Explanation Conclusion: In general, Most trends of weights(i.e whether a weight is positive or negative) gotten by LIME and SimMachines workbench are similar, especially on Top positive features and Top negative features. Even they have different trends for one feature, that feature usually didn't take much weight for both.
*For different weight trends, I decide which one made more sense based on both distribution and monotonicity

Time Comparison:

```
#Explain all records
import time
start_time = time.time()

for i in range(data_2.shape[0]):
    exp = explainer.explain_instance(X[i], xgb2.predict_proba, num_features=23)

print("--- %s seconds ---" % (time.time() - start_time))
```

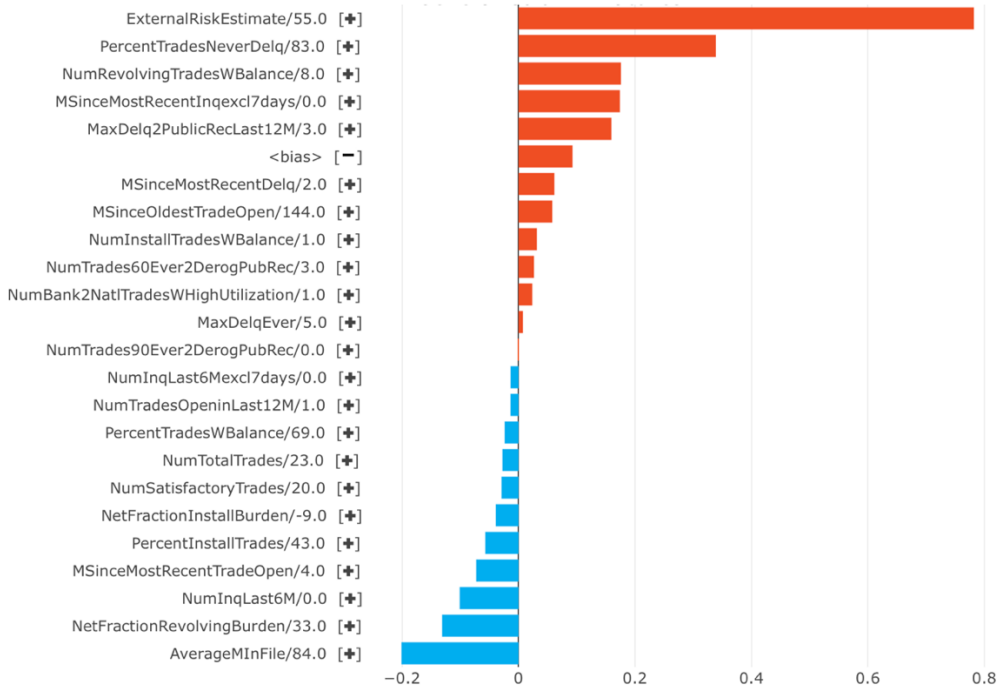
```
--- 4454.182390928268 seconds ---
```

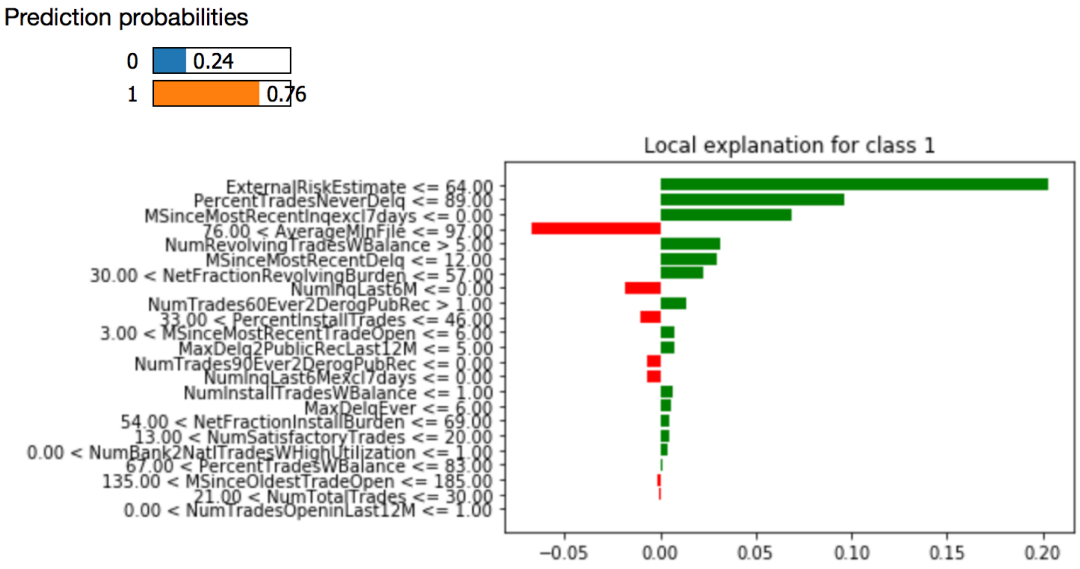
```
print ('LIME timing with Xgboost is',4454.182390928268/60/60,' hours' )
print ('Each query timing with Xgboost is', 4454.182390928268/data_2.shape[0],' seconds')
```

```
LIME timing with Xgboost is 1.2372728863689635  hours
Each query timing with Xgboost is 0.4512392250965726  seconds
```

Process:
Instance 1: Record Index = 0

The object classification is: 1



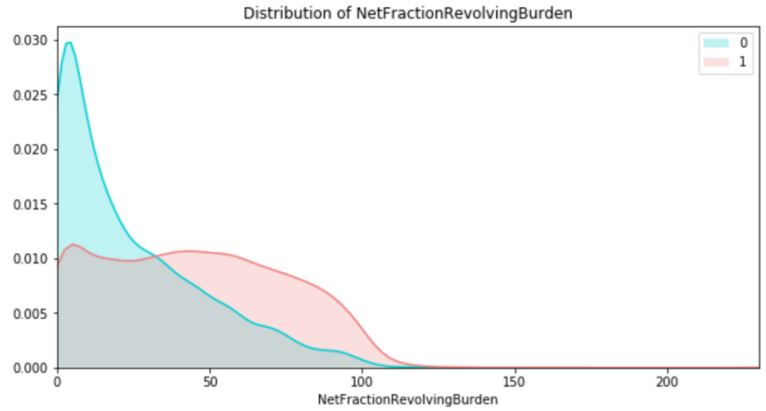


Similar part:

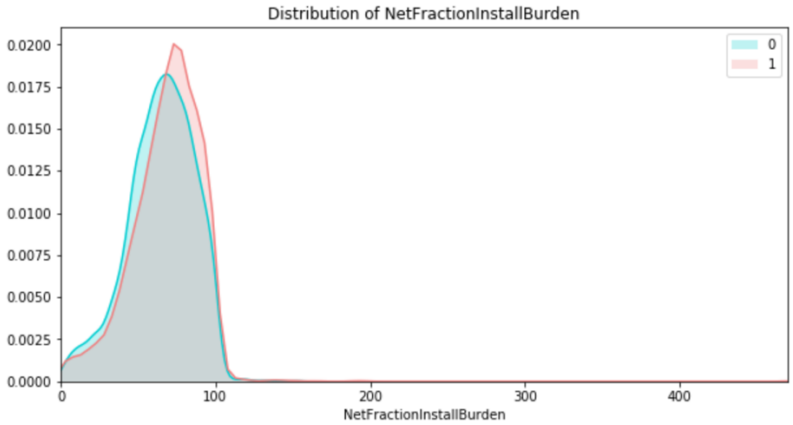
1) Common columns of Top positive weight(Num_Col=3): ExternalRiskEstimate,PercentTradesNeverDelq, MSinceMonstRecentInqexcl7days, NumRevolvinTradesWBalance
2) Common columns of Top negative weight(Num_Col=3): AverageMInFile, NumInqLast6M, PercentInstallTrade

Different part: NetFractionRevolvingBurden=33(LIME: P, Sim: N),
NetFractionInstallBurden=60(LIME: P, Sim: N),
NumSatisfactoryTrades=20(LIME: P, Sim: N)
NumTrades90Ever2DerogPubRec=0 (LIME: N, Sim: S)

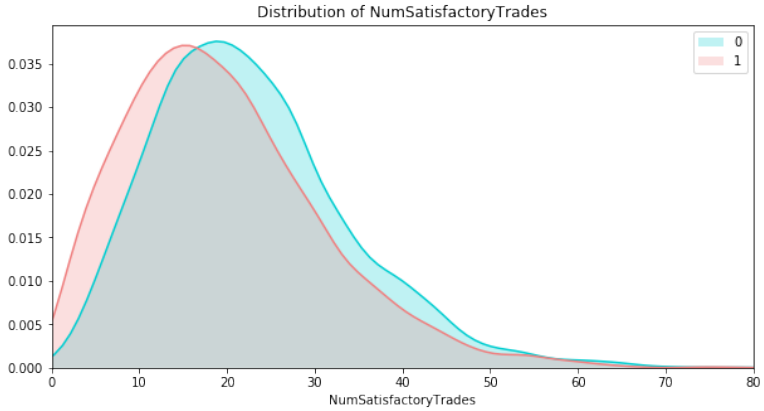
Explore on different part – which made more sense?



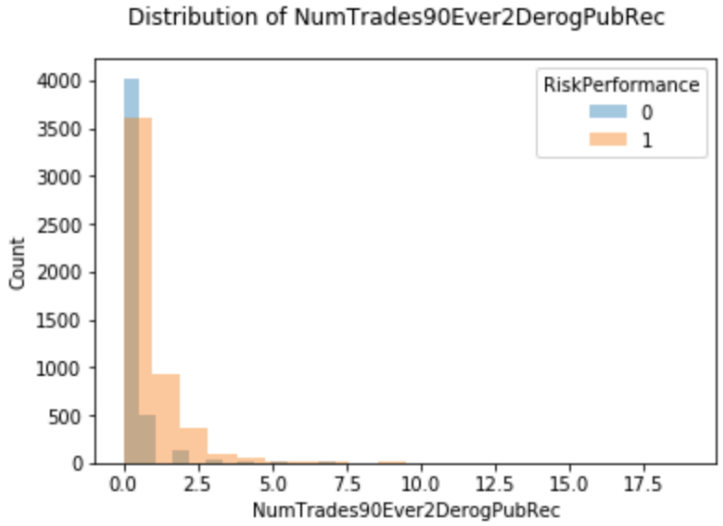
NetFractionRevolvingBurden = 33 (Monotonically Increasing)
Sim(weight=N) made more sense



NetFractionInstallBurden=60(Monotonically Increasing)
LIME(weight=P) made more sense

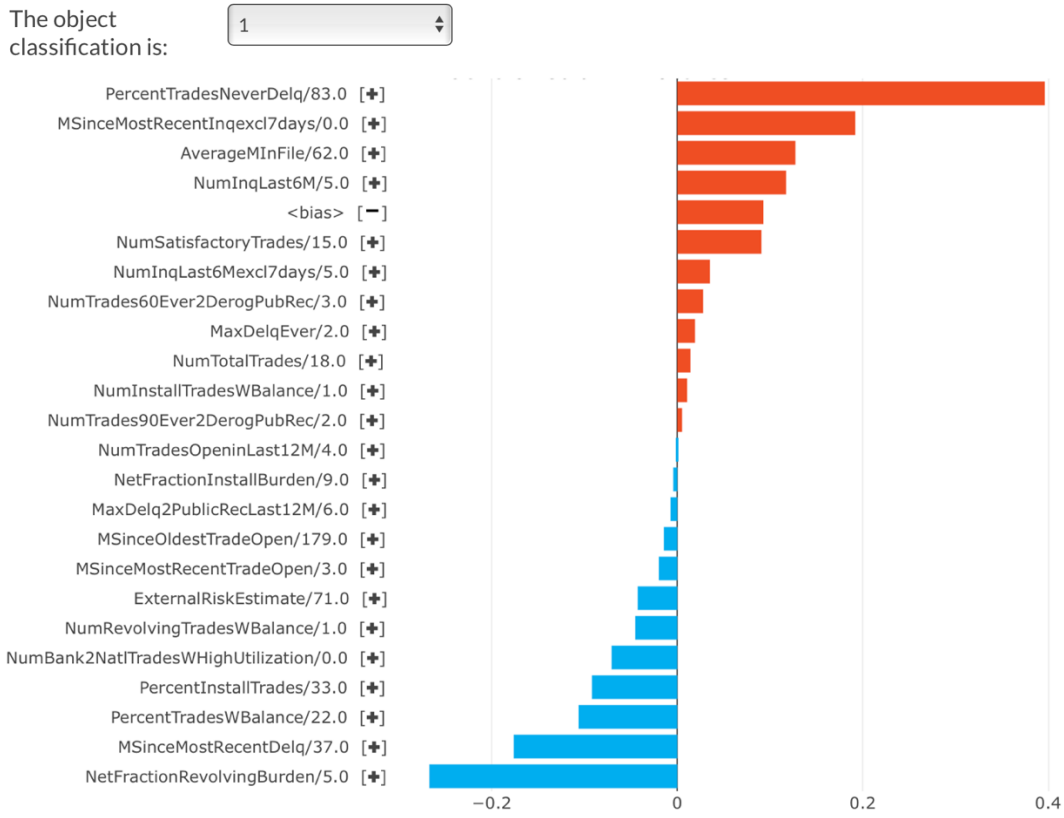


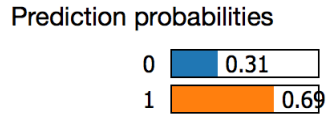
NumSatisfactoryTrades=20 (Monotonically decreasing)
Sim(weight=N) made more sense

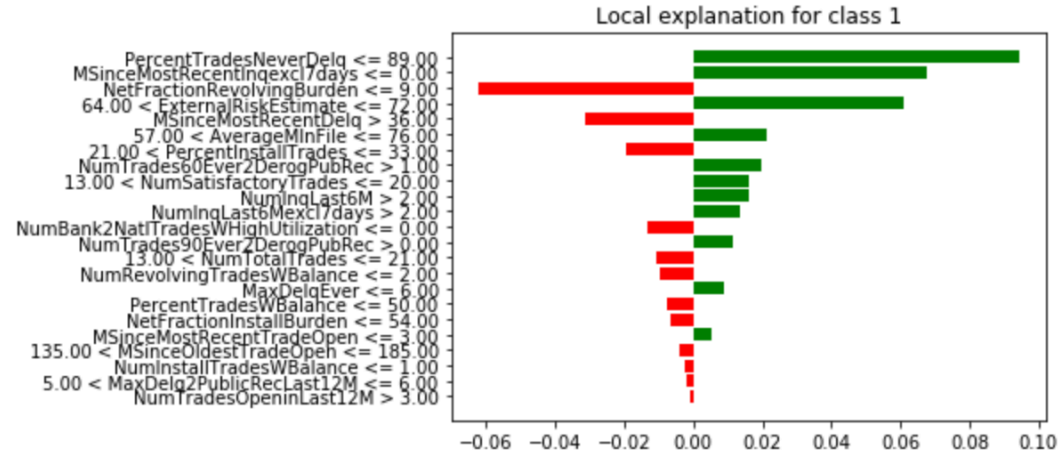


NumTrades90Ever2DerogPubRec=0 (Monotonically Increasing)
LIME(weight=N) made more sense

Instance 2: Record Index = 30







Similar part:

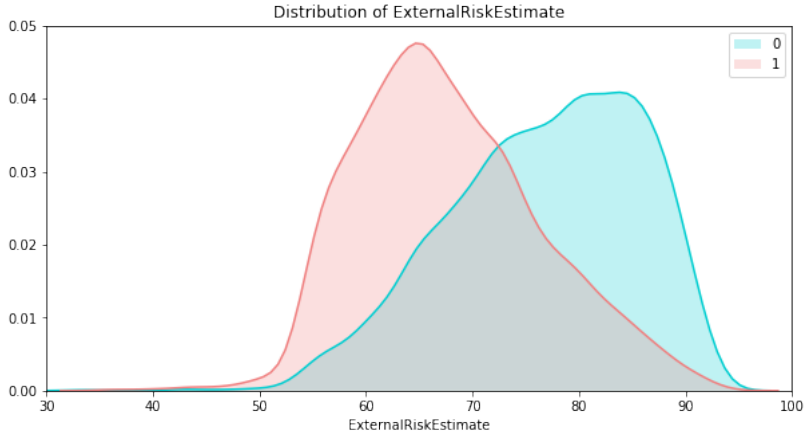
1) Common columns of Top positive weight(Num_col=4): PercentTradesNeverDelq, MSinceMonstRecentInqexcl7days,, AverageMInFile,NumInqLast6M, NumSatisfactoryTrades
2) Common columns of Top negative weight(Num_Col=4): NetFractionRevolingBurden, MSinceMostRecentDelq, PercentInstallTrade, NumBank2NatlTradesWHighUtilization

Different part:

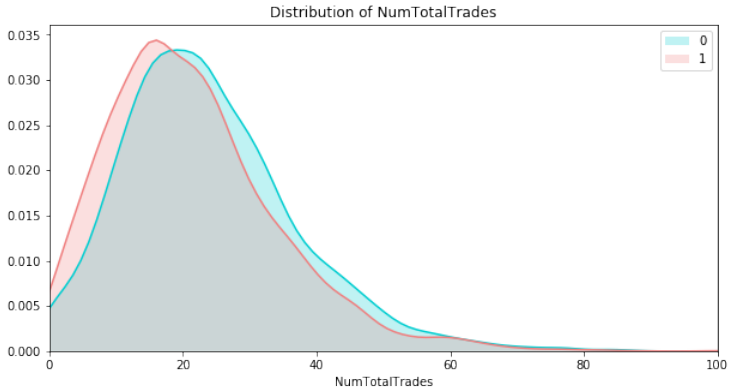
ExternalRiskEstimate=71(LIME: P, Sim: N),

NumTotalTrade=18(LIME: N, Sim: P),
MSinceMostRecentTradeOpen=3(LIME: P, Sim: N)

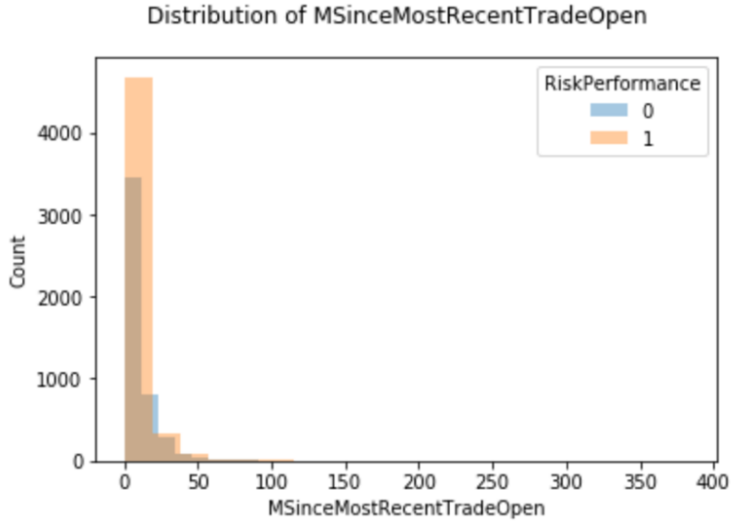
Explore on different part – which made more sense?



ExternalRiskEstimate=71(Monotonically Decreasing)
Sim(weight=N) made more sense

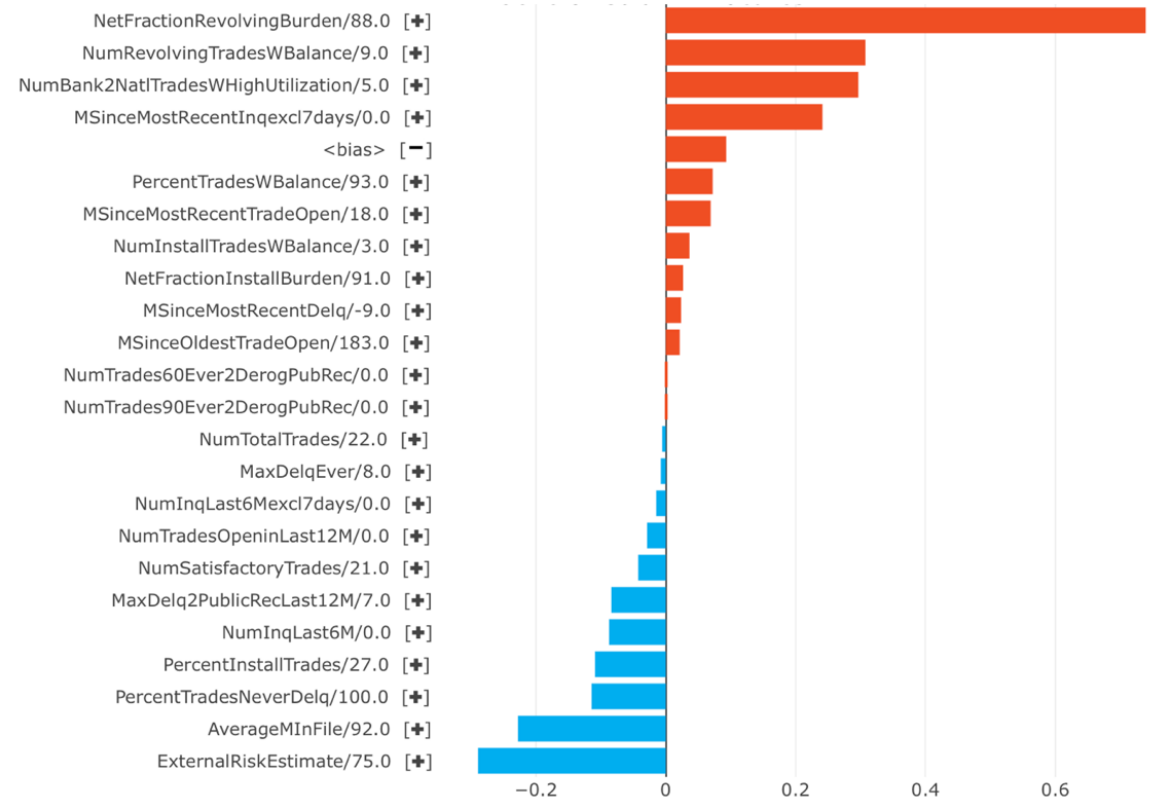


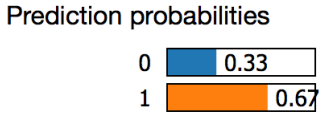
NumTotalTrade=18
Can't compare: no constraint on monotonicity

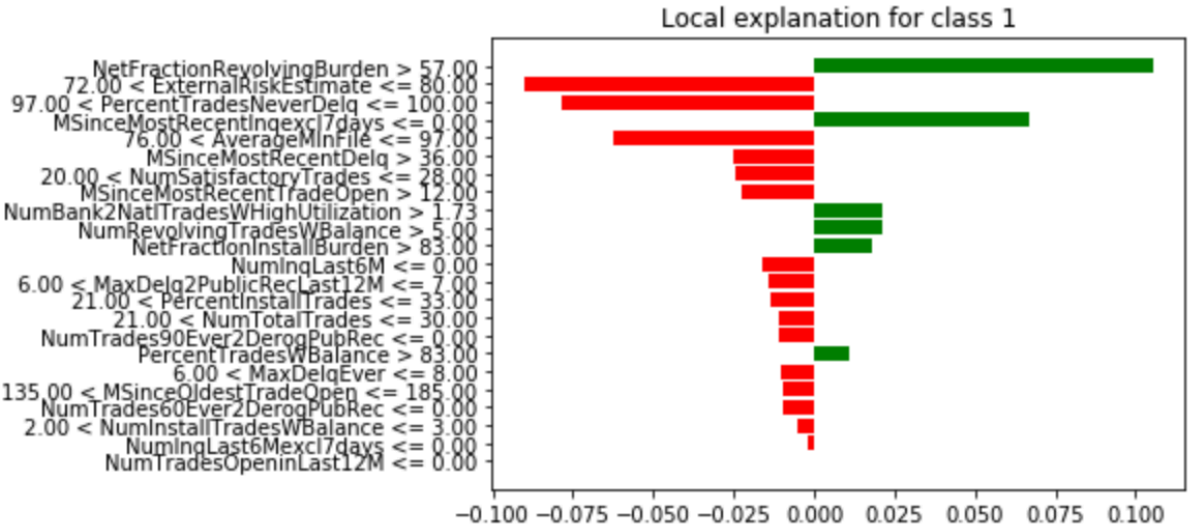


MSinceMostRecentTradeOpen=3(Monotonically Decreasing)
LIME(weight=P) made more sense

Instance 3: Record Index = 52







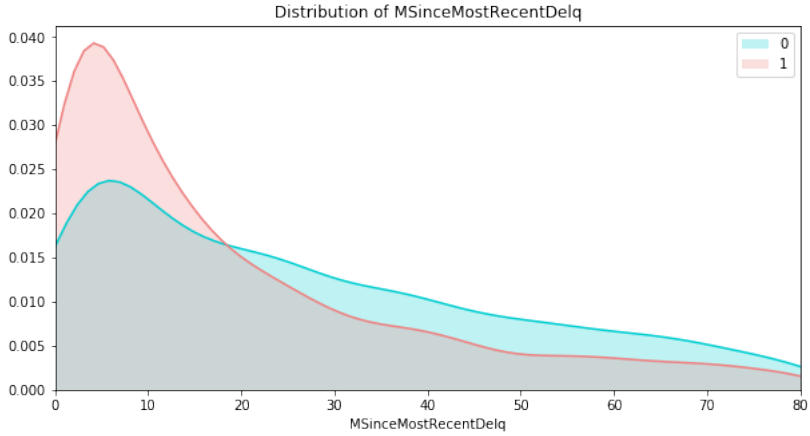
Similar part:

1) Common columns of Top positive weight(Num_col=4): NetFractionRevolvingBurden, MSinceMostRecentInqexcl7days, NumBank2NatlTradesWHighUtilization, NumRevolvingTradesWBalance, NetFractionInstallBurden, percentTradesWBalance
2) Common columns of Top negative weight(Num_col=4): ExcernalRiskEstimate, PercenTradesNeverDelq, AverageMInfile, PercentInstallTrades,

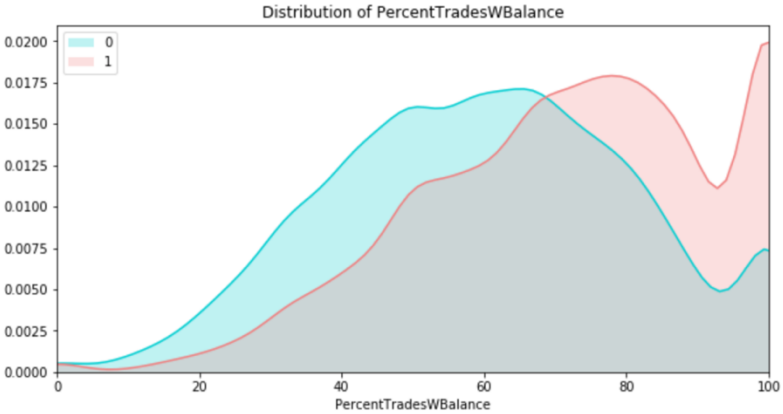
Different part:

MSinceMostRecentDelq= -9(raw_value)/45.68(impute_value) (LIME: N, Sim: P),
PercentTradesWBalance=93(LIME:N, Sim=P)
MSinceMostRecentTradeOpen=183 (LIME: N, Sim: P)

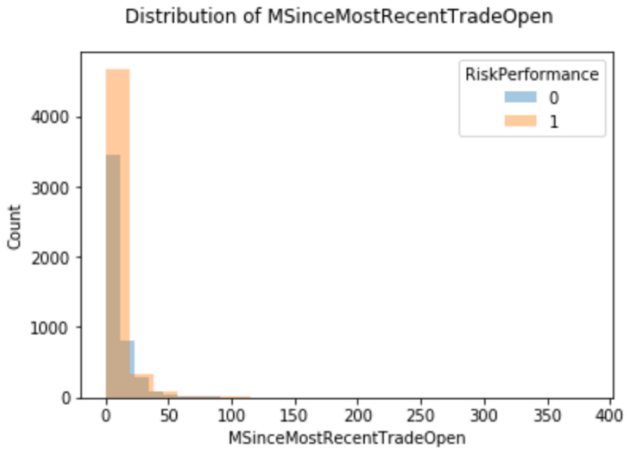
Explore on different part – which made more sense?



MSinceMostRecentDelq= -9/45.68(Monotonically Decreasing)
LIME(weight=N) made more sense

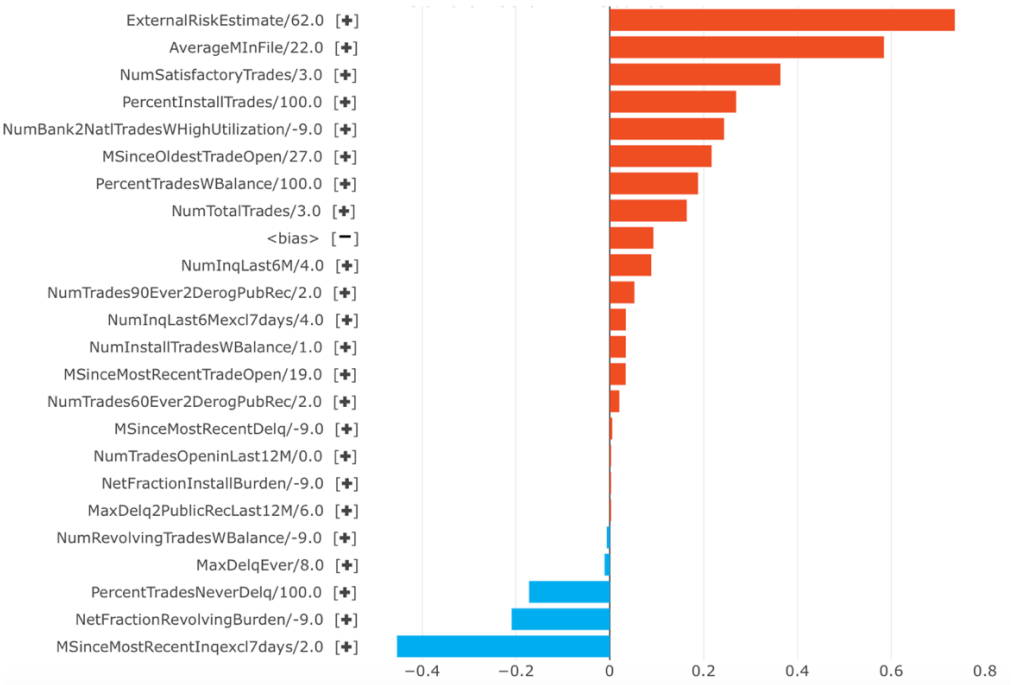


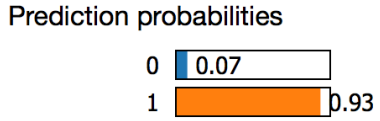
PercentTradesWBalance=93
Can't compare: no constraint on monotonicity

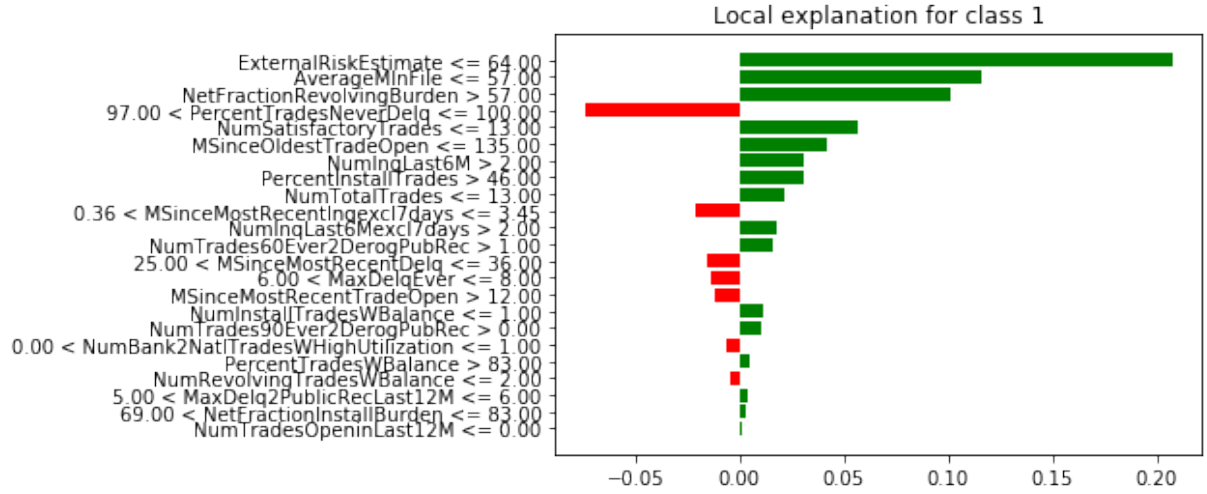


MSinceMostRecentTradeOpen=183(Monotonically Decreasing)
LIME(weight=N) made more sense

Instance 4: Record Index = 146(index on Sim=159)--- have -9 in some cells







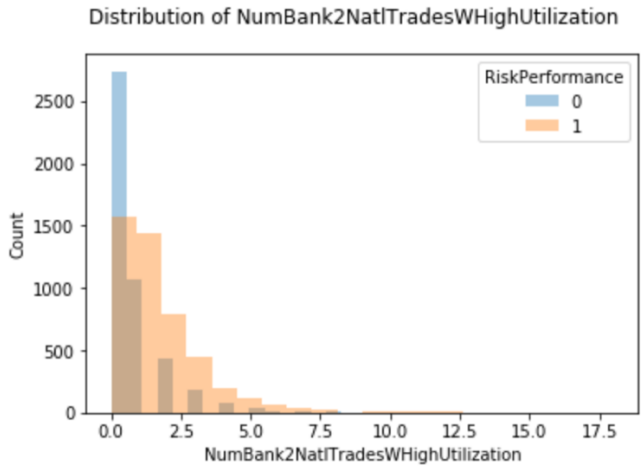
Similar part:

1) Common columns of Top positive weight(Num_col=4):
   ExternalRiskEstimate, AverageMInfile, NumSatisfactoryTrades, PercentInstallTrades, MSinceOldestTradeOpen
2) Common columns of Top negative weight(Num_col=4):
   PercentTradesNeverDelq,MSinceMostRecentInqexcl7days

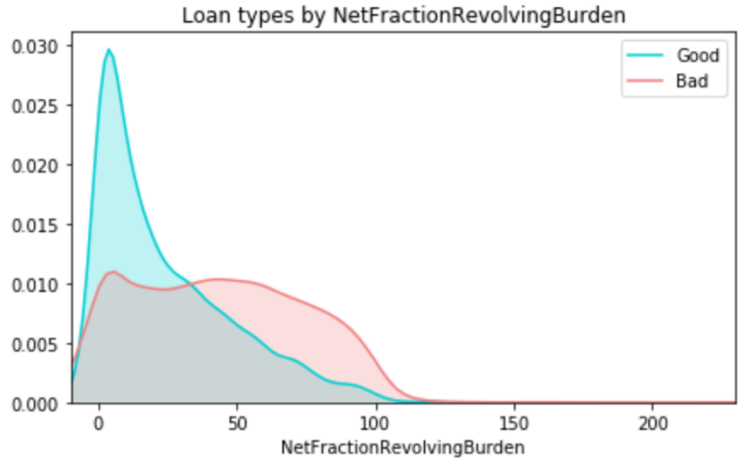
Different part:

NumBank2NatITadesWHighUtilization= -9(on Sim)/5(on LIME)(LIME: N Sim:P),
NetFractionRevolingBurden=-9(on Sim)/88(on Sim)(LIME: P Sim:N)

Explore on different part – which made more sense?

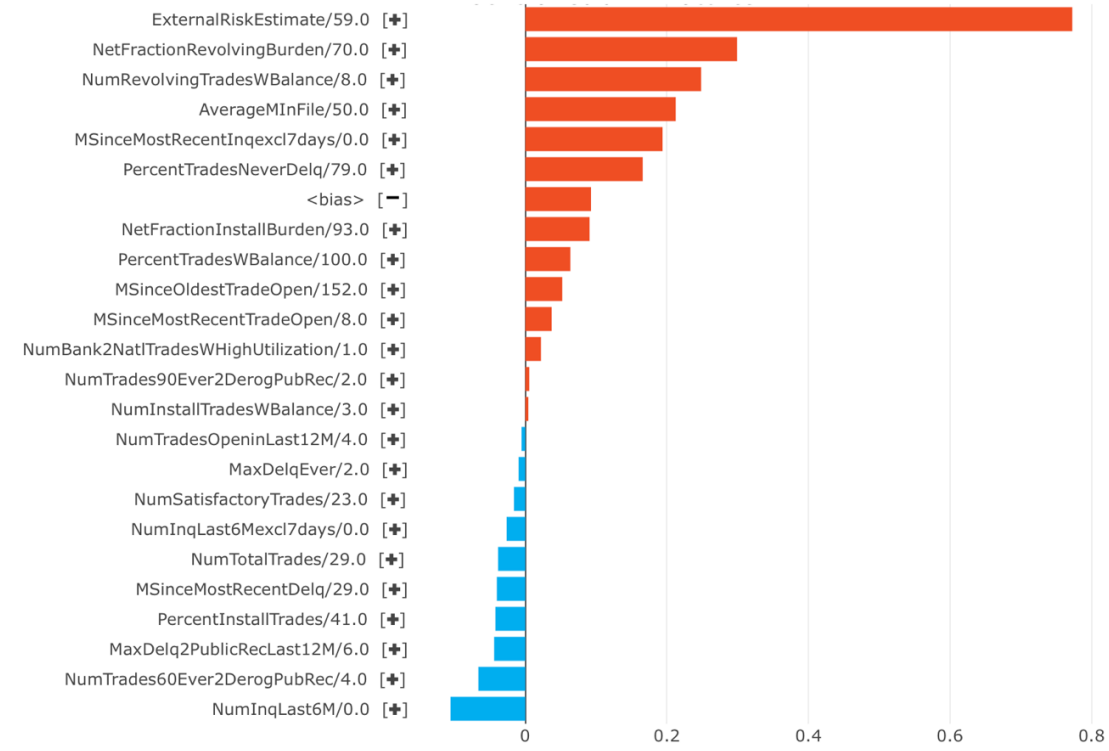


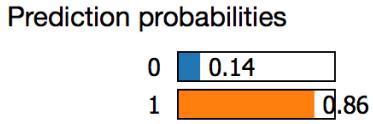
NumBank2NatITadesWHighUtilization= -9(on Sim)/5(on LIME)(Monotonically Increasing)
Sim(weight=P) made more sense

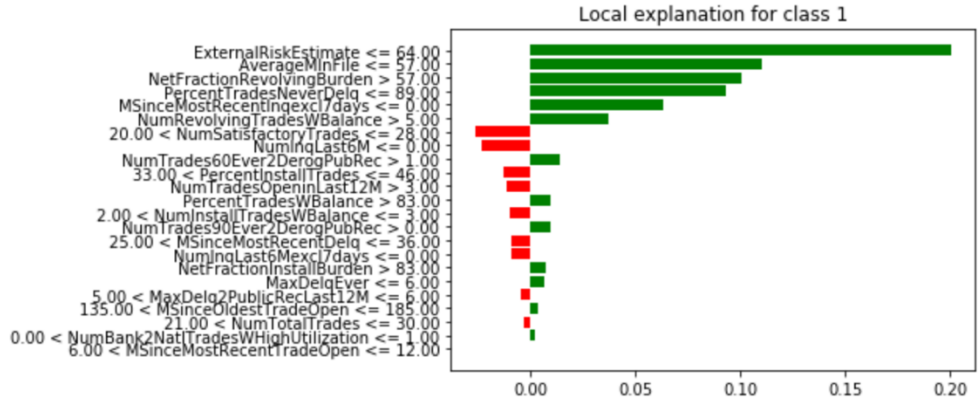


NetFractionRevolingBurden=-9(on Sim)/88(on Sim)
Lime(wight=P) made more sense

Instance 5: Record Index = 252(index on Sim=275)





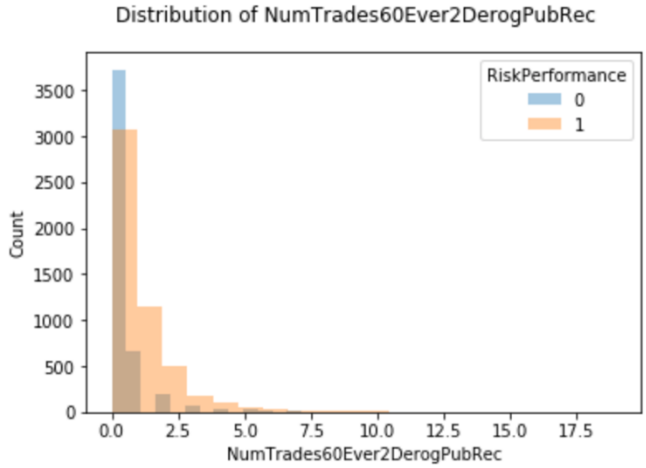


Similar part:

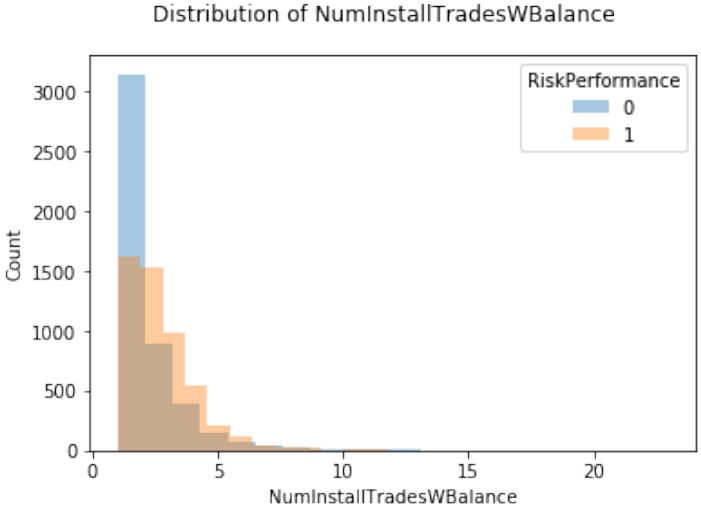
1) Common columns of Top positive weight(Num_col=6):
   ExternalRiskEstimate, AverageMInfile, NetFractionRevolvingBurden, PercentTradesNeverDelq, MSinceMostRecentInqexcl7days, NumRevolingTradesWBalance
2) Common columns of Top negative weight(Num_col=5):
   PercenteInstallTrades, NumTradesOpenInLast12M, PercentInstallTrades, MSinceMostRecentDelq, NumInqLast6Mexcl7days,

Different part: NumTrades60Ever2DerogPubRec=4(LIME:P, Sim:N)
NumInstallTradesWBalance=3(LIME:N, Sim:P)
MaxDelqEver=2(LIME:P, Sim:N)

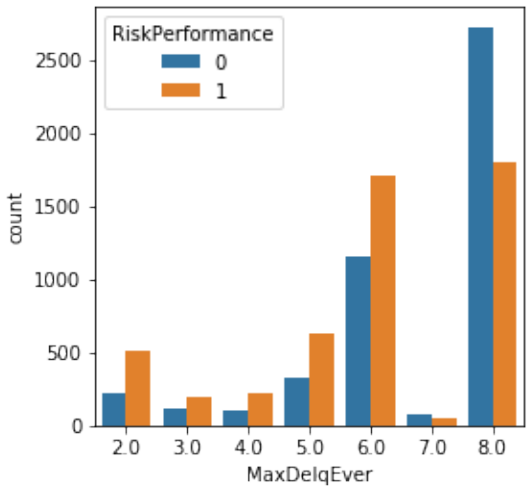
Explore on different part – which made more sense?



NumTrades60Ever2DerogPubRec=4(Monotonically Increasing)
LIME(weight=P) made more sense

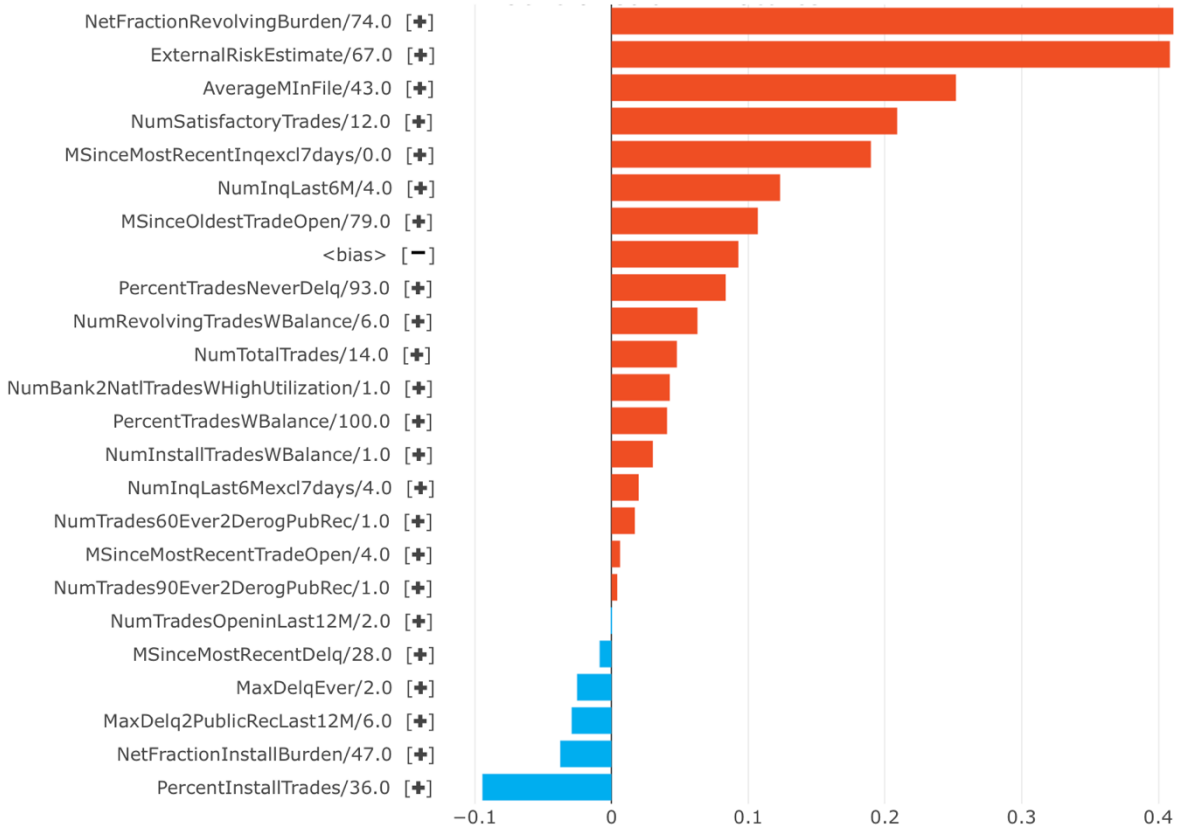


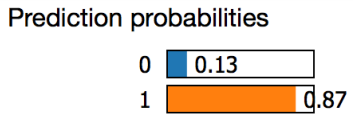
NumInstallTradesWBalance=3
Can't compare: no constraint on monotonicity

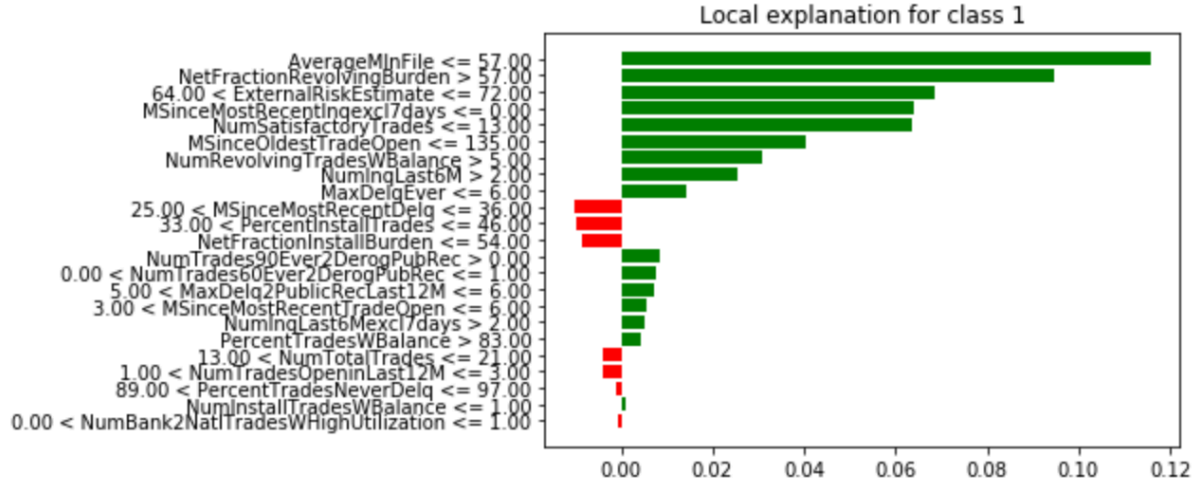


MaxDelqEver=2
LIME(weight=P) made more sense

Instance 6: Record Index = 365(index on Sim=388)







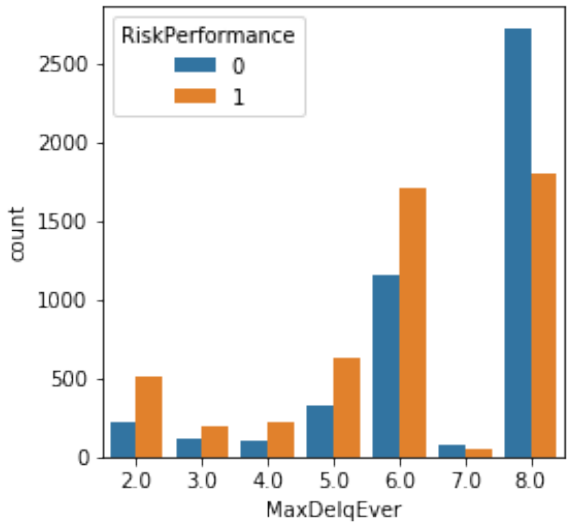
Similar part:

1) Common columns of Top positive weight(Num_col=8):
   ExternalRiskEstimate, AverageMInfile, NetFractionRevolvingBurden, MSinceMostRecentInqexcl7days, NumSatisfactoryTrades, MSinceOldestTradeOpen, NumRevolvingTradesWBalance, NumInqLast6M
2) Common columns of Top negative weight(Num_col=5):
   MSinceMostRecentDelq, PercentInstallTrades, NetFractionInstallBurden,

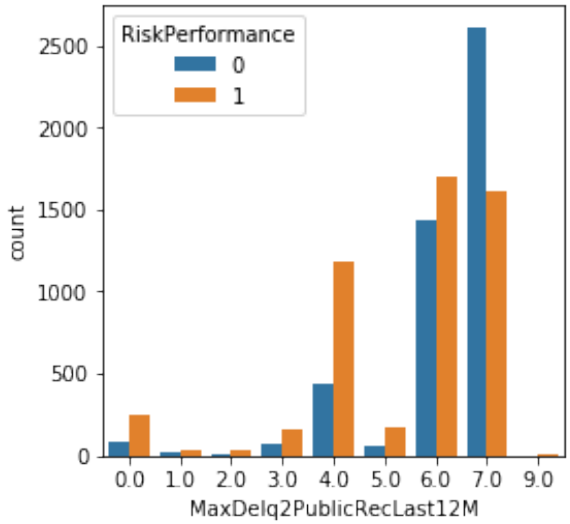
Different part: MaxDelqEver=2(LIME:P, Sim:N)

MaxDelq2PublicRecLast12M=6(LIME:P, Sim:N)

Explore on different part – which made more sense?

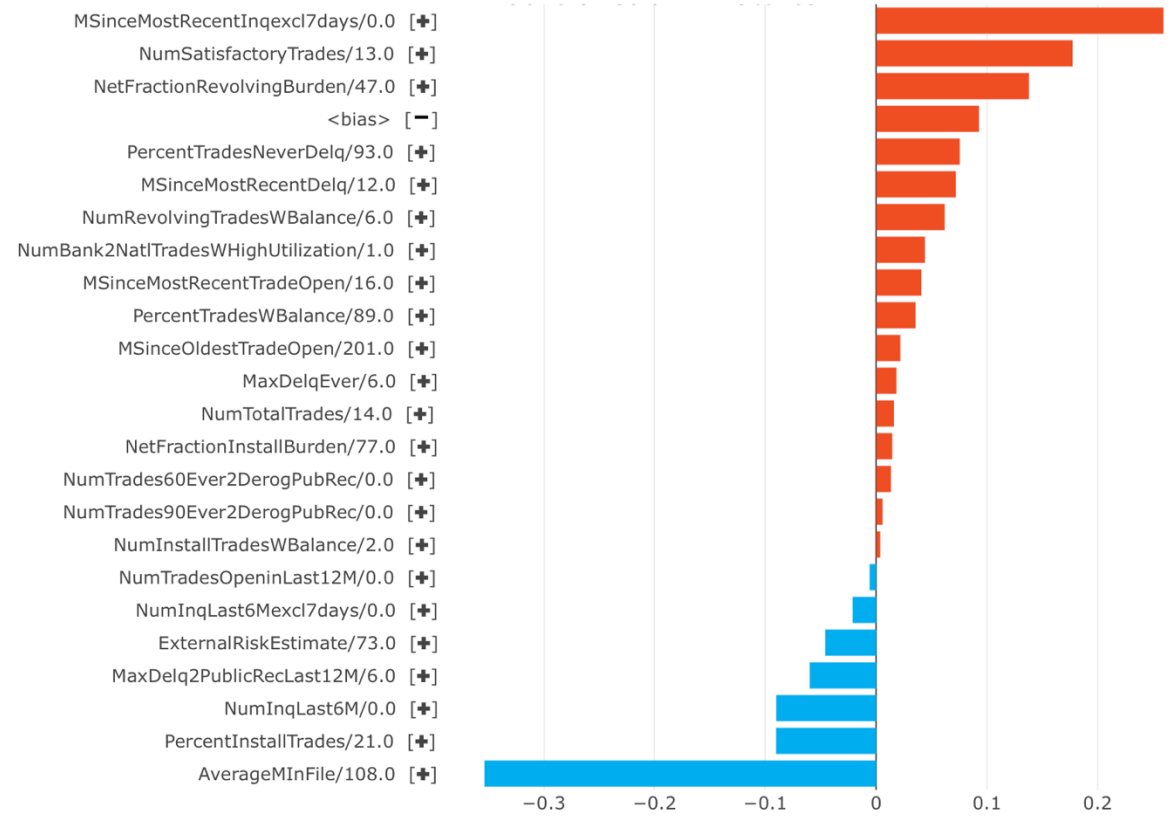


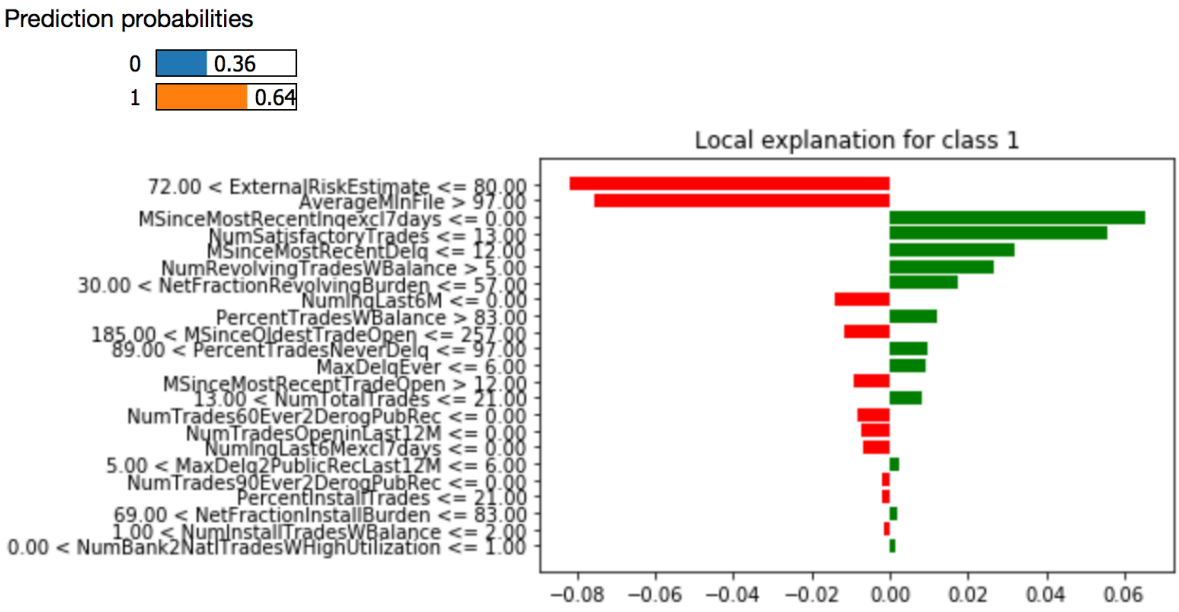
MaxDelqEver=2(Values 2-8 are monotonically decreasing)
LIME(weight=P) made more sense



MaxDelq2PublicRecLast12M=6(Values 0-7 are monotonically decreasing)
Sim(weight=N) made more sense

Instance 7: Record Index = 443(index on Sim=466)

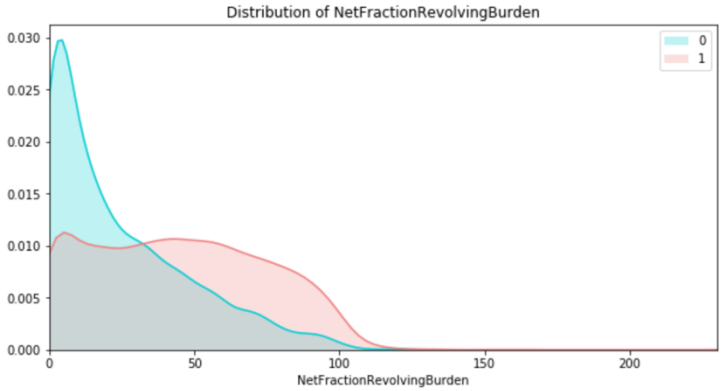




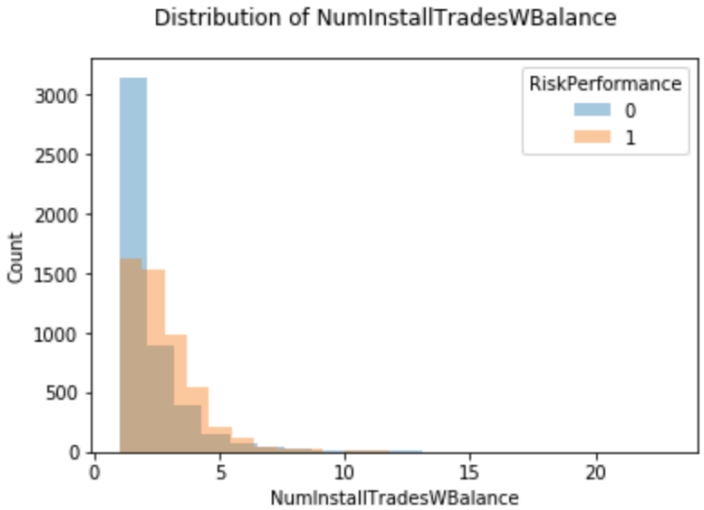
Similar part:

1) Common columns of Top positive weight(Num_col=4):
   MSinceMostRecentInqexcl7days, NumSatisfactoryTrades, MSinceMostRecentDelq, NumRevolvingTradesWBalance
2) Common columns of Top negative weight(Num_col=4):
   ExternalRiskEstimate(LIME significant but Sim not), AverageMInfile, PercentInstallTrades(Sim significant but LIME not), NumInqLast6

Different part: NetFractionRevolvingBurden =47(LIME:P, Sim:N)
NumInstallTradesWBalance=2(LIME:N, Sim:P)



NetFractionRevolvingBurden =47(monotonically increasing)
Sim(weight=N) made more sense



Can’t compare: no constraint on monotonicity, but from distribution, I think that LIME(weight=N) made more sense