

Comparison of ML Algorithms on MIMIC data with and without Aeolus matching

Definitions:

Precision: *Correct prediction / total predictions*

Recall: *Correct predictions / all actions taken*

F Score: $(2 * \text{precision} * \text{recall}) / (\text{precision} + \text{recall})$

SVM Strategy 1

Construct an SVM per action for similar patients. Apply that SVM to p to determine whether to do a . If some attribute to the SVM is not present in p , then just assign the median value of that attribute to p .

SVM Strategy 1						
Days in ICU	Precision (with aeolus)	Precision (without aeolus)	Recall (with aeolus)	Recall (without aeolus)	F Scale (with aeolus)	F Scale (without aeolus)
1	0.26	0.25	0.80	0.81	0.38	0.38
2	0.28	0.29	0.78	0.82	0.40	0.40
3	0.29	0.30	0.79	0.81	0.41	0.41
7	0.33	0.33	0.78	0.80	0.44	0.43
14	0.34	0.34	0.78	0.79	0.44	0.44

SVM Strategy 2

Construct an SVM per action for similar patients. Apply that SVM to p to determine whether to do a . If the system recommends to take action, make the priority 1. If some attribute to the SVM is not present in p , then just assign the median value of that attribute to p .

SVM Strategy 2						
Days in ICU	Precision (with aeolus)	Precision (without aeolus)	Recall (with aeolus)	Recall (without aeolus)	F Scale (with aeolus)	F Scale (without aeolus)
1	0.25	0.25	0.83	0.82	0.37	0.35
2	0.29	0.28	0.82	0.82	0.41	0.39
3	0.31	0.30	0.82	0.81	0.43	0.41
7	0.34	0.33	0.80	0.80	0.45	0.43
14	0.36	0.36	0.80	0.80	0.45	0.45

Random Forest

Construct a random forest per action for similar patients. Apply that random forest to p to determine whether to do a . If the system recommends to take action, make the priority 1. If some attribute to the SVM is not present in p , then just assign the median value of that attribute to p .

Random Forest						
Days in ICU	Precision (with aeolus)	Precision (without aeolus)	Recall (with aeolus)	Recall (without aeolus)	F Scale (with aeolus)	F Scale (without aeolus)
1	0.23	0.22	0.78	0.84	0.34	0.33
2	0.26	0.26	0.79	0.81	0.38	0.37
3	0.29	0.28	0.79	0.81	0.40	0.39
7	0.34	0.30	0.78	0.79	0.44	0.40
14	0.38	0.32	0.78	0.79	0.46	0.40

Appendix

SVM Strategy 1 - With Aeolus matching

1 day precision

MEAN of column 1day_prec: 0.26137428018166964

95.0 confidence interval 3.7% and 55.6%

1 day recall

MEAN of column 1day_rcl: 0.8048938472184086

95.0 confidence interval 49.4% and 100.0%

1 day f score

MEAN of column 1day_f1: 0.38269610171173113

95.0 confidence interval 7.7% and 69.8%

2 day precision

MEAN of column 2day_prec: 0.27774104641250347

95.0 confidence interval 3.7% and 55.6%

2 day recall

MEAN of column 2day_rcl: 0.7824198324198325

95.0 confidence interval 25.0% and 100.0%

2 day f score

MEAN of column 2day_f1: 0.3967611832438806

95.0 confidence interval 7.7% and 68.2%

3 day precision

MEAN of column 3day_prec: 0.2881455627743514

95.0 confidence interval 4.0% and 59.5%

COL: 3day_rcl

MEAN of column 3day_rcl: 0.7859200664814158

95.0 confidence interval 25.0% and 100.0%

COL: 3day_f1

MEAN of column 3day_f1: 0.4049030207789657

95.0 confidence interval 6.5% and 73.5%

COL: 7day_prec

MEAN of column 7day_prec: 0.3268764687526741

95.0 confidence interval 4.0% and 73.0%

COL: 7day_rcl

MEAN of column 7day_rcl: 0.7827848033007314

95.0 confidence interval 25.0% and 100.0%

COL: 7day_f1

MEAN of column 7day_f1: 0.4364516678113786

95.0 confidence interval 7.7% and 80.6%

COL: 14day_prec

MEAN of column 14day_prec: 0.33543079634441897

95.0 confidence interval 3.7% and 67.9%

COL: 14day_rcl
MEAN of column 14day_rcl: 0.7804690140155023
95.0 confidence interval 25.0% and 100.0%

COL: 14day_f1
MEAN of column 14day_f1: 0.4418898206391385
95.0 confidence interval 7.7% and 84.9%

SVM Strategy 2 - With Aeolus matching

COL: 1day_prec
MEAN of column 1day_prec: 0.24644946056887693
95.0 confidence interval 6.9% and 44.4%

COL: 1day_rcl
MEAN of column 1day_rcl: 0.8330936435425599
95.0 confidence interval 57.1% and 100.0%

COL: 1day_f1
MEAN of column 1day_f1: 0.3663380821179314
95.0 confidence interval 11.8% and 58.5%

COL: 2day_prec
MEAN of column 2day_prec: 0.29038005139912965
95.0 confidence interval 6.9% and 51.7%

COL: 2day_rcl
MEAN of column 2day_rcl: 0.8241700840401878
95.0 confidence interval 55.6% and 100.0%

COL: 2day_f1
MEAN of column 2day_f1: 0.4089096343079792
95.0 confidence interval 13.3% and 65.3%

COL: 3day_prec
MEAN of column 3day_prec: 0.31150497380270226
95.0 confidence interval 7.1% and 56.2%

COL: 3day_rcl
MEAN of column 3day_rcl: 0.8168591110163258
95.0 confidence interval 52.0% and 100.0%

COL: 3day_f1
MEAN of column 3day_f1: 0.42493822285747657
95.0 confidence interval 12.9% and 69.5%

COL: 7day_prec
MEAN of column 7day_prec: 0.3426007731646306
95.0 confidence interval 7.1% and 65.6%

COL: 7day_rcl
MEAN of column 7day_rcl: 0.8022521458626356
95.0 confidence interval 54.5% and 100.0%

COL: 7day_f1
MEAN of column 7day_f1: 0.4449995039773469
95.0 confidence interval 12.9% and 73.1%

COL: 14day_prec
MEAN of column 14day_prec: 0.35897810762982596
95.0 confidence interval 6.9% and 84.4%

COL: 14day_rcl
MEAN of column 14day_rcl: 0.8010467067502798
95.0 confidence interval 54.5% and 100.0%

COL: 14day_f1
MEAN of column 14day_f1: 0.45300893487610744
95.0 confidence interval 12.9% and 79.4%

Random Forest - With Aeolus matching

COL: 1day_prec
MEAN of column 1day_prec: 0.2302175438054826
95.0 confidence interval 2.9% and 43.8%

COL: 1day_rcl
MEAN of column 1day_rcl: 0.7811665957499291
95.0 confidence interval 50.0% and 100.0%

COL: 1day_f1
MEAN of column 1day_f1: 0.34229150312190065
95.0 confidence interval 11.3% and 58.3%

COL: 2day_prec
MEAN of column 2day_prec: 0.26305237930523906
95.0 confidence interval 8.0% and 60.0%

COL: 2day_rcl
MEAN of column 2day_rcl: 0.7918226668226668
95.0 confidence interval 50.0% and 100.0%

COL: 2day_f1
MEAN of column 2day_f1: 0.37765383597391705
95.0 confidence interval 14.8% and 69.2%

COL: 3day_prec
MEAN of column 3day_prec: 0.29320091338139503
95.0 confidence interval 8.0% and 66.7%

COL: 3day_rcl
MEAN of column 3day_rcl: 0.7913427942839708
95.0 confidence interval 50.0% and 100.0%

COL: 3day_f1
MEAN of column 3day_f1: 0.40809868896194723
95.0 confidence interval 15.4% and 74.1%

COL: 7day_prec
MEAN of column 7day_prec: 0.3444923559418396
95.0 confidence interval 6.5% and 80.0%

COL: 7day_rcl
MEAN of column 7day_rcl: 0.778747750914957
95.0 confidence interval 54.5% and 100.0%

COL: 7day_f1
MEAN of column 7day_f1: 0.43919264551639914
95.0 confidence interval 11.8% and 88.9%

COL: 14day_prec
MEAN of column 14day_prec: 0.37944048113327344
95.0 confidence interval 8.0% and 100.0%

COL: 14day_rcl
MEAN of column 14day_rcl: 0.7785205222705223
95.0 confidence interval 50.0% and 100.0%

COL: 14day_f1
MEAN of column 14day_f1: 0.46374260588683036
95.0 confidence interval 14.8% and 88.9%

SVM Strategy 1 - Without Aeolus matching

COL: 1day_prec
MEAN of column 1day_prec: 0.253988326538113
95.0 confidence interval 0.0% and 56.0%

COL: 1day_rcl
MEAN of column 1day_rcl: 0.8095764924512552
95.0 confidence interval 0.0% and 100.0%

COL: 1day_f1
MEAN of column 1day_f1: 0.3805470654160154
95.0 confidence interval 6.7% and 60.9%

COL: 2day_prec
MEAN of column 2day_prec: 0.2864287654044937
95.0 confidence interval 3.4% and 60.0%

COL: 2day_rcl
MEAN of column 2day_rcl: 0.8178099372033194
95.0 confidence interval 33.3% and 100.0%

COL: 2day_f1
MEAN of column 2day_f1: 0.39998128444324194
95.0 confidence interval 6.5% and 64.0%

COL: 3day_prec
MEAN of column 3day_prec: 0.30434208134621304
95.0 confidence interval 3.4% and 64.0%

COL: 3day_rcl
MEAN of column 3day_rcl: 0.809846326389074
95.0 confidence interval 58.8% and 100.0%

COL: 3day_f1
MEAN of column 3day_f1: 0.4140300771776013
95.0 confidence interval 6.5% and 68.2%

COL: 7day_prec
MEAN of column 7day_prec: 0.3262104749280114
95.0 confidence interval 3.6% and 64.3%

COL: 7day_rcl
MEAN of column 7day_rcl: 0.7978803524506524
95.0 confidence interval 33.3% and 100.0%

COL: 7day_f1
MEAN of column 7day_f1: 0.4262517153614965
95.0 confidence interval 6.7% and 69.2%

COL: 14day_prec
MEAN of column 14day_prec: 0.3434323022339361
95.0 confidence interval 3.4% and 80.0%

COL: 14day_rcl
MEAN of column 14day_rcl: 0.7918817666783675
95.0 confidence interval 33.3% and 100.0%

COL: 14day_f1
MEAN of column 14day_f1: 0.44016876481399586
95.0 confidence interval 6.5% and 72.7%

SVM Strategy 2 - Without Aeolus matching

COL: 1day_prec
MEAN of column 1day_prec: 0.24547084381977777
95.0 confidence interval 4.5% and 61.3%

COL: 1day_rcl
MEAN of column 1day_rcl: 0.8174334985190249
95.0 confidence interval 50.0% and 100.0%

COL: 1day_f1
MEAN of column 1day_f1: 0.35419891234455264
95.0 confidence interval 8.7% and 69.1%

COL: 2day_prec
MEAN of column 2day_prec: 0.2780764083636508
95.0 confidence interval 4.5% and 64.5%

COL: 2day_rcl
MEAN of column 2day_rcl: 0.8233671461180112
95.0 confidence interval 50.0% and 100.0%

COL: 2day_f1
MEAN of column 2day_f1: 0.38906860242442787
95.0 confidence interval 12.5% and 64.9%

COL: 3day_prec
MEAN of column 3day_prec: 0.29830460882678944
95.0 confidence interval 4.5% and 64.5%

COL: 3day_rcl
MEAN of column 3day_rcl: 0.8098213514880181
95.0 confidence interval 53.6% and 100.0%

COL: 3day_f1
MEAN of column 3day_f1: 0.4048829184975427
95.0 confidence interval 12.5% and 71.4%

COL: 7day_prec
MEAN of column 7day_prec: 0.3314668414477026
95.0 confidence interval 4.5% and 67.9%

COL: 7day_rcl
MEAN of column 7day_rcl: 0.7953488755952076
95.0 confidence interval 50.0% and 100.0%

COL: 7day_f1
MEAN of column 7day_f1: 0.43013959975226596
95.0 confidence interval 8.7% and 74.4%

COL: 14day_prec
MEAN of column 14day_prec: 0.3602674067188561
95.0 confidence interval 4.5% and 85.3%

COL: 14day_rcl
MEAN of column 14day_rcl: 0.7964098522420003
95.0 confidence interval 48.6% and 100.0%

COL: 14day_f1
MEAN of column 14day_f1: 0.44923068167080815
95.0 confidence interval 8.7% and 81.7%

Random Forest - Without Aeolus matching

COL: 1day_prec
MEAN of column 1day_prec: 0.22211157627692163
95.0 confidence interval 3.0% and 48.5%

COL: 1day_rcl
MEAN of column 1day_rcl: 0.8378685128685129
95.0 confidence interval 37.5% and 100.0%

COL: 1day_f1
MEAN of column 1day_f1: 0.3289058481787513
95.0 confidence interval 7.1% and 73.1%

COL: 2day_prec
MEAN of column 2day_prec: 0.2645631429105042
95.0 confidence interval 3.7% and 57.6%

COL: 2day_rcl
MEAN of column 2day_rcl: 0.8114380054035226
95.0 confidence interval 50.0% and 100.0%

COL: 2day_f1
MEAN of column 2day_f1: 0.3697765036825811
95.0 confidence interval 7.1% and 70.4%

COL: 3day_prec
MEAN of column 3day_prec: 0.2839236769345533
95.0 confidence interval 3.0% and 75.8%

COL: 3day_rcl
MEAN of column 3day_rcl: 0.8082232589558038
95.0 confidence interval 54.5% and 100.0%

COL: 3day_f1
MEAN of column 3day_f1: 0.3853227703133346
95.0 confidence interval 7.1% and 80.9%

COL: 7day_prec
MEAN of column 7day_prec: 0.30303706018943793
95.0 confidence interval 3.0% and 78.8%

COL: 7day_rcl
MEAN of column 7day_rcl: 0.7908482528682605
95.0 confidence interval 46.2% and 100.0%

COL: 7day_f1
MEAN of column 7day_f1: 0.398122889278082
95.0 confidence interval 7.1% and 80.0%

COL: 14day_prec
MEAN of column 14day_prec: 0.3157481064531158
95.0 confidence interval 3.7% and 87.5%

COL: 14day_rcl
MEAN of column 14day_rcl: 0.7851102187545147
95.0 confidence interval 56.2% and 100.0%

COL: 14day_f1
MEAN of column 14day_f1: 0.4026448877375993
95.0 confidence interval 7.1% and 88.9%