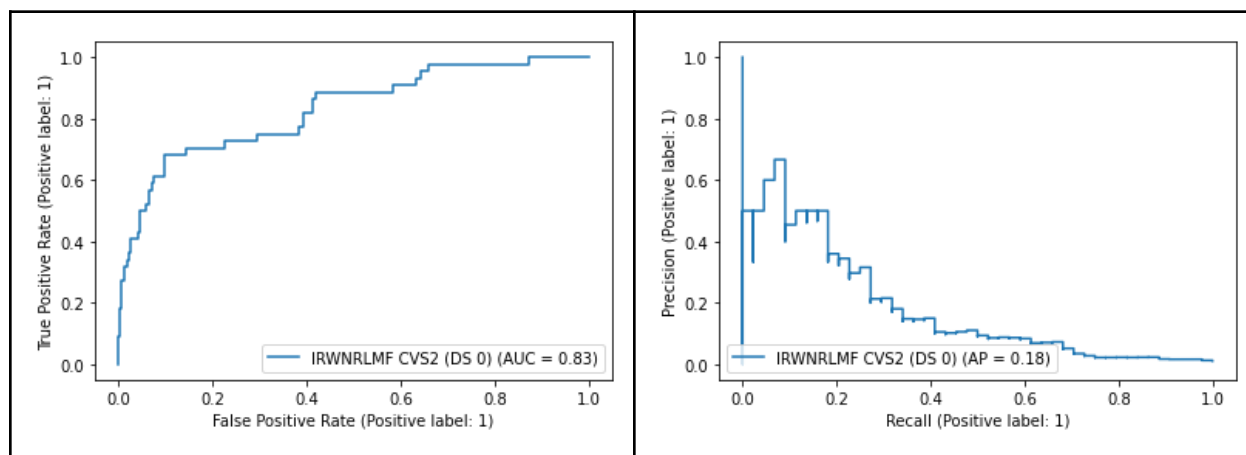


CVS-2: 16-fold cross validation on columns(represents Proteins) in the interaction matrix. The columns were randomly split into 16 equal sets(took 16 for ease of division since the total number of proteins taken is 64). For each such set:

1. Entries of columns in that set are made 0
2. IRWNRLMF is performed with this set of proteins as the negative protein set (Since RW cannot be performed on proteins in the negative protein set, S_r values for those proteins are uniformly set to $1/\text{rna_cnt}(=1/990)$)
3. ROC curve and PR curve are drawn taking the negative protein set as the test set

[Jump to CVS-2 average results](#)

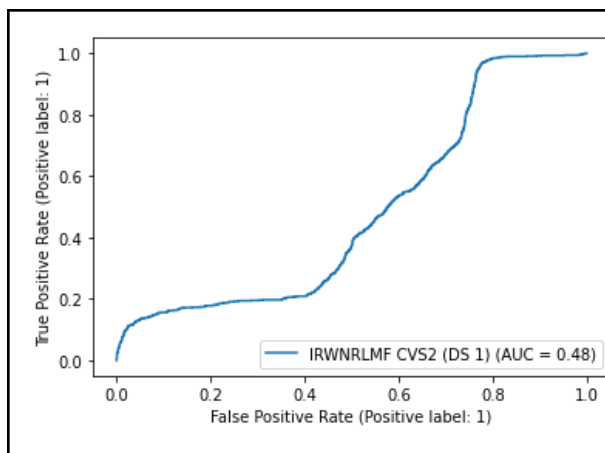
```
+++ IRWNRLMF CVS-2: Dataset-0 +++
Negative protein set= [26, 32, 60, 27]
AUROC=0.8313446002414338
AUPR=0.18177575749349448
```



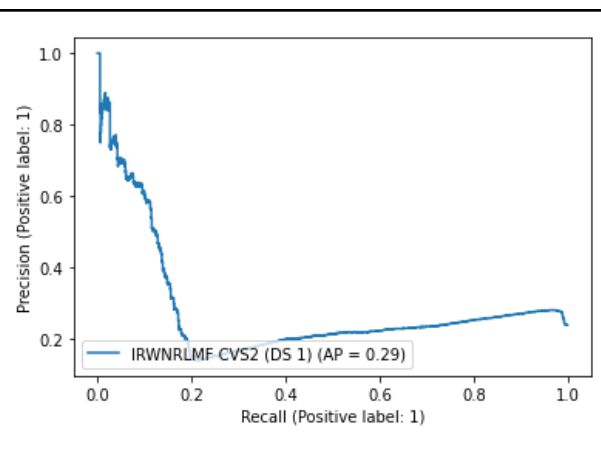
IRWNRLMF CVS-2 ROC Curve DS-0

IRWNRLMF CVS-2 PR Curve DS-0

```
+++ IRWNRLMF CVS-2: Dataset-1 +++
Negative protein set= [16, 8, 4, 48]
AUROC=0.4817600621543856
AUPR=0.28620904837324557
```

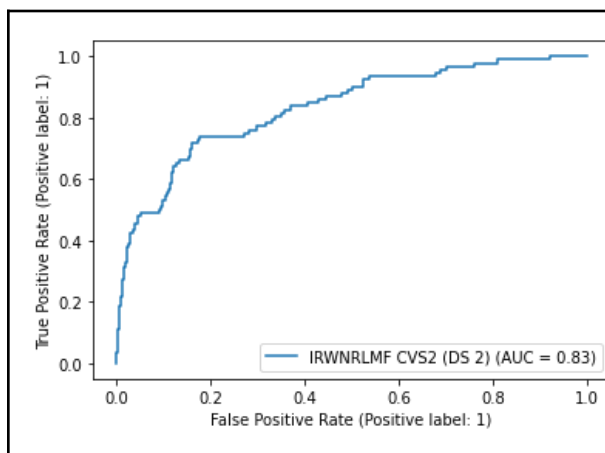


IRWNRLMF CVS-2 ROC Curve DS-1

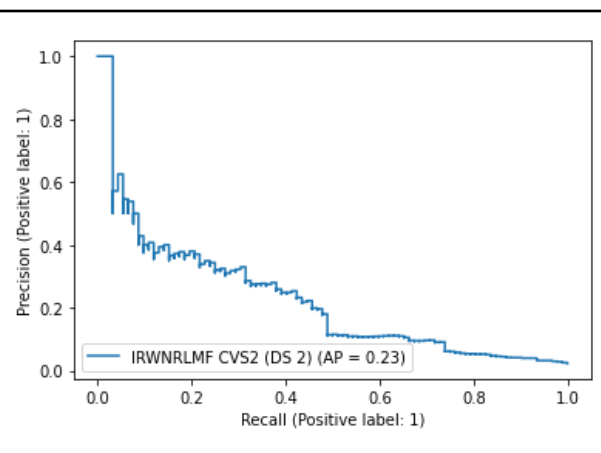


IRWNRLMF CVS-2 PR Curve DS-1

+++ IRWNRLMF CVS-2: Dataset-2 +++
 Negative protein set= [15, 55, 42, 51]
 AUROC=0.8321006249718987
 AUPR=0.22584042058808942

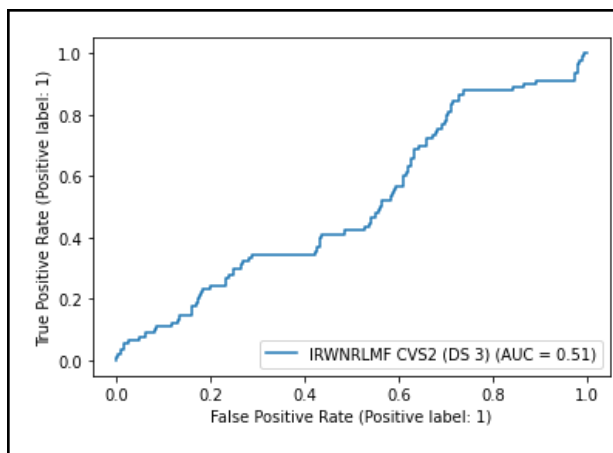


IRWNRLMF CVS-2 ROC Curve DS-2

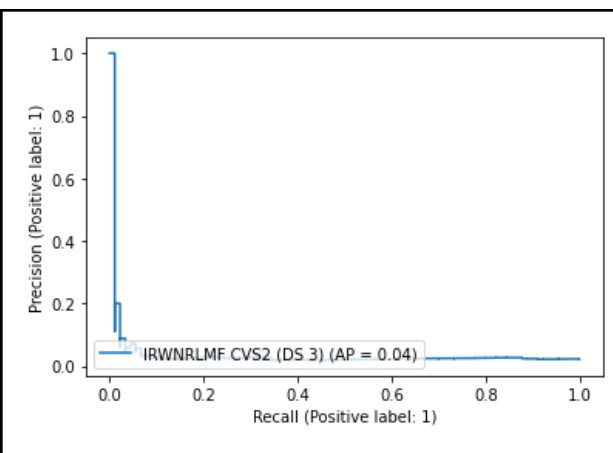


IRWNRLMF CVS-2 PR Curve DS-2

+++ IRWNRLMF CVS-2: Dataset-3 +++
 Negative protein set= [36, 47, 41, 14]
 AUROC=0.5098105081826012
 AUPR=0.03873266050845152

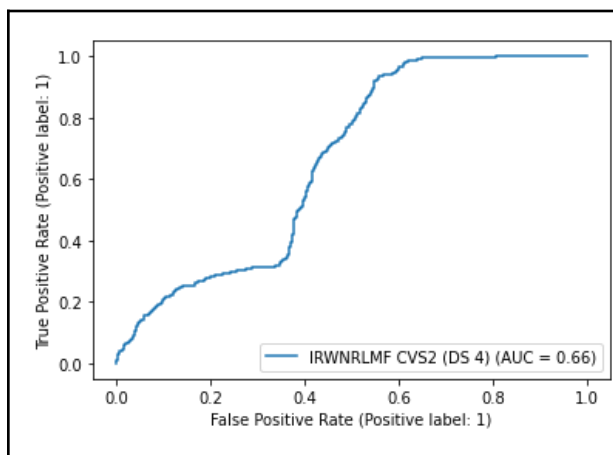


IRWNRLMF CVS-2 ROC Curve DS-3

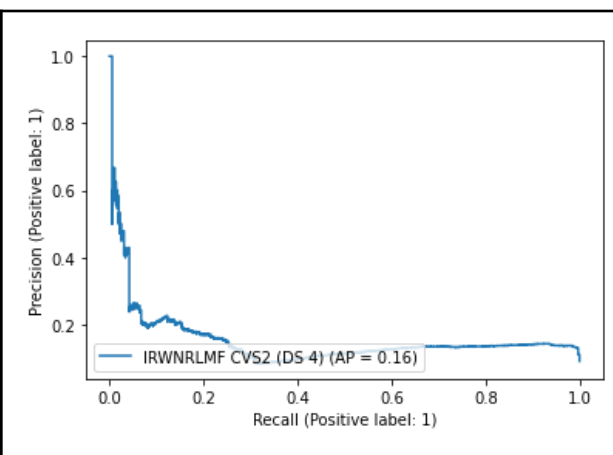


IRWNRLMF CVS-2 PR Curve DS-3

+++ IRWNRLMF CVS-2: Dataset-4 +++
 Negative protein set= [35, 63, 6, 17]
 AUROC=0.6600934017792518
 AUPR=0.15719849574274217

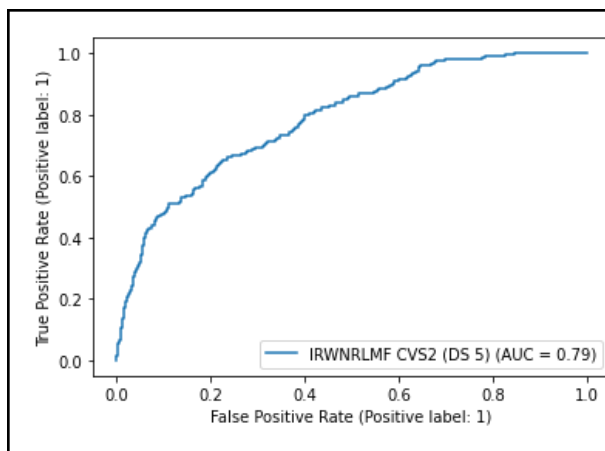


IRWNRLMF CVS-2 ROC Curve DS-4

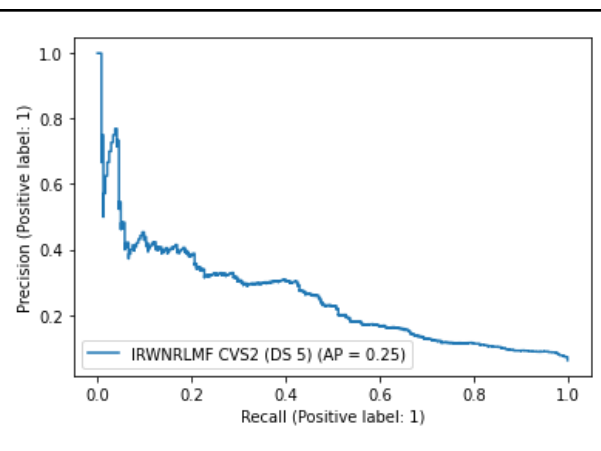


IRWNRLMF CVS-2 PR Curve DS-4

+++ IRWNRLMF CVS-2: Dataset-5 +++
 Negative protein set= [0, 61, 40, 10]
 AUROC=0.7876679899883968
 AUPR=0.2526058824994711

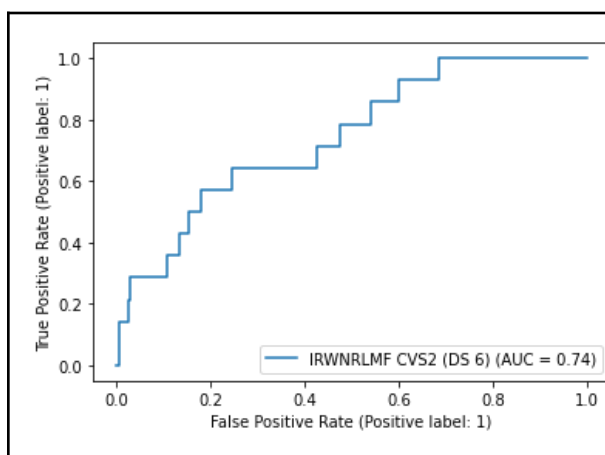


IRWNRLMF CVS-2 ROC Curve DS-5

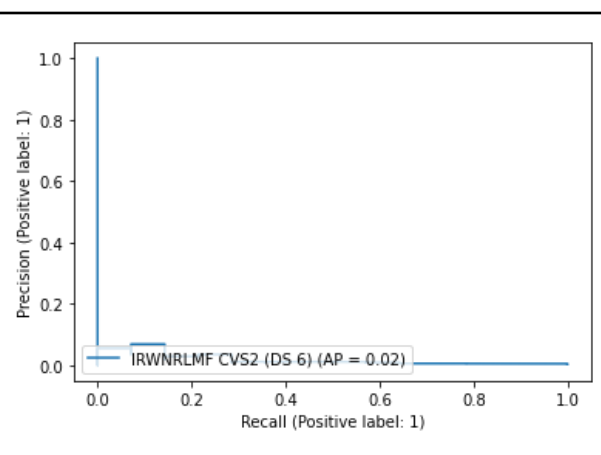


IRWNRLMF CVS-2 PR Curve DS-5

+++ IRWNRLMF CVS-2: Dataset-6 +++
 Negative protein set= [62, 58, 50, 52]
 AUROC=0.7423068568532329
 AUPR=0.019402066384377633

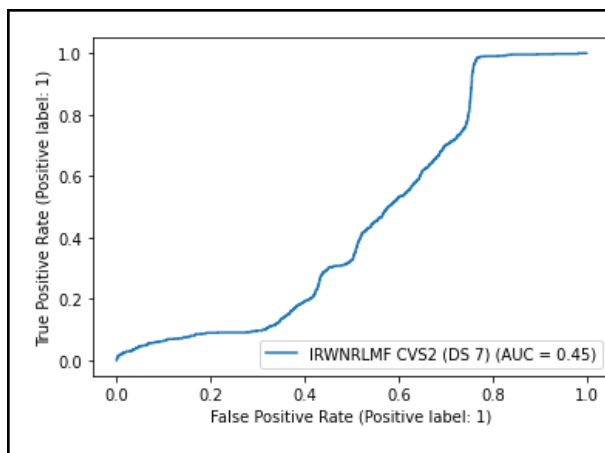


IRWNRLMF CVS-2 ROC Curve DS-6

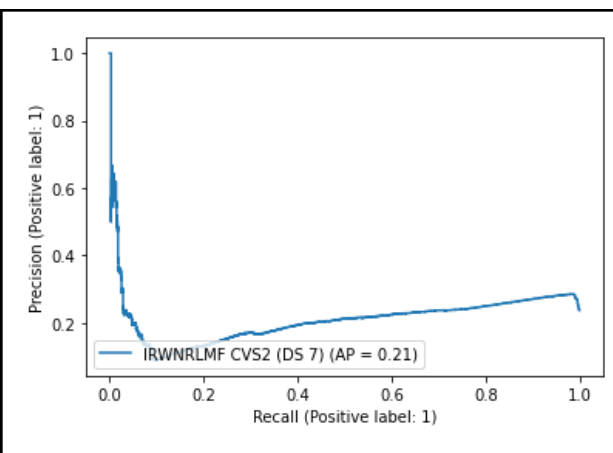


IRWNRLMF CVS-2 PR Curve DS-6

+++ IRWNRLMF CVS-2: Dataset-7 +++
 Negative protein set= [38, 34, 39, 1]
 AUROC=0.45173596679826233
 AUPR=0.21486759328037752

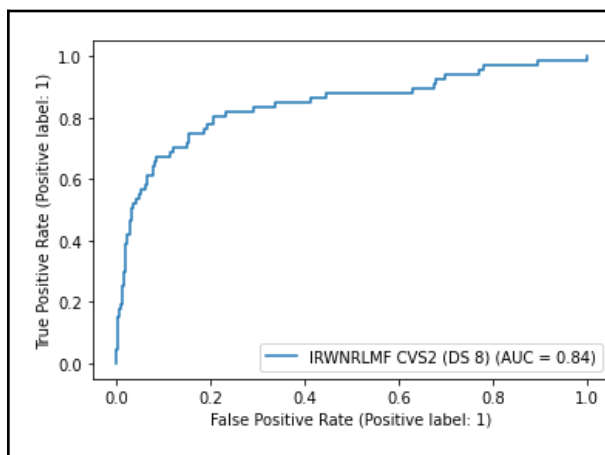


IRWNRLMF CVS-2 ROC Curve DS-7

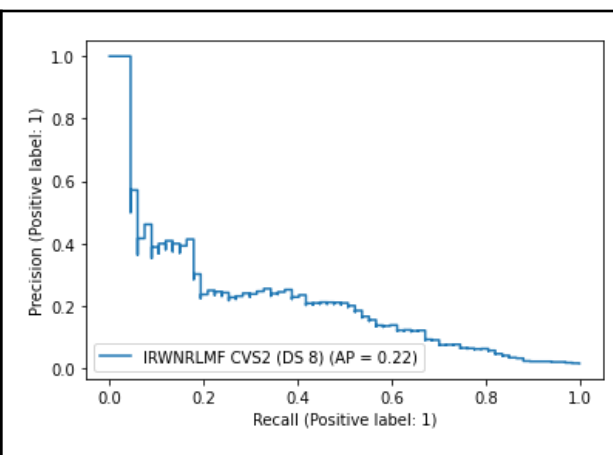


IRWNRLMF CVS-2 PR Curve DS-7

+++ IRWNRLMF CVS-2: Dataset-8 +++
 Negative protein set= [19, 25, 22, 5]
 AUROC=0.8434081838431782
 AUPR=0.2194671685887401

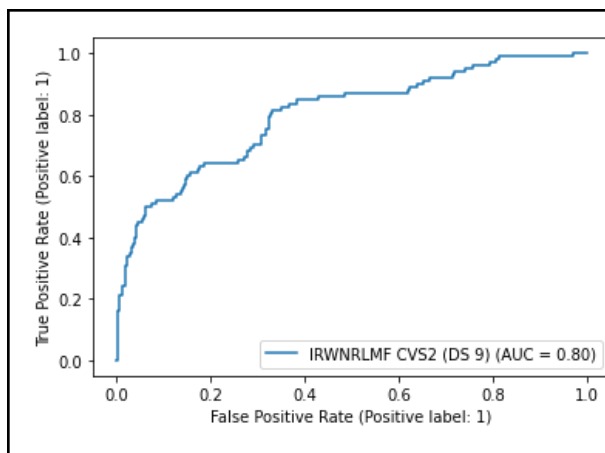


IRWNRLMF CVS-2 ROC Curve DS-8

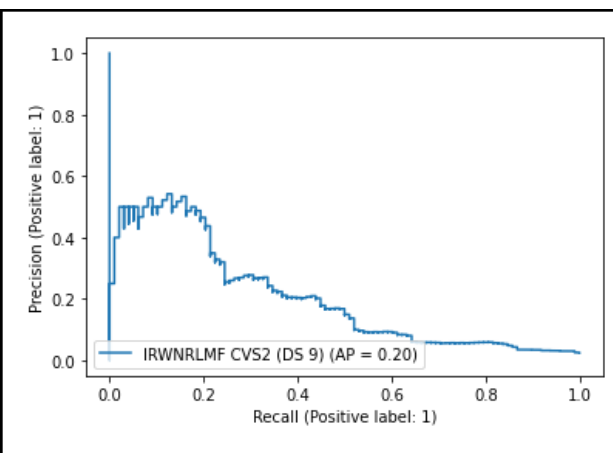


IRWNRLMF CVS-2 PR Curve DS-8

+++ IRWNRLMF CVS-2: Dataset-9 +++
 Negative protein set= [3, 54, 7, 44]
 AUROC=0.7991761696910767
 AUPR=0.20165941725467798

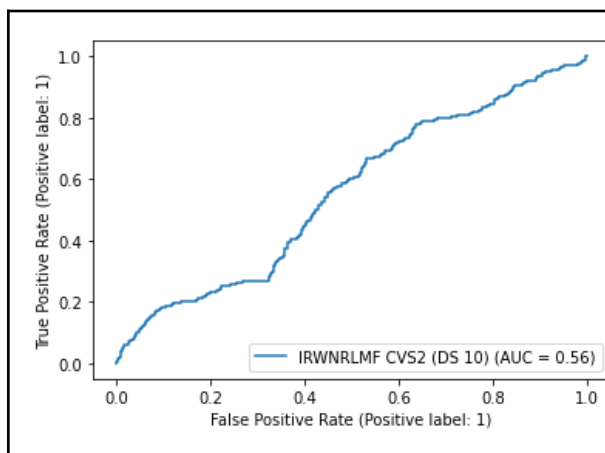


IRWNRLMF CVS-2 ROC Curve DS-9

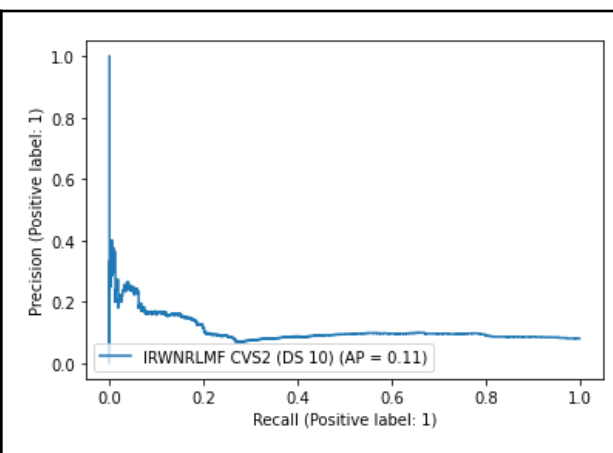


IRWNRLMF CVS-2 PR Curve DS-9

+++ IRWNRLMF CVS-2: Dataset-10 +++
 Negative protein set= [11, 24, 28, 18]
 AUROC=0.556124659608717
 AUPR=0.11026049875296538

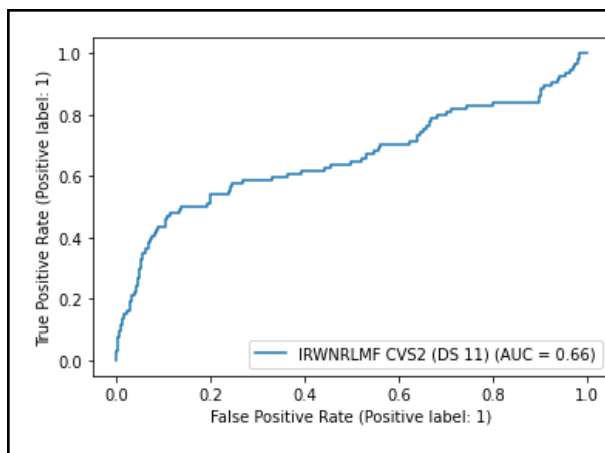


IRWNRLMF CVS-2 ROC Curve DS-10

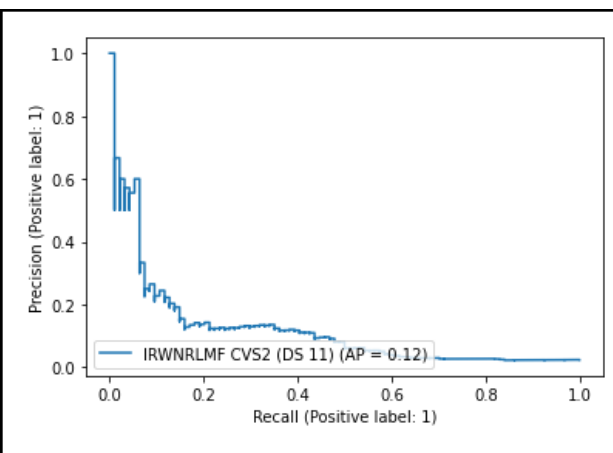


IRWNRLMF CVS-2 PR Curve DS-10

+++ IRWNRLMF CVS-2: Dataset-11 +++
 Negative protein set= [9, 56, 53, 12]
 AUROC=0.6584765164940397
 AUPR=0.12159164211872703

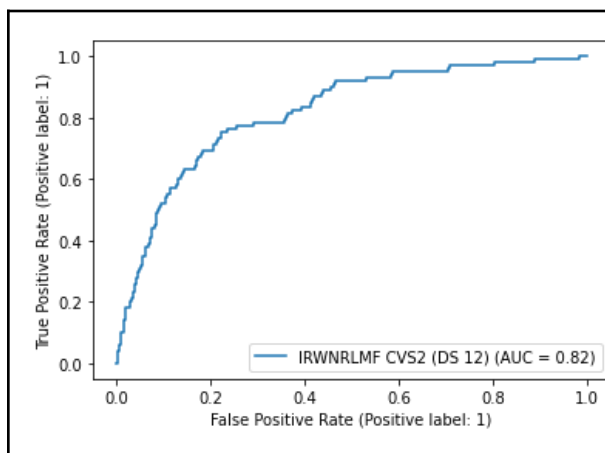


IRWNRLMF CVS-2 ROC Curve DS-11

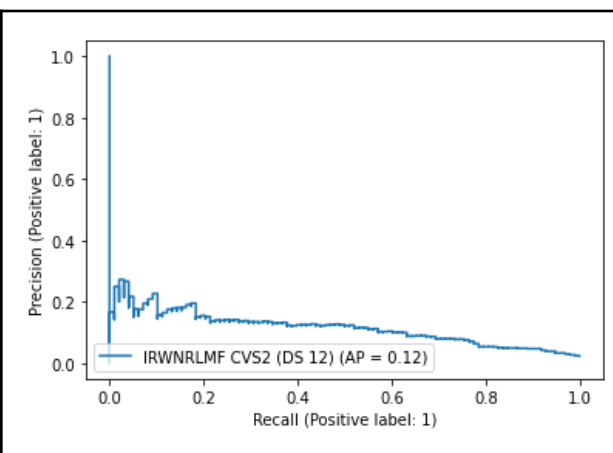


IRWNRLMF CVS-2 PR Curve DS-11

+++ IRWNRLMF CVS-2: Dataset-12 +++
 Negative protein set= [43, 21, 37, 31]
 AUROC=0.8183213730857439
 AUPR=0.11539629485154565

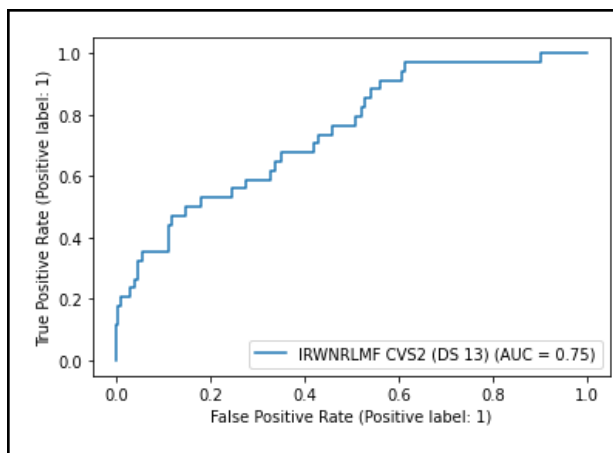


IRWNRLMF CVS-2 ROC Curve DS-12

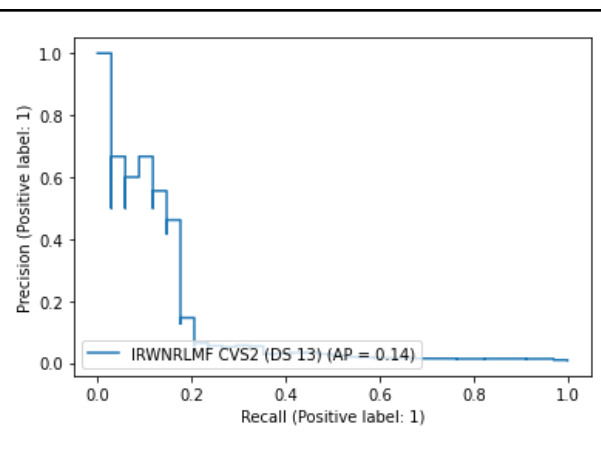


IRWNRLMF CVS-2 PR Curve DS-12

+++ IRWNRLMF CVS-2: Dataset-13 +++
 Negative protein set= [59, 20, 57, 29]
 AUROC=0.745849689850469
 AUPR=0.14099552718907526

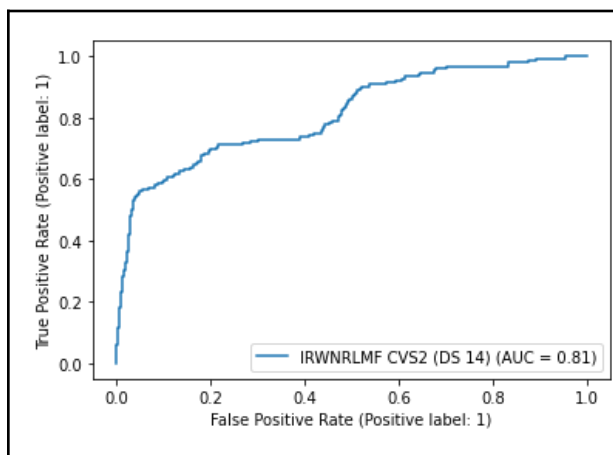


IRWNRLMF CVS-2 ROC Curve DS-13

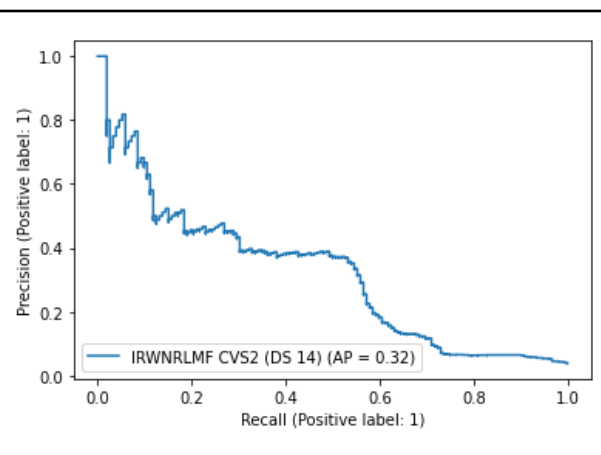


IRWNRLMF CVS-2 PR Curve DS-13

+++ IRWNRLMF CVS-2: Dataset-14 +++
 Negative protein set= [23, 33, 30, 13]
 AUROC=0.8123566038257407
 AUPR=0.31799878396929454

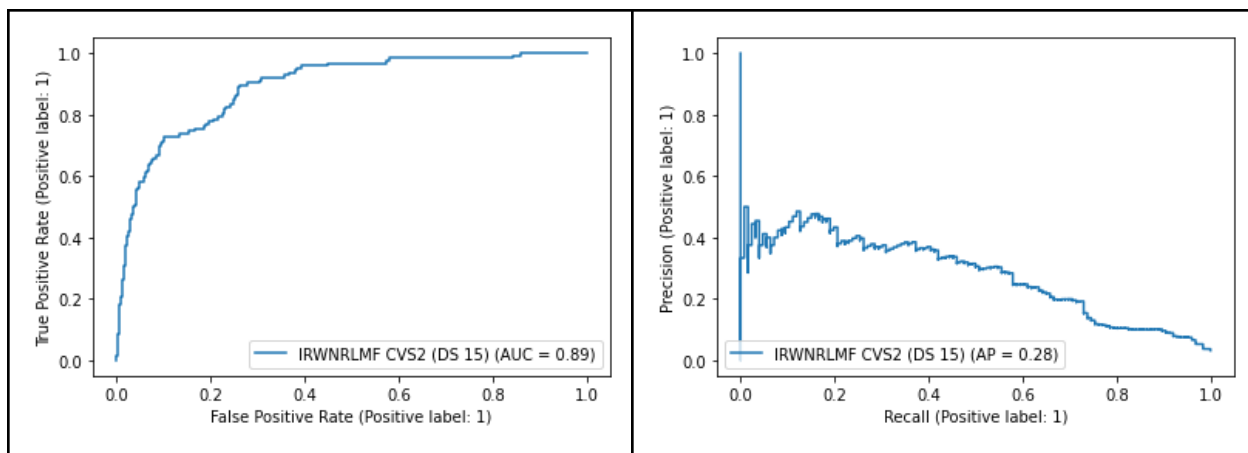


IRWNRLMF CVS-2 ROC Curve DS-14



IRWNRLMF CVS-2 PR Curve DS-14

+++ IRWNRLMF CVS-2: Dataset-15 +++
 Negative protein set= [45, 46, 2, 49]
 AUROC=0.8924596964503068
 AUPR=0.27833121019553125



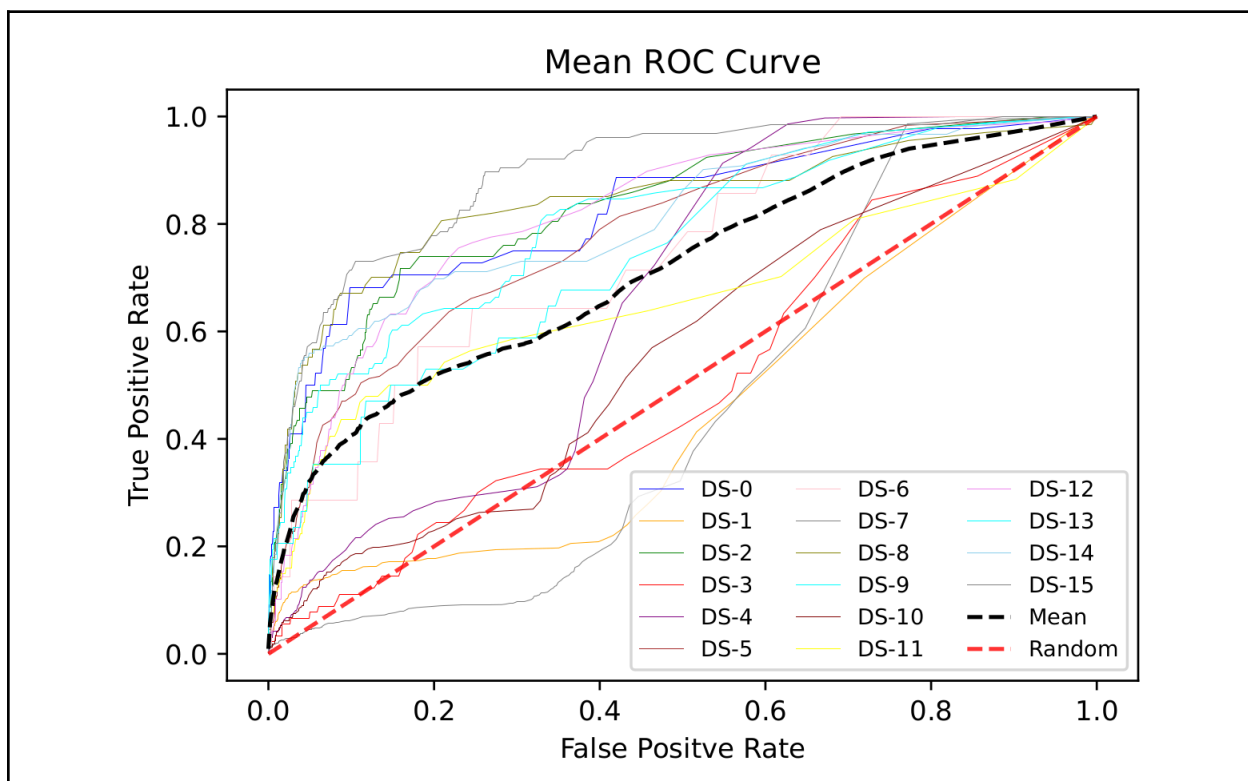
IRWNRLMF CVS-2 ROC Curve DS-15

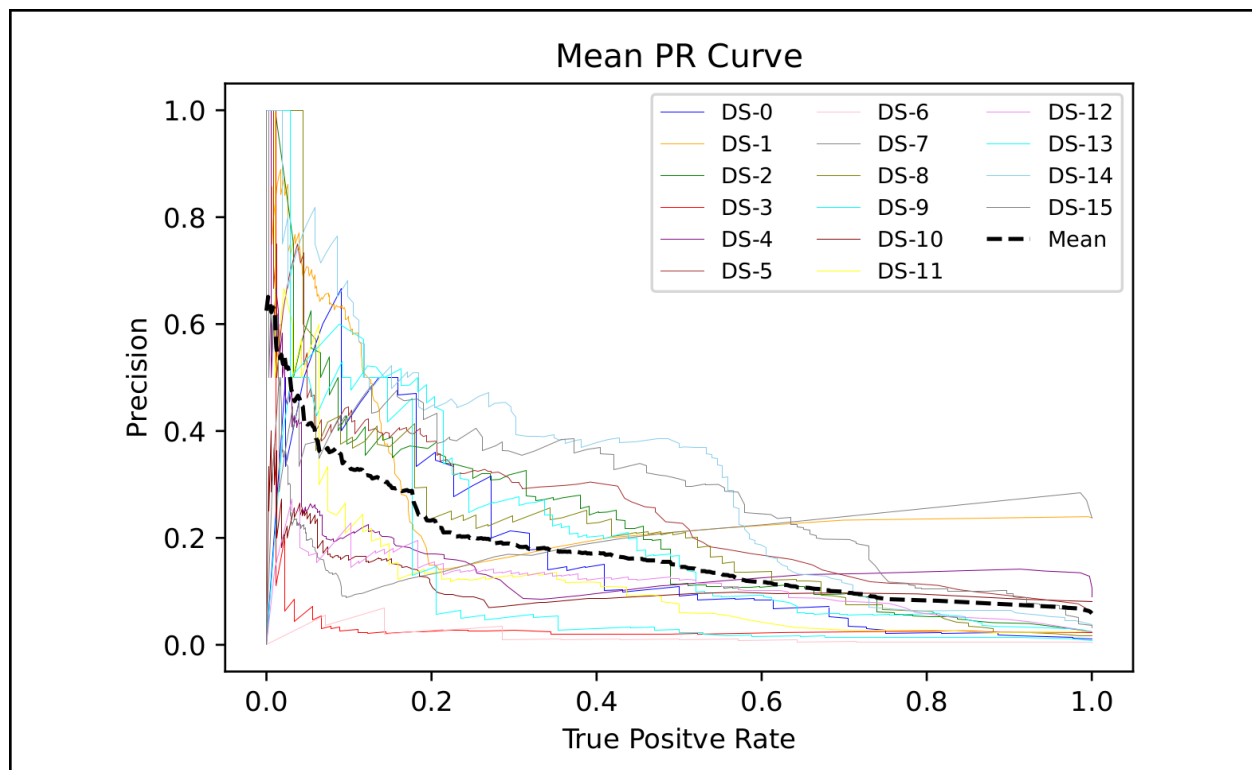
IRWNRLMF CVS-2 PR Curve DS-15

AVERAGE RESULTS CVS-2:

AUROC (arithmetic mean) = **0.7139370564886709**

AUPR (arithmetic mean) = **0.1801457792369254**



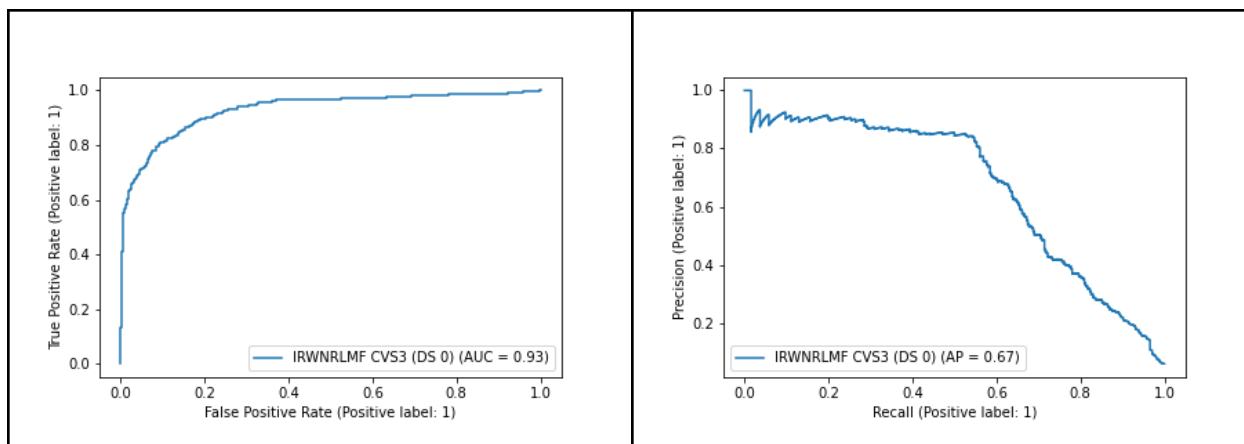


CVS-3: 10-fold cross validation on the entries of the interaction matrix. The entries of the interaction matrix are randomly split into 10 equal sets (10 disjoint sets of ordered pairs (i,j) , $1 \leq i \leq \text{rna_cnt}$ & $1 \leq j \leq \text{prot_cnt}$). For each such set:

1. The corresponding entries are made 0 (some of them were already 0 so they need not be changed).
2. Due to the previous step, some rows and columns might become all 0, such rows(RNAs) and columns(proteins) are added to the `neg_rna_set` and `neg_prot_set` respectively
3. IRWNRLMF is performed
4. ROC curve and PR curve are drawn taking the zeroed out entries as the test set.

[Jump to CVS-3 average results](#)

```
+++ IRWNRLMF CVS-3: Dataset-0 +++
Negative RNA set= [110, 163, 258, 262, 357]
Negative protein set= []
AUROC=0.929473243924402
AUPR=0.6689702378260414
```



IRWNRLMF CVS-3 ROC Curve DS-0

IRWNRLMF CVS-3 PR Curve DS-0

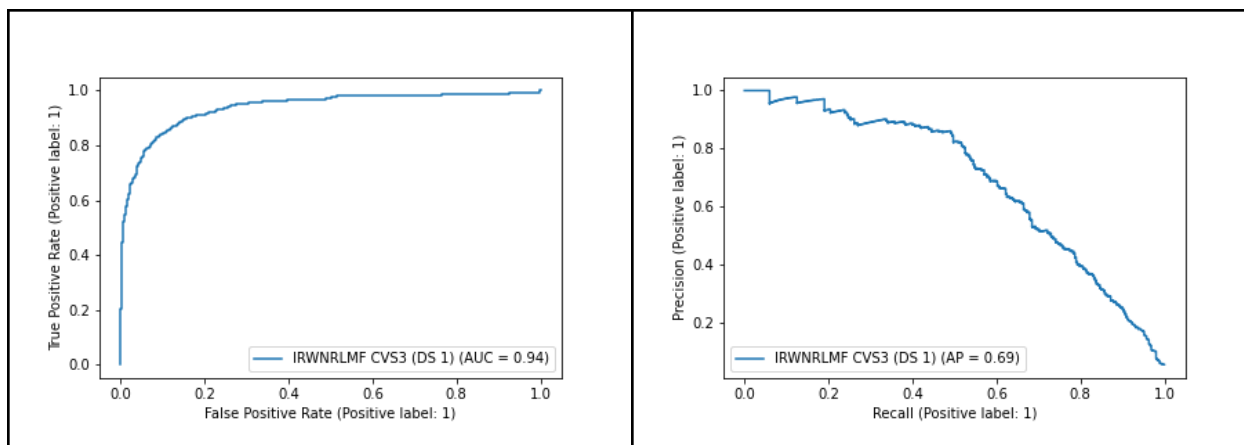
+++ IRWNRLMF CVS-3: Dataset-1 +++

Negative RNA set= [298, 301, 469, 753, 851, 961]

Negative protein set= []

AUROC=0.9388236053719008

AUPR=0.6922197805946584



IRWNRLMF CVS-3 ROC Curve DS-1

IRWNRLMF CVS-3 PR Curve DS-1

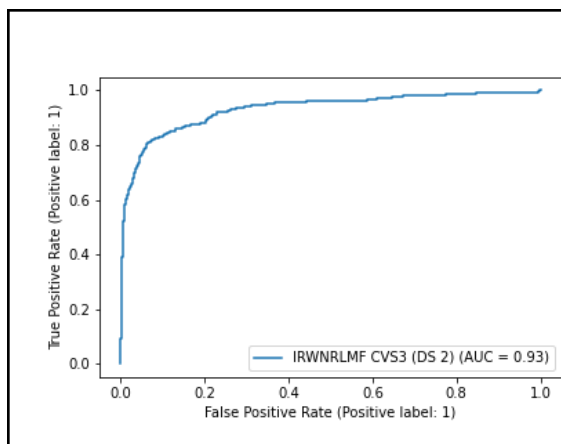
+++ IRWNRLMF CVS-3: Dataset-2 +++

Negative RNA set= [341, 402, 468, 808]

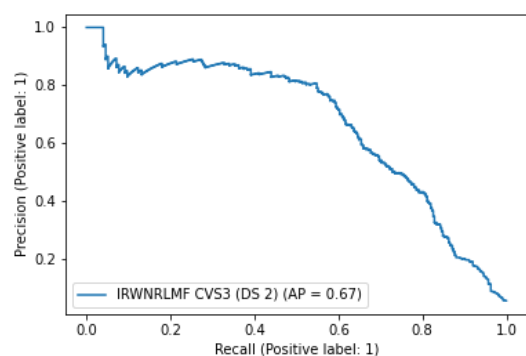
Negative protein set= []

AUROC=0.931377022576488

AUPR=0.6675985932550721

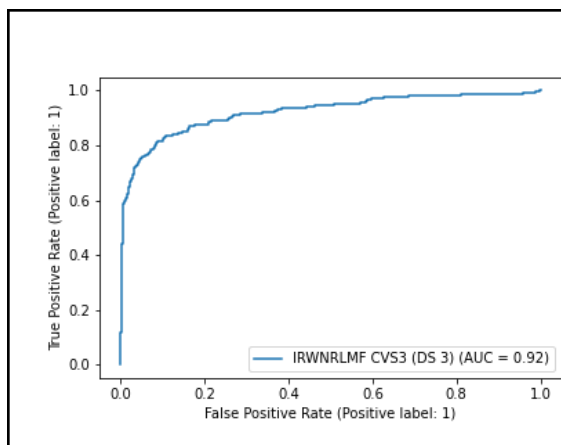


IRWNRLMF CVS-3 ROC Curve DS-2

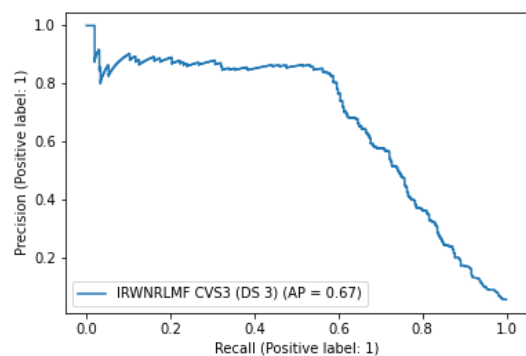


IRWNRLMF CVS-3 PR Curve DS-2

+++ IRWNRLMF CVS-3: Dataset-3 +++
 Negative RNA set= [166, 450, 848]
 Negative protein set= [47]
 AUROC=0.9213055803980253
 AUPR=0.6715109688284623

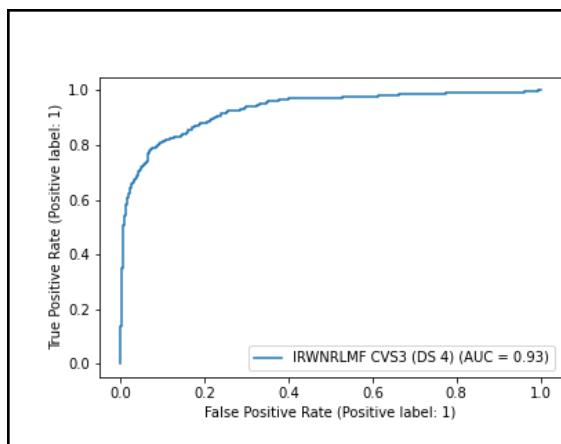


IRWNRLMF CVS-3 ROC Curve DS-3

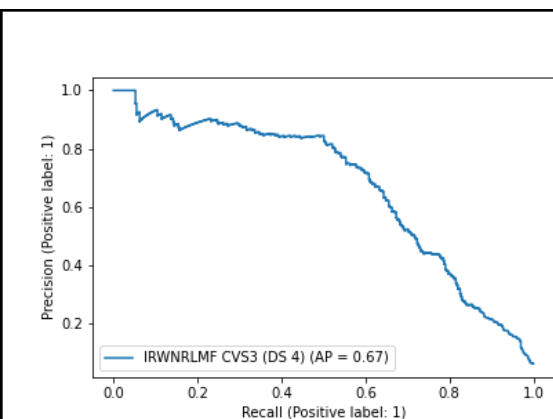


IRWNRLMF CVS-3 PR Curve DS-3

+++ IRWNRLMF CVS-3: Dataset-4 +++
 Negative RNA set= [22, 53, 196, 281, 347, 436, 609, 672]
 Negative protein set= []
 AUROC=0.930009433030734
 AUPR=0.6715886336114609

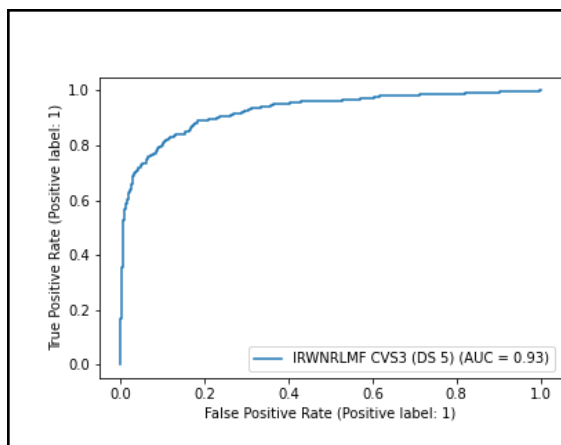


IRWNRLMF CVS-3 ROC Curve DS-4

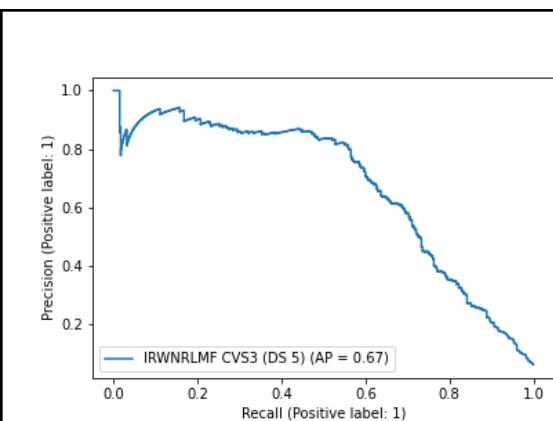


IRWNRLMF CVS-3 PR Curve DS-4

+++ IRWNRLMF CVS-3: Dataset-5 +++
 Negative RNA set= [555, 616, 934]
 Negative protein set= [49]
 AUROC=0.9269304824410765
 AUPR=0.6730372558910498

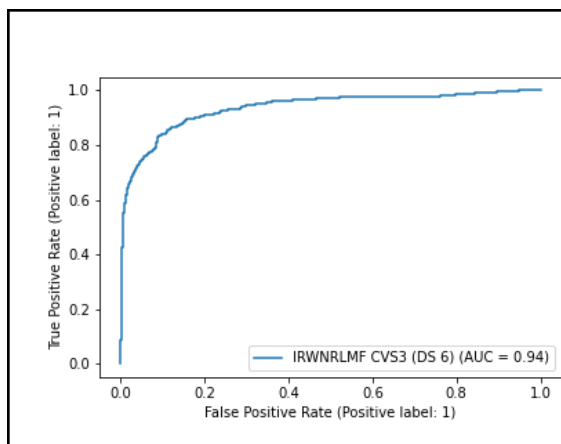


IRWNRLMF CVS-3 ROC Curve DS-5

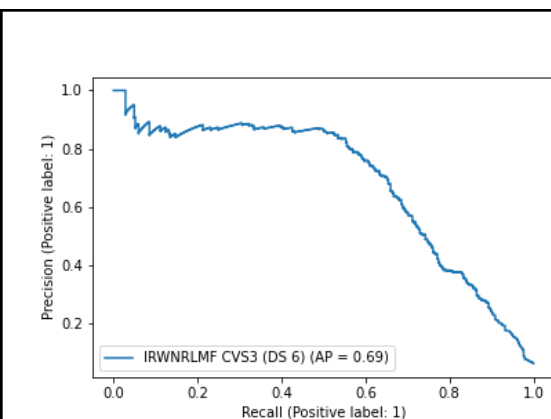


IRWNRLMF CVS-3 PR Curve DS-5

+++ IRWNRLMF CVS-3: Dataset-6 +++
 Negative RNA set= [210, 230, 590, 606, 772, 779]
 Negative protein set= [56, 60]
 AUROC=0.9357689529425373
 AUPR=0.6852914176750426

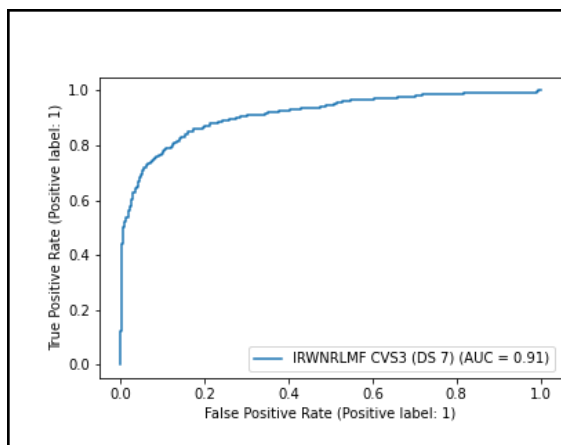


IRWNRLMF CVS-3 ROC Curve DS-6

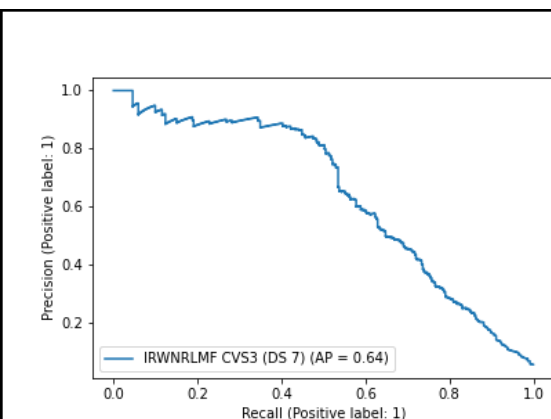


IRWNRLMF CVS-3 PR Curve DS-6

+++ IRWNRLMF CVS-3: Dataset-7 +++
 Negative RNA set= [430, 661]
 Negative protein set= [62]
 AUROC=0.9131523009021872
 AUPR=0.6417595620957057

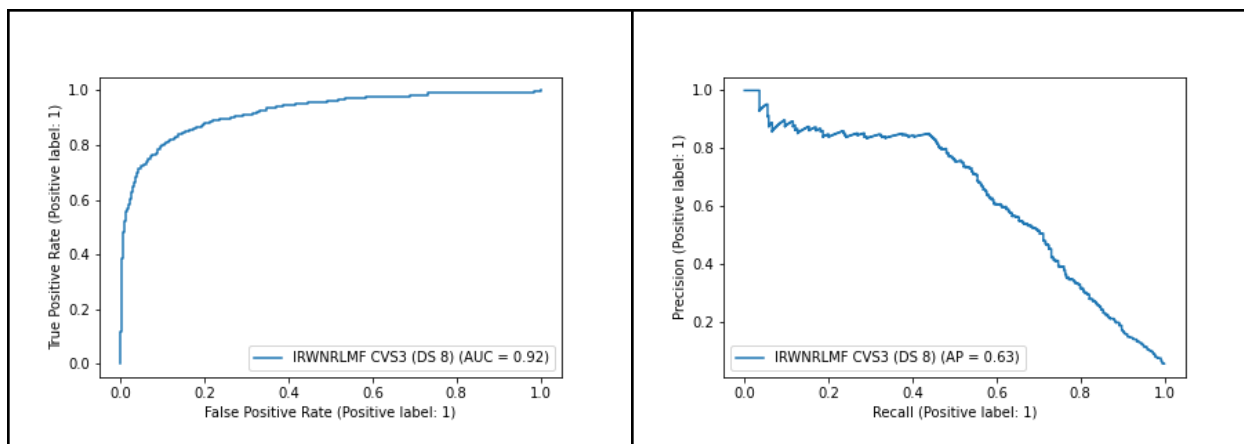


IRWNRLMF CVS-3 ROC Curve DS-7



IRWNRLMF CVS-3 PR Curve DS-7

+++ IRWNRLMF CVS-3: Dataset-8 +++
 Negative RNA set= [740, 758]
 Negative protein set= []
 AUROC=0.9217207775479711
 AUPR=0.6348155496467914



IRWNRLMF CVS-3 ROC Curve DS-8

IRWNRLMF CVS-3 PR Curve DS-8

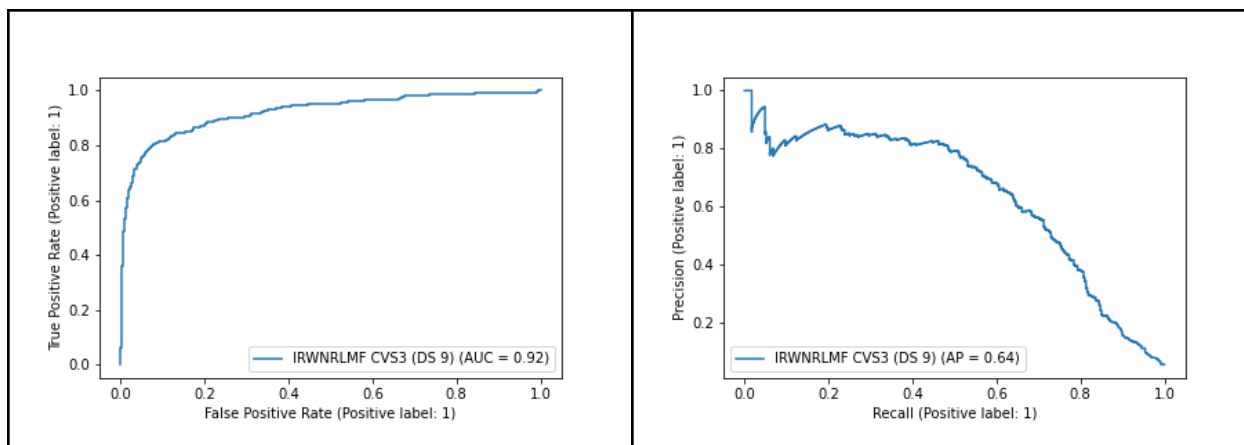
+++ IRWNRLMF CVS-3: Dataset-9 +++

Negative RNA set= [120, 279, 391, 396, 783, 971]

Negative protein set= []

AUROC=0.9215893472769293

AUPR=0.6416746134000267



IRWNRLMF CVS-3 ROC Curve DS-9

IRWNRLMF CVS-3 PR Curve DS-9

AVERAGE RESULTS CVS-3:

AUROC (arithmetic mean) = **0.9270150746412252**

AUPR (arithmetic mean) = **0.6648466612824311**

