BPMN

October 30, 2023

[ ]:
```
import sqlite3
import pandas as pd
import pm4py
from pm4py.objects.log.importer.xes import importer as xes_importer
from pm4py.algo.discovery.alpha import algorithm as alpha_miner
from pathlib import Path
import warnings

from model import *

warnings.filterwarnings("ignore", category=UserWarning)
```

[ ]:
```
dbPath = Path("../data/data.sqlite")
if not dbPath.exists():
    # Avoid creating an empty database
    raise Exception("Database file does not exist")
con = sqlite3.connect(dbPath)
```

[ ]:
```
def query2BPMN(sql):
    df = pd.read_sql_query(sql, con)
    df["EVENTTIME"] = pd.to_datetime(df["EVENTTIME"],␣
 ↪infer_datetime_format=True)
    log = pm4py.format_dataframe(df, case_id="_CASE_KEY",␣
 ↪activity_key="ACTIVITY_EN", timestamp_key="EVENTTIME")
    net, initial_marking, final_marking = alpha_miner.apply(log)
    process_model = pm4py.discover_bpmn_inductive(log)
    pm4py.view_bpmn(process_model)
    avgProfit = df["Profit"].mean()
    avgCosts = df["Costs"].mean()
    avgRevenue = df["Revenue"].mean()
    avgRating = df["CustomerSatisfaction"].mean()
    medianDirations = pd.Series(pm4py.stats.get_all_case_durations(log)).
 ↪median() / 60 # seconds to minutes
    print()
    print(f"{avgProfit = } € \n{avgCosts = } € \n{avgRevenue = } € \n{avgRating␣
 ↪= }  \n {medianDirations = } minutes")
    print()
```

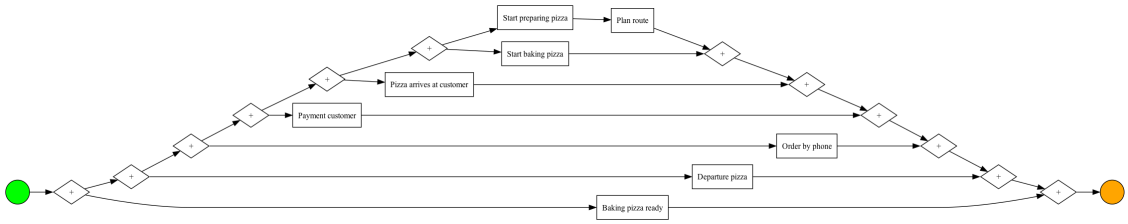
```
    # case durations
    print()

def query2Prediction(sql):
    print("RandomForrest:")
    res = predictProfitabilityAndCustomerSatisfactionBasedOnSQLQuery(con, sql)
    for i in res:
        algoPrinter(res[i])
        print()
        print()

def query2Info(whereClause="1=1"):
    query2BPMN(f"""select e.sorting, e.EVENTTIME, e.ACTIVITY_EN, e.Automation, ␣
 ↪c.*, Revenue - Costs as "Profit"
                from Pizza_Event e
                inner join Pizza_Case c on e._CASE_KEY = c._CASE_KEY
                where """+whereClause+"""
                order by sorting
        """)
    query2Prediction('SELECT *, Revenue - Costs as "Profit" FROM Pizza_Case␣
 ↪WHERE Variant != 5 and '+whereClause)
```

[ ]:
```
#query2BPMN("SELECT * FROM Pizza_Event")
```

0.1 Analyse By Variant

[ ]:
```
queries = [
        #"SELECT * FROM Pizza_Event",
]
for i in range(1, 9):
        queries.append(f"Variant = {i}")

print(queries)

count = 0
for query in queries:
        try:
                query2Info(query)
                count += 1
        except Exception as e:
                if count != 4: # error on variant 5 is expected because it has␣
 ↪not event data so the machine learning fails here
                        raise e
        print(query)
        print()
        print()
```

['Variant = 1', 'Variant = 2', 'Variant = 3', 'Variant = 4', 'Variant = 5',
'Variant = 6', 'Variant = 7', 'Variant = 8']



avgProfit = 7.932960893854749 €
avgCosts = 15.273743016759777 €
avgRevenue = 23.206703910614525 €
avgRating = 2.474860335195531
 medianDirations = 41.0 minutes

RandomForrest:

parsing log, completed traces :: 100%| | 1826/1826 [00:00<00:00,
3154.17it/s]

===
Accuracy: 0.5925925925925926
Recall: 0.48484848484848486
Precision: 0.3018867924528302

Column: IsOrderProfitable

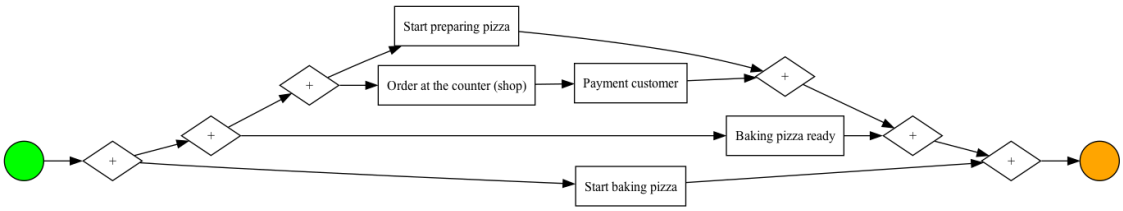
Feature Importances:
CustomerSatisfaction: 0.06774620393387282
Daytime: 0.09086472747764002
CustomerType_Adult: 0.016677801231147614
CustomerType_Senior: 0.007375671113248595
CustomerType_Student: 0.024062391552591333
CustomerType_Teenager: 0.017210106067191536
CustomerLocation_Munich District Five: 0.014354647976690615
CustomerLocation_Munich District Four: 0.013139189043806438
CustomerLocation_Munich District One: 0.02718021811808247
CustomerLocation_Munich District Three: 0.017677597491559265
CustomerLocation_Munich District Two: 0.017854280868627653
DistributionChannel_BestOrder Inc.: 0.021596270166313172

```
DistributionChannel_Deliver Now Holding: 0.02515218240857532
DistributionChannel_Deliveruu Inc.: 0.013343435858686732
DistributionChannel_Feedera SE: 0.02164682490261087
DistributionChannel_Heropizza Lmtd.: 0.00591196756740264
DistributionChannel_Orderly SE: 0.006863282515884559
DistributionChannel_TownExpress Inc.: 0.011990613837527236
Weekday_Friday: 0.020941445039770922
Weekday_Monday: 0.012256070150841339
Weekday_Saturday: 0.023243834074072597
Weekday_Sunday: 0.023960716586117533
Weekday_Thursday: 0.006727633930677288
Weekday_Tuesday: 0.005560487369443916
Weekday_Wednesday: 0.012335785755010521
CostFactor_Chef 1: 0.017573774103802016
CostFactor_Chef 2: 0.023591440891756785
CostFactor_Delivery Guy 1: 0.008739545881291977
CostFactor_Delivery Guy 2: 0.01654671842884581
CostFactor_Delivery Scooters: 0.01588288998177929
CostFactor_Distribution channel fees: 0.001980124774783341
CostFactor_Ingredients: 0.018080393979105925
CostFactor_Phone Bill: 0.018546797011003927
CostFactor_Waiter: 0.013795265327433805
PizzaSize_Large: 0.021362788735812863
PizzaSize_Medium: 0.019828911819007273
PizzaSize_Small: 0.022406111288309133
PizzaType_Calzone: 0.014359422085569286
PizzaType_Funghi: 0.02720683221369174
PizzaType_Magherita: 0.019310647328687078
PizzaType_Paprika: 0.00941990473874453
PizzaType_Salami: 0.022106497214345794
PizzaType_Speciale: 0.013182264359096037
PizzaType_Veggie: 0.0064360821422262985
Variant_1: 0.0
Duration: 0.13089297248850035
StartActivity_Order by phone: 0.010235295073649675
StartActivity_Start baking pizza: 0.004792408274499472
StartActivity_Start preparing pizza: 0.015098606836101227
EndActivity_Payment customer: 0.0011605667521533798
EndActivity_Pizza arrives at customer: 0.0005565422198803386
EndActivity_Plan route: 0.0012338110125296759
===



===
Accuracy: 0.5648148148148148
Recall: 0.3589680934726436
Precision: 0.35335249042145594
```

```
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.0633689589077725
Costs: 0.0656635829657908
Daytime: 0.05109466845379039
Profit: 0.0696823247515987
CustomerType_Adult: 0.011785702583450733
CustomerType_Senior: 0.005306950714506681
CustomerType_Student: 0.014908614460395566
CustomerType_Teenager: 0.014731349732406442
CustomerLocation_Munich District Five: 0.009627449489565579
CustomerLocation_Munich District Four: 0.009321872889751885
CustomerLocation_Munich District One: 0.0176617572486903
CustomerLocation_Munich District Three: 0.011825953260682845
CustomerLocation_Munich District Two: 0.011564778147705665
DistributionChannel_BestOrder Inc.: 0.013753277894003565
DistributionChannel_Deliver Now Holding: 0.017127699729814684
DistributionChannel_Deliveruu Inc.: 0.011267003882877111
DistributionChannel_Feedera SE: 0.013433710562458725
DistributionChannel_Heropizza Lmtd.: 0.0038113604637491265
DistributionChannel_Orderly SE: 0.00456042525855344
DistributionChannel_TownExpress Inc.: 0.0075127442746409775
Weekday_Friday: 0.016231022926337692
Weekday_Monday: 0.004053417697405793
Weekday_Saturday: 0.014397715538932074
Weekday_Sunday: 0.016693135269472754
Weekday_Thursday: 0.0037875594740988264
Weekday_Tuesday: 0.0024045316493226613
Weekday_Wednesday: 0.006522560896051575
CostFactor_Chef 1: 0.013066803284636793
CostFactor_Chef 2: 0.016710848337272766
CostFactor_Delivery Guy 1: 0.0069266047316599
CostFactor_Delivery Guy 2: 0.006921688806720858
CostFactor_Delivery Scooters: 0.010369660682739082
CostFactor_Distribution channel fees: 0.006575867890932999
CostFactor_Ingredients: 0.012073373053220973
CostFactor_Phone Bill: 0.00928478861920127
CostFactor_Waiter: 0.010856082051027718
PizzaSize_Large: 0.01381412606941059
PizzaSize_Medium: 0.014498336913950052
PizzaSize_Small: 0.01562354918738424
PizzaType_Calzone: 0.009517024683864221
PizzaType_Funghi: 0.013360198475949207
PizzaType_Magherita: 0.012081549849650902
PizzaType_Paprika: 0.007324273443070158
PizzaType_Salami: 0.01447425585299871
```

PizzaType_Speciale: 0.007583869476729811
PizzaType_Veggie: 0.0050349362305943356
Variant_1: 0.0
IsOrderProfitable: 0.010355892983250847
Duration: 0.07299040876567378
StartActivity_Order by phone: 0.00948785812995494
StartActivity_Start baking pizza: 0.0019157445606563328
StartActivity_Start preparing pizza: 0.008742774676558063
EndActivity_Payment customer: 0.0013615603926218733
EndActivity_Pizza arrives at customer: 0.0013419963574617347
EndActivity_Plan route: 0.00030774070493952454
IsCustomerSatisfied: 0.1952980566640413
===

Variant = 1



avgProfit = 6.656330749354005 €
avgCosts = 15.31266149870801 €
avgRevenue = 21.968992248062015 €
avgRating = 3.7235142118863047
 medianDirations = 12.0 minutes

RandomForrest:

parsing log, completed traces :: 100%| | 1826/1826 [00:00<00:00,
3250.21it/s]

===
Accuracy: 0.6794871794871795
Recall: 0.525462962962963

```
Precision: 0.5663983903420523
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.04599876993272834
Daytime: 0.08760413817547469
CustomerType_Adult: 0.01538809128415094
CustomerType_Senior: 0.007552869672749553
CustomerType_Student: 0.022854174152082816
CustomerType_Teenager: 0.019369995974750413
CustomerLocation_Munich District Five: 0.013433740894016005
CustomerLocation_Munich District Four: 0.016446238254446008
CustomerLocation_Munich District One: 0.022511653806892018
CustomerLocation_Munich District Three: 0.02481956967104033
CustomerLocation_Munich District Two: 0.022372809531200338
DistributionChannel_BestOrder Inc.: 0.02085143567045709
DistributionChannel_Deliver Now Holding: 0.020740494840334436
DistributionChannel_Deliveruu Inc.: 0.017568778204411797
DistributionChannel_Feedera SE: 0.023936273072075676
DistributionChannel_Heropizza Lmtd.: 0.007125131975012119
DistributionChannel_Orderly SE: 0.010198216430424425
DistributionChannel_TownExpress Inc.: 0.008484163547246393
Weekday_Friday: 0.019474149901338347
Weekday_Monday: 0.007403975936936394
Weekday_Saturday: 0.0192863167376523
Weekday_Sunday: 0.022536891835977613
Weekday_Thursday: 0.00881167447736016
Weekday_Tuesday: 0.004738444345748958
Weekday_Wednesday: 0.014507674812745681
CostFactor_Chef 1: 0.025151027196816497
CostFactor_Chef 2: 0.018205940102287013
CostFactor_Delivery Guy 1: 0.01069765064858227
CostFactor_Delivery Guy 2: 0.014182269546607465
CostFactor_Delivery Scooters: 0.017420670131840097
CostFactor_Distribution channel fees: 0.008825665028841374
CostFactor_Ingredients: 0.014835848686259036
CostFactor_Phone Bill: 0.01319602817607262
CostFactor_Waiter: 0.01533329786144316
PizzaSize_Large: 0.025130498691649142
PizzaSize_Medium: 0.018348979256635964
PizzaSize_Small: 0.030066237448873476
PizzaType_Calzone: 0.01742218305023067
PizzaType_Funghi: 0.02133444882796888
PizzaType_Magherita: 0.020352240621641964
PizzaType_Paprika: 0.009368043251686109
PizzaType_Salami: 0.02074795320479661
PizzaType_Speciale: 0.010237555988749208
```

PizzaType_Veggie: 0.011842906586908612
Variant_2: 0.0
Duration: 0.11075992035930604
StartActivity_Order at the counter (shop): 0.010308578527825267
StartActivity_Start baking pizza: 0.0039002289140457874
StartActivity_Start preparing pizza: 0.008263341016674785
EndActivity_Baking pizza ready: 0.01669108001395191
EndActivity_Payment customer: 0.02023814834920963
EndActivity_Start baking pizza: 0.00312358537384352
===

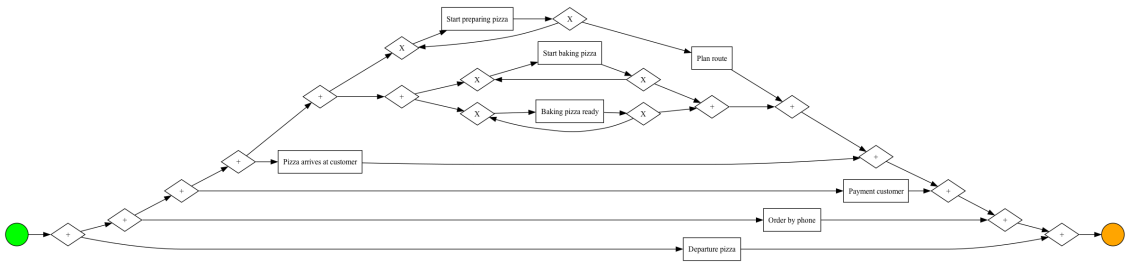
===
Accuracy: 0.47435897435897434
Recall: 0.5175729442970822
Precision: 0.45941558441558444

Column: CustomerSatisfaction

Feature Importances:
Revenue: 0.07346296194365724
Costs: 0.07538903977057321
Daytime: 0.062155967156422874
Profit: 0.08747079519004775
CustomerType_Adult: 0.01256206079884796
CustomerType_Senior: 0.006450227278150139
CustomerType_Student: 0.017946056273815226
CustomerType_Teenager: 0.0199224657830228
CustomerLocation_Munich District Five: 0.010445051788869973
CustomerLocation_Munich District Four: 0.013836274122779726
CustomerLocation_Munich District One: 0.016785644970313235
CustomerLocation_Munich District Three: 0.01656262756652441
CustomerLocation_Munich District Two: 0.014238036708814517
DistributionChannel_BestOrder Inc.: 0.01790746687152864
DistributionChannel_Deliver Now Holding: 0.015653961519085328
DistributionChannel_Deliveruu Inc.: 0.012365137459449893
DistributionChannel_Feedera SE: 0.017774099897981115
DistributionChannel_Heropizza Lmtd.: 0.0020761539911113343
DistributionChannel_Orderly SE: 0.006953765945328256
DistributionChannel_TownExpress Inc.: 0.005477207124280022
Weekday_Friday: 0.016940106328400553
Weekday_Monday: 0.004490575055021353
Weekday_Saturday: 0.016528542891847336
Weekday_Sunday: 0.016902126543674914
Weekday_Thursday: 0.005794881818234941
Weekday_Tuesday: 0.003178741477842839
Weekday_Wednesday: 0.01145410839798419

CostFactor_Chef 1: 0.015901942750300116
CostFactor_Chef 2: 0.018738199102373638
CostFactor_Delivery Guy 1: 0.0048896787241048765
CostFactor_Delivery Guy 2: 0.00810122491954931
CostFactor_Delivery Scooters: 0.011887654474166558
CostFactor_Distribution channel fees: 0.005096960768719932
CostFactor_Ingredients: 0.012216380834929012
CostFactor_Phone Bill: 0.013934110579763029
CostFactor_Waiter: 0.011990105078541707
PizzaSize_Large: 0.017127965085777314
PizzaSize_Medium: 0.014860420430956159
PizzaSize_Small: 0.020514578265678696
PizzaType_Calzone: 0.01567887986509775
PizzaType_Funghi: 0.013403455893887297
PizzaType_Magherita: 0.017758786021099208
PizzaType_Paprika: 0.008239780182449282
PizzaType_Salami: 0.01564548372370121
PizzaType_Speciale: 0.009724041742863614
PizzaType_Veggie: 0.008278192601364118
Variant_2: 0.0
IsOrderProfitable: 0.014832216061860005
Duration: 0.07600350556286145
StartActivity_Order at the counter (shop): 0.00744467146185788
StartActivity_Start baking pizza: 0.002127586639482628
StartActivity_Start preparing pizza: 0.008319245806040612
EndActivity_Baking pizza ready: 0.014326069243966224
EndActivity_Payment customer: 0.014959030566354711
EndActivity_Start baking pizza: 0.0023897665985695843
IsCustomerSatisfied: 0.03488598234007426
===

Variant = 2

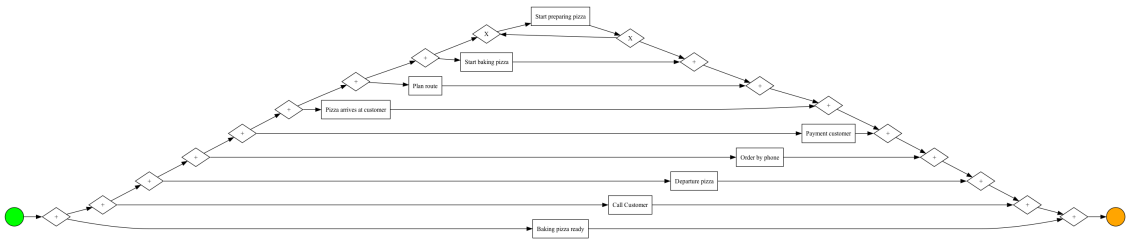


```
avgProfit = 7.183229813664596 €
avgCosts = 15.251552795031056 €
avgRevenue = 22.434782608695652 €
avgRating = 1.2732919254658386
 medianDirations = 61.0 minutes


RandomForrest:



parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3255.17it/s]



===
Accuracy: 0.5846153846153846
Recall: 0.49358974358974356
Precision: 0.46505376344086025
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.059446744428436865
Daytime: 0.08871244898727647
CustomerType_Adult: 0.020093292978422262
CustomerType_Senior: 0.005779776583520483
CustomerType_Student: 0.02248408442391364
CustomerType_Teenager: 0.02048490190509035
CustomerLocation_Munich District Five: 0.016079138785479858
CustomerLocation_Munich District Four: 0.015867146442754356
CustomerLocation_Munich District One: 0.024309609227860907
CustomerLocation_Munich District Three: 0.020673056668859262
CustomerLocation_Munich District Two: 0.018800462680276554
DistributionChannel_BestOrder Inc.: 0.021334724826367092
DistributionChannel_Deliver Now Holding: 0.021181527434303397
DistributionChannel_Deliveruu Inc.: 0.01184076702125344
DistributionChannel_Feedera SE: 0.02300162312875903
DistributionChannel_Heropizza Lmtd.: 0.008106896768998204
DistributionChannel_Orderly SE: 0.012106156288795532
DistributionChannel_TownExpress Inc.: 0.010664975626916505
Weekday_Friday: 0.022222730365537405
Weekday_Monday: 0.0076354218263886805
Weekday_Saturday: 0.022639627982488666
Weekday_Sunday: 0.025636328750029105
Weekday_Thursday: 0.008016418970579444
Weekday_Tuesday: 0.006113907145781553
Weekday_Wednesday: 0.014597385245720155
```

```
CostFactor_Chef 1: 0.014842235007703953
CostFactor_Chef 2: 0.025707028629715054
CostFactor_Delivery Guy 1: 0.009554143750889565
CostFactor_Delivery Guy 2: 0.011836319156445726
CostFactor_Delivery Scooters: 0.017161608634262353
CostFactor_Distribution channel fees: 0.0037010140474326996
CostFactor_Ingredients: 0.02263626722271476
CostFactor_Phone Bill: 0.015493532940576595
CostFactor_Waiter: 0.016696735802789093
PizzaSize_Large: 0.023667717039557255
PizzaSize_Medium: 0.02415309540809763
PizzaSize_Small: 0.024043651856241337
PizzaType_Calzone: 0.01715510501764669
PizzaType_Funghi: 0.023837498317441218
PizzaType_Magherita: 0.01707112718979263
PizzaType_Paprika: 0.007969800527610862
PizzaType_Salami: 0.019945476368048103
PizzaType_Speciale: 0.01277060698676372
PizzaType_Veggie: 0.01220502860606826
Variant_3: 0.0
Duration: 0.12125428889748723
StartActivity_Order by phone: 0.009612764525367398
StartActivity_Start baking pizza: 0.002072787840942907
StartActivity_Start preparing pizza: 0.011069123813946502
EndActivity_Departure pizza: 0.0022550045907919493
EndActivity_Payment customer: 0.003907423665972952
EndActivity_Pizza arrives at customer: 0.001551459661884227
===



===
Accuracy: 0.4307692307692308
Recall: 0.387989448258327
Precision: 0.5032214156079855
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.06492534459986274
Costs: 0.07191739391353741
Daytime: 0.06708977081893319
Profit: 0.07827551071515346
CustomerType_Adult: 0.010725805171946292
CustomerType_Senior: 0.003654364433590881
CustomerType_Student: 0.013139456725699026
CustomerType_Teenager: 0.013586013708012594
CustomerLocation_Munich District Five: 0.00901745200199565
```

```
CustomerLocation_Munich District Four: 0.010403405984084403
CustomerLocation_Munich District One: 0.019554491736261476
CustomerLocation_Munich District Three: 0.013510393128037425
CustomerLocation_Munich District Two: 0.012798888199461336
DistributionChannel_BestOrder Inc.: 0.016130956705968688
DistributionChannel_Deliver Now Holding: 0.015059752149088456
DistributionChannel_Deliveruu Inc.: 0.007090512950766674
DistributionChannel_Feedera SE: 0.018465802231229293
DistributionChannel_Heropizza Lmtd.: 0.005140064921059693
DistributionChannel_Orderly SE: 0.009310926241633814
DistributionChannel_TownExpress Inc.: 0.009075092533198824
Weekday_Friday: 0.015768465916691798
Weekday_Monday: 0.004186714295086337
Weekday_Saturday: 0.014800516780231563
Weekday_Sunday: 0.019076802327684137
Weekday_Thursday: 0.009516249659499001
Weekday_Tuesday: 0.005226205289190418
Weekday_Wednesday: 0.011162972091448014
CostFactor_Chef 1: 0.013221950130100402
CostFactor_Chef 2: 0.014918349972045586
CostFactor_Delivery Guy 1: 0.007690089990636898
CostFactor_Delivery Guy 2: 0.009458324992029638
CostFactor_Delivery Scooters: 0.01503710190845328
CostFactor_Distribution channel fees: 0.0011245567978790986
CostFactor_Ingredients: 0.01534227604654574
CostFactor_Phone Bill: 0.011902499331311808
CostFactor_Waiter: 0.007578268086529236
PizzaSize_Large: 0.016905740244655236
PizzaSize_Medium: 0.01684728638419152
PizzaSize_Small: 0.01715728244550391
PizzaType_Calzone: 0.009001618605681822
PizzaType_Funghi: 0.019802081038088747
PizzaType_Magherita: 0.019918194528046208
PizzaType_Paprika: 0.006736030461561698
PizzaType_Salami: 0.01914634054748582
PizzaType_Speciale: 0.008126418500498566
PizzaType_Veggie: 0.005193686779775004
Variant_3: 0.0
IsOrderProfitable: 0.01317935542227877
Duration: 0.08612699558807545
StartActivity_Order by phone: 0.010875669959679802
StartActivity_Start baking pizza: 0.00046485514162450685
StartActivity_Start preparing pizza: 0.006590632909600286
EndActivity_Departure pizza: 0.00014885552800526986
EndActivity_Payment customer: 0.001389384441211437
EndActivity_Pizza arrives at customer: 0.0023881268855456754
IsCustomerSatisfied: 0.095118702103606
===
```

Variant = 3



avgProfit = 8.093023255813954 €
avgCosts = 16.8953488372093 €
avgRevenue = 24.988372093023255 €
avgRating = 1.0852713178294573
 medianDirations = 48.0 minutes

RandomForrest:

parsing log, completed traces :: 100%| | 1826/1826 [00:00<00:00,
3769.51it/s]

===
Accuracy: 0.5576923076923077
Recall: 0.5196969696969698
Precision: 0.5256410256410257

Column: IsOrderProfitable

Feature Importances:
CustomerSatisfaction: 0.052003480586611354
Daytime: 0.10692108036708353
CustomerType_Adult: 0.01428069364503786
CustomerType_Senior: 0.0067192912099767995
CustomerType_Student: 0.02149585129138479
CustomerType_Teenager: 0.01864086859121595
CustomerLocation_Munich District Five: 0.009987696564085687

CustomerLocation_Munich District Four: 0.024042042221892924
CustomerLocation_Munich District One: 0.02146446476849032
CustomerLocation_Munich District Three: 0.013442699755009824
CustomerLocation_Munich District Two: 0.015309009242299944
DistributionChannel_BestOrder Inc.: 0.021149953640430357
DistributionChannel_Deliver Now Holding: 0.020948316842272333
DistributionChannel_Deliveruu Inc.: 0.013366353436795868
DistributionChannel_Feedera SE: 0.025509340476573227
DistributionChannel_Heropizza Lmtd.: 0.006766820717324512
DistributionChannel_Orderly SE: 0.007438769340068998
DistributionChannel_TownExpress Inc.: 0.010465908280631969
Weekday_Friday: 0.019041975750022075
Weekday_Monday: 0.009710181531213648
Weekday_Saturday: 0.02320667736217013
Weekday_Sunday: 0.0205553376300749
Weekday_Thursday: 0.01151081961184986
Weekday_Tuesday: 0.002478856237652708
Weekday_Wednesday: 0.016985189980474217
CostFactor_Chef 1: 0.01892051945990699
CostFactor_Chef 2: 0.011704501203124985
CostFactor_Delivery Guy 1: 0.00281975280676805
CostFactor_Delivery Guy 2: 0.014446121978856741
CostFactor_Delivery Scooters: 0.017675965297347655
CostFactor_Distribution channel fees: 0.005401684060798563
CostFactor_Ingredients: 0.019016308915448317
CostFactor_Phone Bill: 0.015655014949252234
CostFactor_Waiter: 0.019678898310220988
PizzaSize_Large: 0.02230269638422022
PizzaSize_Medium: 0.03000440450295675
PizzaSize_Small: 0.020935188553744048
PizzaType_Calzone: 0.010395096871306258
PizzaType_Funghi: 0.026710057045667486
PizzaType_Magherita: 0.02320698420233655
PizzaType_Paprika: 0.008253951309242676
PizzaType_Salami: 0.026442539314762085
PizzaType_Speciale: 0.028891842465873552
PizzaType_Veggie: 0.01054313466033088
Variant_4: 0.0
Duration: 0.1280683880882232
StartActivity_Call Customer: 0.00021726526098285947
StartActivity_Order by phone: 0.01254256646664848
StartActivity_Start preparing pizza: 0.009146052844895298
EndActivity_Payment customer: 0.001046355861919609
EndActivity_Pizza arrives at customer: 0.0025330301045217653
===

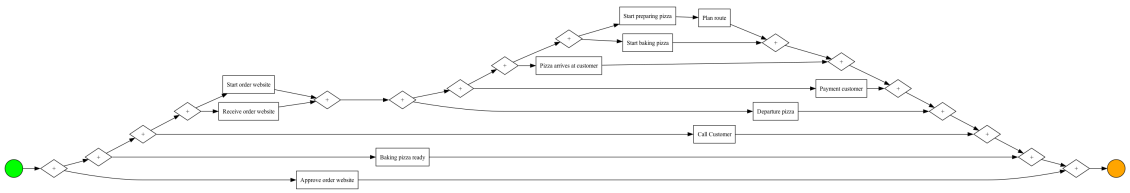
```
===
Accuracy: 0.34615384615384615
Recall: 0.47583333333333333
Precision: 0.5080128205128205
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.07110161037607349
Costs: 0.07123786372320821
Daytime: 0.05629479446555405
Profit: 0.08269124164974581
CustomerType_Adult: 0.016741855757999156
CustomerType_Senior: 0.008118441829884457
CustomerType_Student: 0.01845894559139988
CustomerType_Teenager: 0.013714834093302241
CustomerLocation_Munich District Five: 0.006897408174578563
CustomerLocation_Munich District Four: 0.013932035395656205
CustomerLocation_Munich District One: 0.01685586774027797
CustomerLocation_Munich District Three: 0.01556220998259263
CustomerLocation_Munich District Two: 0.01728983354325518
DistributionChannel_BestOrder Inc.: 0.019051425816902553
DistributionChannel_Deliver Now Holding: 0.017708293828219784
DistributionChannel_Deliveruu Inc.: 0.010581561356349776
DistributionChannel_Feedera SE: 0.017099747966033637
DistributionChannel_Heropizza Lmtd.: 0.004917242862683063
DistributionChannel_Orderly SE: 0.01070763879941516
DistributionChannel_TownExpress Inc.: 0.007394964204780318
Weekday_Friday: 0.014648280529950762
Weekday_Monday: 0.003251475243412797
Weekday_Saturday: 0.01764659831347097
Weekday_Sunday: 0.01877880302069361
Weekday_Thursday: 0.006231667305631579
Weekday_Tuesday: 0.00647435480593803
Weekday_Wednesday: 0.012776174807795004
CostFactor_Chef 1: 0.01591609145399522
CostFactor_Chef 2: 0.012117931731898544
CostFactor_Delivery Guy 1: 0.004196739876846468
CostFactor_Delivery Guy 2: 0.008629956348133128
CostFactor_Delivery Scooters: 0.013986574453673246
CostFactor_Distribution channel fees: 0.0024956090555392956
CostFactor_Ingredients: 0.01454118704433572
CostFactor_Phone Bill: 0.014324785546356656
CostFactor_Waiter: 0.014534943220303307
PizzaSize_Large: 0.022103350257077284
PizzaSize_Medium: 0.013782059190081606
PizzaSize_Small: 0.019648894651445713
PizzaType_Calzone: 0.012063845434268463
```

PizzaType_Funghi: 0.015826857163039377
PizzaType_Magherita: 0.018673229197383477
PizzaType_Paprika: 0.004680158191327593
PizzaType_Salami: 0.017384499976193384
PizzaType_Speciale: 0.011013251862096762
PizzaType_Veggie: 0.008643425388299309
Variant_4: 0.0
IsOrderProfitable: 0.011740303546941859
Duration: 0.08565262628008044
StartActivity_Call Customer: 0.001554349049058393
StartActivity_Order by phone: 0.007100746431101809
StartActivity_Start preparing pizza: 0.00915022814437575
EndActivity_Payment customer: 0.0004382862661758188
EndActivity_Pizza arrives at customer: 0.00017297863935012377
IsCustomerSatisfied: 0.06346192041581639
===

Variant = 4

avgProfit = NaT €
avgCosts = NaT €
avgRevenue = NaT €
avgRating = NaT
 medianDirations = nan minutes

RandomForrest:
Variant = 5



avgProfit = 9.751937984496124 €
avgCosts = 15.015503875968992 €
avgRevenue = 24.767441860465116 €
avgRating = 2.395348837209302
 medianDirations = 56.0 minutes

RandomForrest:

parsing log, completed traces :: 100%| | 1826/1826 [00:00<00:00,
3262.32it/s]

===
Accuracy: 0.6538461538461539
Recall: 0.5069444444444444
Precision: 0.5144927536231884

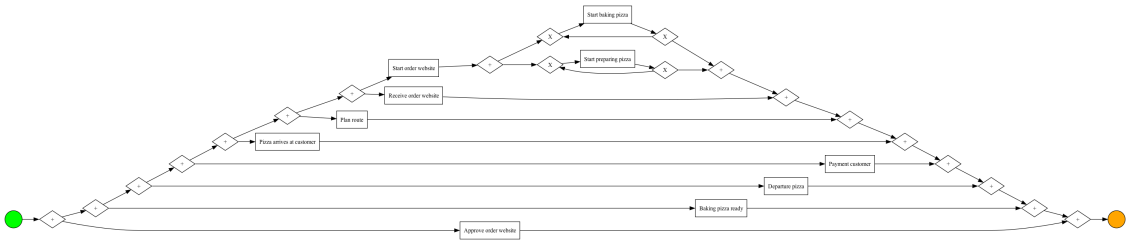
Column: IsOrderProfitable

Feature Importances:
CustomerSatisfaction: 0.05934990317849774
Daytime: 0.08329125080654873
CustomerType_Adult: 0.015166983150012924
CustomerType_Senior: 0.005101974576080921
CustomerType_Student: 0.03546447178248474
CustomerType_Teenager: 0.019904379039304067
CustomerLocation_Munich District Five: 0.012534731211435314
CustomerLocation_Munich District Four: 0.01806838591971173
CustomerLocation_Munich District One: 0.022779672222396862
CustomerLocation_Munich District Three: 0.02112534020693406
CustomerLocation_Munich District Two: 0.011932908708214993
DistributionChannel_BestOrder Inc.: 0.04883380336056649
DistributionChannel_Deliver Now Holding: 0.020954182413072
DistributionChannel_Deliveruu Inc.: 0.013633429233719449
DistributionChannel_Feedera SE: 0.026646657592276978

```
DistributionChannel_Heropizza Lmtd.: 0.008469755087250747
DistributionChannel_Orderly SE: 0.006133961814184745
DistributionChannel_TownExpress Inc.: 0.0049506195558186375
Weekday_Friday: 0.025307693199278183
Weekday_Monday: 0.00238533880240956
Weekday_Saturday: 0.01970112887807684
Weekday_Sunday: 0.026103519788369636
Weekday_Thursday: 0.008403646387362766
Weekday_Tuesday: 0.011879157370483555
Weekday_Wednesday: 0.010461184204321487
CostFactor_Chef 1: 0.015035954672119328
CostFactor_Chef 2: 0.019304165930106292
CostFactor_Delivery Guy 1: 0.008510819483033756
CostFactor_Delivery Guy 2: 0.012031104843085689
CostFactor_Delivery Scooters: 0.03119595757131956
CostFactor_Distribution channel fees: 0.005864782232724257
CostFactor_Ingredients: 0.015977224379888483
CostFactor_Phone Bill: 0.011996611686267492
CostFactor_Waiter: 0.022051881140881666
PizzaSize_Large: 0.023573013153922916
PizzaSize_Medium: 0.015962719635838542
PizzaSize_Small: 0.03101264051937648
PizzaType_Calzone: 0.01292064539434555
PizzaType_Funghi: 0.019658551296499113
PizzaType_Magherita: 0.01886356668841815
PizzaType_Paprika: 0.006578151120587195
PizzaType_Salami: 0.03411582718767645
PizzaType_Speciale: 0.012143796294517107
PizzaType_Veggie: 0.007461870473215549
Variant_6: 0.0
Duration: 0.13347282265169638
StartActivity_Approve order website: 0.0016693994518386765
StartActivity_Receive order website: 0.0
StartActivity_Start order website: 0.0004419547926540544
EndActivity_Payment customer: 0.0010552511996764623
EndActivity_Pizza arrives at customer: 0.0005172097114977355
===



===
Accuracy: 0.5384615384615384
Recall: 0.3148148148148148
Precision: 0.18803418803418803
----
Column: CustomerSatisfaction
----
Feature Importances:
```

Revenue: 0.05820582769970797
Costs: 0.05859752890630512
Daytime: 0.04823510361096447
Profit: 0.07048478797885467
CustomerType_Adult: 0.0121850454044789
CustomerType_Senior: 0.0067281398498988355
CustomerType_Student: 0.027861718454357667
CustomerType_Teenager: 0.02033713236822629
CustomerLocation_Munich District Five: 0.01598841449498573
CustomerLocation_Munich District Four: 0.009288187158594361
CustomerLocation_Munich District One: 0.0418748408653426
CustomerLocation_Munich District Three: 0.014261422993615889
CustomerLocation_Munich District Two: 0.015722891655366694
DistributionChannel_BestOrder Inc.: 0.013413733867422306
DistributionChannel_Deliver Now Holding: 0.020440193167408607
DistributionChannel_Deliveruu Inc.: 0.005867379247761826
DistributionChannel_Feedera SE: 0.022126392935094722
DistributionChannel_Heropizza Lmtd.: 0.004034769771666339
DistributionChannel_Orderly SE: 0.008507490586942537
DistributionChannel_TownExpress Inc.: 0.004872270213928991
Weekday_Friday: 0.012204908167099746
Weekday_Monday: 0.0019298135968724714
Weekday_Saturday: 0.012243472927325267
Weekday_Sunday: 0.014833052428061412
Weekday_Thursday: 0.003075313633096756
Weekday_Tuesday: 0.004906634151221803
Weekday_Wednesday: 0.009668799614540232
CostFactor_Chef 1: 0.00995153533044166
CostFactor_Chef 2: 0.01145079443710176
CostFactor_Delivery Guy 1: 0.007440357388456522
CostFactor_Delivery Guy 2: 0.010669213050420474
CostFactor_Delivery Scooters: 0.0183896266354524
CostFactor_Distribution channel fees: 0.00024942805331087237
CostFactor_Ingredients: 0.008965866379771677
CostFactor_Phone Bill: 0.007254726876282097
CostFactor_Waiter: 0.006588838291720477
PizzaSize_Large: 0.018824801616736872
PizzaSize_Medium: 0.016576509685829383
PizzaSize_Small: 0.012129832671570695
PizzaType_Calzone: 0.018083944865731613
PizzaType_Funghi: 0.008535661701076051
PizzaType_Magherita: 0.012222506515967022
PizzaType_Paprika: 0.004062952522827436
PizzaType_Salami: 0.0264435945412144
PizzaType_Speciale: 0.010331536159164888
PizzaType_Veggie: 0.003782350578659233
Variant_6: 0.0
IsOrderProfitable: 0.010431875284815538

```
Duration: 0.0618716122990026
StartActivity_Approve order website: 0.0018474003408786308
StartActivity_Receive order website: 0.0
StartActivity_Start order website: 0.0011086338533584687
EndActivity_Payment customer: 0.0012426609582006116
EndActivity_Pizza arrives at customer: 0.0024050775476319973
IsCustomerSatisfied: 0.17124339666523447
===



Variant = 6
```



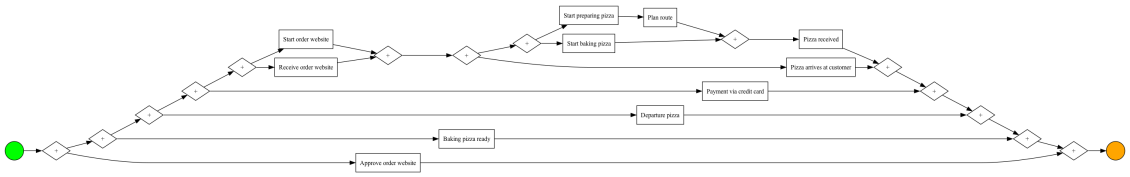

```
avgProfit = 10.930232558139535 €
avgCosts = 12.430232558139535 €
avgRevenue = 23.36046511627907 €
avgRating = 2.302325581395349
 medianDirations = 60.0 minutes


RandomForrest:


parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3755.73it/s]


===
Accuracy: 0.7777777777777778
Recall: 0.4666666666666667
Precision: 0.4117647058823529
----
Column: IsOrderProfitable
----
```

```
Feature Importances:
CustomerSatisfaction: 0.05141067803773417
Daytime: 0.08605189707892054
CustomerType_Adult: 0.016731337117422744
CustomerType_Senior: 0.0020275349612713088
CustomerType_Student: 0.014202805449468874
CustomerType_Teenager: 0.019348898688420227
CustomerLocation_Munich District Five: 0.00886653616267242
CustomerLocation_Munich District Four: 0.04893122348416768
CustomerLocation_Munich District One: 0.02522389979918806
CustomerLocation_Munich District Three: 0.014749733868397459
CustomerLocation_Munich District Two: 0.020068363435628695
DistributionChannel_BestOrder Inc.: 0.012825267382898005
DistributionChannel_Deliver Now Holding: 0.017127317961868452
DistributionChannel_Deliveruu Inc.: 0.00661236097897856
DistributionChannel_Feedera SE: 0.026540415360193758
DistributionChannel_Heropizza Lmtd.: 0.021946402222447207
DistributionChannel_Orderly SE: 0.02208306068152817
DistributionChannel_TownExpress Inc.: 0.005703831971230954
Weekday_Friday: 0.048019189264116226
Weekday_Monday: 0.017438334504538636
Weekday_Saturday: 0.020012888548156256
Weekday_Sunday: 0.01195466348952189
Weekday_Thursday: 0.0041254145404597655
Weekday_Tuesday: 0.006855557324134235
Weekday_Wednesday: 0.005991457124348913
CostFactor_Chef 1: 0.0319966681268573
CostFactor_Chef 2: 0.023699961882186128
CostFactor_Delivery Guy 1: 0.040041715596438626
CostFactor_Delivery Guy 2: 0.017563177504192534
CostFactor_Delivery Scooters: 0.016416479878016265
CostFactor_Distribution channel fees: 0.0005647840531561461
CostFactor_Ingredients: 0.02892901364760246
CostFactor_Phone Bill: 0.0050412618326427005
CostFactor_Waiter: 0.030439016766420177
PizzaSize_Large: 0.02240167854967093
PizzaSize_Medium: 0.01591688838918436
PizzaSize_Small: 0.0192094019531167
PizzaType_Calzone: 0.005873611600583532
PizzaType_Funghi: 0.03173794143926538
PizzaType_Magherita: 0.018857339325474703
PizzaType_Paprika: 0.020545038837168496
PizzaType_Salami: 0.029026022470912963
PizzaType_Speciale: 0.005584078260263427
PizzaType_Veggie: 0.006745691297171425
Variant_7: 0.0
Duration: 0.0913119750328517
StartActivity_Approve order website: 0.000572550034506556
```

```
StartActivity_Receive order website: 0.000857519292301901
StartActivity_Start order website: 0.001819114792302477
EndActivity_Payment customer: 0.0
===



===
Accuracy: 0.2777777777777778
Recall: 0.20833333333333334
Precision: 0.14583333333333334
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.0605176804520819
Costs: 0.04836635412661124
Daytime: 0.04755176039147652
Profit: 0.07186065943746638
CustomerType_Adult: 0.004718791127755477
CustomerType_Senior: 0.0010796741661284576
CustomerType_Student: 0.015487953266669944
CustomerType_Teenager: 0.011303781541675002
CustomerLocation_Munich District Five: 0.009424520726488445
CustomerLocation_Munich District Four: 0.009379090943673576
CustomerLocation_Munich District One: 0.015501077302399543
CustomerLocation_Munich District Three: 0.014977772334558555
CustomerLocation_Munich District Two: 0.021641784993234936
DistributionChannel_BestOrder Inc.: 0.03224802451247173
DistributionChannel_Deliver Now Holding: 0.016026227401409406
DistributionChannel_Deliveruu Inc.: 0.01085369830107969
DistributionChannel_Feedera SE: 0.020481682287160564
DistributionChannel_Heropizza Lmtd.: 0.009452432922813189
DistributionChannel_Orderly SE: 0.006988215447456456
DistributionChannel_TownExpress Inc.: 0.005199014701485699
Weekday_Friday: 0.01693685576173953
Weekday_Monday: 0.006817784002617778
Weekday_Saturday: 0.013940052910188043
Weekday_Sunday: 0.011848011525546567
Weekday_Thursday: 0.008051917746534468
Weekday_Tuesday: 0.00757985081147109
Weekday_Wednesday: 0.006095993605817776
CostFactor_Chef 1: 0.012485904415544487
CostFactor_Chef 2: 0.012121427004406646
CostFactor_Delivery Guy 1: 0.0116081361631124
CostFactor_Delivery Guy 2: 0.009744768046057293
CostFactor_Delivery Scooters: 0.00952122459248462
CostFactor_Distribution channel fees: 0.005402898810859414
```

CostFactor_Ingredients: 0.01080043336259392
CostFactor_Phone Bill: 0.011927890610742434
CostFactor_Waiter: 0.015597861849207036
PizzaSize_Large: 0.01928308525898998
PizzaSize_Medium: 0.008054015555284679
PizzaSize_Small: 0.020330074211373863
PizzaType_Calzone: 0.006425620022502562
PizzaType_Funghi: 0.01130177739991109
PizzaType_Magherita: 0.012748243711394231
PizzaType_Paprika: 0.001825980359309234
PizzaType_Salami: 0.008983158700796141
PizzaType_Speciale: 0.015097084204359757
PizzaType_Veggie: 0.00473600239614602
Variant_7: 0.0
IsOrderProfitable: 0.015255843645483047
Duration: 0.06759874029205397
StartActivity_Approve order website: 0.0055938860709572585
StartActivity_Receive order website: 0.006987405459648623
StartActivity_Start order website: 0.008609093665009133
EndActivity_Payment customer: 0.0
IsCustomerSatisfied: 0.18362878144376044
===

Variant = 7



avgProfit = 6.359375 €
avgCosts = 14.734375 €
avgRevenue = 21.09375 €
avgRating = 2.765625
medianDirations = 57.0 minutes

RandomForrest:

```
parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3279.17it/s]



===
Accuracy: 0.6153846153846154
Recall: 0.4444444444444444
Precision: 0.3333333333333333
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.06307133223852977
Daytime: 0.07833005971708117
CustomerType_Adult: 0.012503707306847254
CustomerType_Senior: 0.009961394323401492
CustomerType_Student: 0.023258151800994435
CustomerType_Teenager: 0.016693916605946504
CustomerLocation_Munich District Five: 0.011255109871051418
CustomerLocation_Munich District Four: 0.052992124021933484
CustomerLocation_Munich District One: 0.018900308291141598
CustomerLocation_Munich District Three: 0.013523493041429437
CustomerLocation_Munich District Two: 0.014827554989814553
DistributionChannel_BestOrder Inc.: 0.015417820905093154
DistributionChannel_Deliver Now Holding: 0.023047704304450838
DistributionChannel_Deliveruu Inc.: 0.016719160926844914
DistributionChannel_Feedera SE: 0.023361622358239756
DistributionChannel_Heropizza Lmtd.: 0.0005395768025078376
DistributionChannel_Orderly SE: 0.0020193280165100806
DistributionChannel_TownExpress Inc.: 0.002728415154905706
Weekday_Friday: 0.020868891430914766
Weekday_Monday: 0.005384447471265489
Weekday_Saturday: 0.01906356098753565
Weekday_Sunday: 0.016782203286251476
Weekday_Thursday: 0.011076099866003192
Weekday_Tuesday: 0.008937347735365753
Weekday_Wednesday: 0.01198451515394232
CostFactor_Chef 1: 0.020676971358169014
CostFactor_Chef 2: 0.017326932157877006
CostFactor_Delivery Guy 1: 0.0023919495172217207
CostFactor_Delivery Guy 2: 0.016389067130420352
CostFactor_Delivery Scooters: 0.009708121088239046
CostFactor_Distribution channel fees: 0.002648471461617609
CostFactor_Ingredients: 0.021599760465150632
CostFactor_Phone Bill: 0.017225169726511627
CostFactor_Waiter: 0.011531267841104606
PizzaSize_Large: 0.028499689198144582
```

```
PizzaSize_Medium: 0.022854755680055062
PizzaSize_Small: 0.01942318990816149
PizzaType_Calzone: 0.05010738285375194
PizzaType_Funghi: 0.0356063952017636
PizzaType_Magherita: 0.023048861957219866
PizzaType_Paprika: 0.006570431560010294
PizzaType_Salami: 0.03476756753719489
PizzaType_Speciale: 0.011565376008517009
PizzaType_Veggie: 0.006221973423846586
Variant_8: 0.0
Duration: 0.1205355197097513
StartActivity_Approve order website: 0.007684555647010407
StartActivity_Receive order website: 0.007352750722186013
StartActivity_Start order website: 0.013015993238073367
EndActivity_Pizza received: 0.0
===



===
Accuracy: 0.6153846153846154
Recall: 0.4
Precision: 0.2611111111111111
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.060763761005190806
Costs: 0.056856841735826676
Daytime: 0.04663870034116512
Profit: 0.06324917494247334
CustomerType_Adult: 0.01820030345130452
CustomerType_Senior: 0.0024237656364262212
CustomerType_Student: 0.015823252648962328
CustomerType_Teenager: 0.011447391409188889
CustomerLocation_Munich District Five: 0.010135380811912566
CustomerLocation_Munich District Four: 0.006379453970449364
CustomerLocation_Munich District One: 0.012688306600510943
CustomerLocation_Munich District Three: 0.021658754781402077
CustomerLocation_Munich District Two: 0.012841668579769818
DistributionChannel_BestOrder Inc.: 0.01310092862728706
DistributionChannel_Deliver Now Holding: 0.012289394175099104
DistributionChannel_Deliveruu Inc.: 0.009281003465672734
DistributionChannel_Feedera SE: 0.010335384795789184
DistributionChannel_Heropizza Lmtd.: 0.0007314949201741658
DistributionChannel_Orderly SE: 0.0014731955994518211
DistributionChannel_TownExpress Inc.: 0.020154589893911404
Weekday_Friday: 0.009693483380163553
```

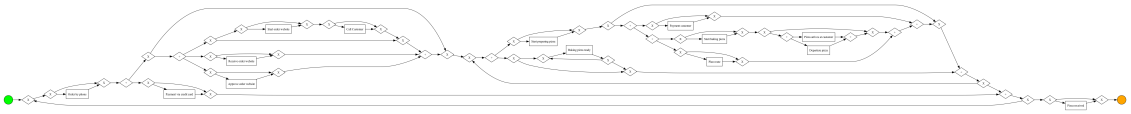
```
Weekday_Monday: 0.005767595554093994
Weekday_Saturday: 0.059627014802069785
Weekday_Sunday: 0.02751029743484207
Weekday_Thursday: 0.006589494938592937
Weekday_Tuesday: 0.002560892438621805
Weekday_Wednesday: 0.007746412616374272
CostFactor_Chef 1: 0.010862831403582969
CostFactor_Chef 2: 0.012226015751394766
CostFactor_Delivery Guy 1: 0.002635720015256611
CostFactor_Delivery Guy 2: 0.001246999080759386
CostFactor_Delivery Scooters: 0.008499146563448407
CostFactor_Distribution channel fees: 0.0009544311956273774
CostFactor_Ingredients: 0.03057237027363212
CostFactor_Phone Bill: 0.008037451824178442
CostFactor_Waiter: 0.028375172331701944
PizzaSize_Large: 0.01422807457946935
PizzaSize_Medium: 0.009165260224488003
PizzaSize_Small: 0.014359714935163003
PizzaType_Calzone: 0.014303465839067499
PizzaType_Funghi: 0.007172674807976315
PizzaType_Magherita: 0.013820364643101633
PizzaType_Paprika: 0.004106263807468137
PizzaType_Salami: 0.029649981641330557
PizzaType_Speciale: 0.006294516868635147
PizzaType_Veggie: 0.009516148474033464
Variant_8: 0.0
IsOrderProfitable: 0.018656450469052052
Duration: 0.06408072482746226
StartActivity_Approve order website: 0.007160683339725631
StartActivity_Receive order website: 0.0015510043350852013
StartActivity_Start order website: 0.011942421469206536
EndActivity_Pizza received: 0.0
IsCustomerSatisfied: 0.1446141727424266
===



Variant = 8
```

0.2 Analyse by Customer Satisfaction

[ ]:
```
queries = []
for i in range(1,6):
        queries.append(f"CustomerSatisfaction = {i}")
```

```
print(queries)

for query in queries:
        query2Info(query)
        print(query)
        print()
        print()
```

```
['CustomerSatisfaction = 1', 'CustomerSatisfaction = 2', 'CustomerSatisfaction =
3', 'CustomerSatisfaction = 4', 'CustomerSatisfaction = 5']
```

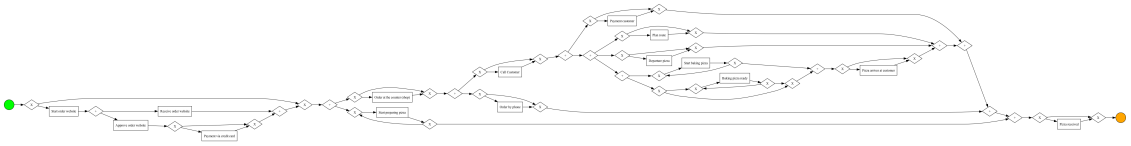


```
avgProfit = 8.0827182489183 €
avgCosts = 15.497073046576737 €
avgRevenue = 23.57979129549504 €
avgRating = 1.0
 medianDirations = 50.0 minutes


RandomForrest:


parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3820.40it/s]


===
Accuracy: 0.6172839506172839
Recall: 0.503921568627451
Precision: 0.5157894736842106
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.0
Daytime: 0.07673957687936413
CustomerType_Adult: 0.018078213588726848
CustomerType_Senior: 0.008804653556124972
CustomerType_Student: 0.020668426747051858
CustomerType_Teenager: 0.0174385158206512
CustomerLocation_Munich District Five: 0.01164708345550279
```

CustomerLocation_Munich District Four: 0.019539556296858385
CustomerLocation_Munich District One: 0.026357001223671753
CustomerLocation_Munich District Three: 0.016066961091100774
CustomerLocation_Munich District Two: 0.013154460360092648
DistributionChannel_BestOrder Inc.: 0.019248235431262455
DistributionChannel_Deliver Now Holding: 0.020782867637083605
DistributionChannel_Deliveruu Inc.: 0.01047123356025421
DistributionChannel_Feedera SE: 0.0198275459439487
DistributionChannel_Heropizza Lmtd.: 0.016076036283909623
DistributionChannel_Orderly SE: 0.010823183774964124
DistributionChannel_TownExpress Inc.: 0.008404974477202135
Weekday_Friday: 0.023066154190238133
Weekday_Monday: 0.01471792277644117
Weekday_Saturday: 0.025401371432499674
Weekday_Sunday: 0.02085492100397757
Weekday_Thursday: 0.009475210665153253
Weekday_Tuesday: 0.010997084020815555
Weekday_Wednesday: 0.012458939350438363
CostFactor_Chef 1: 0.020475312024267976
CostFactor_Chef 2: 0.017598393957634385
CostFactor_Delivery Guy 1: 0.00834726691977846
CostFactor_Delivery Guy 2: 0.011246862320920509
CostFactor_Delivery Scooters: 0.015341347870511208
CostFactor_Distribution channel fees: 0.006610527340734061
CostFactor_Ingredients: 0.01825754454393354
CostFactor_Phone Bill: 0.014692036268105113
CostFactor_Waiter: 0.01772427453167913
PizzaSize_Large: 0.021093633085715803
PizzaSize_Medium: 0.015927459843447702
PizzaSize_Small: 0.025053681477980184
PizzaType_Calzone: 0.017363847012797633
PizzaType_Funghi: 0.02316481215336518
PizzaType_Magherita: 0.01764094949455033
PizzaType_Paprika: 0.010963823966653392
PizzaType_Salami: 0.02084567918887325
PizzaType_Speciale: 0.014458170255887604
PizzaType_Veggie: 0.00875438840318306
Variant_1: 0.019783329816875424
Variant_3: 0.020752108288254058
Variant_4: 0.019282514275731747
Variant_6: 0.00994070964317255
Variant_7: 0.005642958529828864
Variant_8: 0.0037202483706768167
Variant_9: 0.0019253078110408627
Duration: 0.10032678039408846
StartActivity_Approve order website: 0.00021220552039357887
StartActivity_Call Customer: 0.0006173648567272199
StartActivity_Order by phone: 0.01633636547679392

```
StartActivity_Receive order website: 0.0017671011824447083
StartActivity_Start baking pizza: 0.004736530927520327
StartActivity_Start order website: 0.00864796209653184
StartActivity_Start preparing pizza: 0.012628625660833436
EndActivity_Departure pizza: 0.0018523266752340868
EndActivity_Payment customer: 0.005158466513884887
EndActivity_Pizza arrives at customer: 0.0019765473321391863
EndActivity_Pizza received: 0.00404122780278922
EndActivity_Start baking pizza: 0.0017272681535510778
EndActivity_Start preparing pizza: 0.0022639104441354494
===



===
Accuracy: 1.0
Recall: 1.0
Precision: 1.0
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.0
Costs: 0.0
Daytime: 0.0
Profit: 0.0
CustomerType_Adult: 0.0
CustomerType_Senior: 0.0
CustomerType_Student: 0.0
CustomerType_Teenager: 0.0
CustomerLocation_Munich District Five: 0.0
CustomerLocation_Munich District Four: 0.0
CustomerLocation_Munich District One: 0.0
CustomerLocation_Munich District Three: 0.0
CustomerLocation_Munich District Two: 0.0
DistributionChannel_BestOrder Inc.: 0.0
DistributionChannel_Deliver Now Holding: 0.0
DistributionChannel_Deliveruu Inc.: 0.0
DistributionChannel_Feedera SE: 0.0
DistributionChannel_Heropizza Lmtd.: 0.0
DistributionChannel_Orderly SE: 0.0
DistributionChannel_TownExpress Inc.: 0.0
Weekday_Friday: 0.0
Weekday_Monday: 0.0
Weekday_Saturday: 0.0
Weekday_Sunday: 0.0
Weekday_Thursday: 0.0
Weekday_Tuesday: 0.0
```

```
Weekday_Wednesday: 0.0
CostFactor_Chef 1: 0.0
CostFactor_Chef 2: 0.0
CostFactor_Delivery Guy 1: 0.0
CostFactor_Delivery Guy 2: 0.0
CostFactor_Delivery Scooters: 0.0
CostFactor_Distribution channel fees: 0.0
CostFactor_Ingredients: 0.0
CostFactor_Phone Bill: 0.0
CostFactor_Waiter: 0.0
PizzaSize_Large: 0.0
PizzaSize_Medium: 0.0
PizzaSize_Small: 0.0
PizzaType_Calzone: 0.0
PizzaType_Funghi: 0.0
PizzaType_Magherita: 0.0
PizzaType_Paprika: 0.0
PizzaType_Salami: 0.0
PizzaType_Speciale: 0.0
PizzaType_Veggie: 0.0
Variant_1: 0.0
Variant_3: 0.0
Variant_4: 0.0
Variant_6: 0.0
Variant_7: 0.0
Variant_8: 0.0
Variant_9: 0.0
IsOrderProfitable: 0.0
Duration: 0.0
StartActivity_Approve order website: 0.0
StartActivity_Call Customer: 0.0
StartActivity_Order by phone: 0.0
StartActivity_Receive order website: 0.0
StartActivity_Start baking pizza: 0.0
StartActivity_Start order website: 0.0
StartActivity_Start preparing pizza: 0.0
EndActivity_Departure pizza: 0.0
EndActivity_Payment customer: 0.0
EndActivity_Pizza arrives at customer: 0.0
EndActivity_Pizza received: 0.0
EndActivity_Start baking pizza: 0.0
EndActivity_Start preparing pizza: 0.0
IsCustomerSatisfied: 0.0
===



CustomerSatisfaction = 1
```



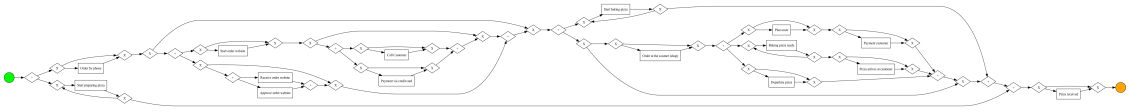
```
avgProfit = 8.196788990825688 €
avgCosts = 15.06788990825688 €
avgRevenue = 23.26467889908257 €
avgRating = 2.0
 medianDirations = 47.0 minutes


RandomForrest:


parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3769.50it/s]


===
Accuracy: 0.6739130434782609
Recall: 0.5458333333333334
Precision: 0.6705426356589147
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.0
Daytime: 0.0751792526130957
CustomerType_Adult: 0.0196881737690608
CustomerType_Senior: 0.005274591079837264
CustomerType_Student: 0.026202185992174862
CustomerType_Teenager: 0.016811837680252118
CustomerLocation_Munich District Five: 0.01029365827150211
CustomerLocation_Munich District Four: 0.02043132755026048
CustomerLocation_Munich District One: 0.023425704029531917
CustomerLocation_Munich District Three: 0.020426851752451708
CustomerLocation_Munich District Two: 0.011720921078866594
DistributionChannel_BestOrder Inc.: 0.024713076469044238
DistributionChannel_Deliver Now Holding: 0.02029186019086861
DistributionChannel_Deliveruu Inc.: 0.010869021863703665
```

DistributionChannel_Feedera SE: 0.02131307895718181
DistributionChannel_Heropizza Lmtd.: 0.005203807993897994
DistributionChannel_Orderly SE: 0.00824109717925396
DistributionChannel_TownExpress Inc.: 0.007519305147652185
Weekday_Friday: 0.02284148241773771
Weekday_Monday: 0.011723942050870469
Weekday_Saturday: 0.019449244248202175
Weekday_Sunday: 0.020940720222908514
Weekday_Thursday: 0.017120582132796023
Weekday_Tuesday: 0.006984995748284157
Weekday_Wednesday: 0.009639850902591425
CostFactor_Chef 1: 0.020235803536372183
CostFactor_Chef 2: 0.022742614345541978
CostFactor_Delivery Guy 1: 0.007588958814277332
CostFactor_Delivery Guy 2: 0.01327752360718325
CostFactor_Delivery Scooters: 0.011512675038361045
CostFactor_Distribution channel fees: 0.004987683695221185
CostFactor_Ingredients: 0.014541837025936854
CostFactor_Phone Bill: 0.017935341442372292
CostFactor_Waiter: 0.02126833773301686
PizzaSize_Large: 0.025025451932083453
PizzaSize_Medium: 0.01593806442794872
PizzaSize_Small: 0.02623379561674941
PizzaType_Calzone: 0.011403405859299246
PizzaType_Funghi: 0.015566938467889702
PizzaType_Magherita: 0.02114160148216079
PizzaType_Paprika: 0.009165337333422025
PizzaType_Salami: 0.025211852814445553
PizzaType_Speciale: 0.01225115673467227
PizzaType_Veggie: 0.008428572903393054
Variant_1: 0.01942676306505361
Variant_2: 0.005220263278245201
Variant_3: 0.018603226356726562
Variant_4: 0.021154492283780926
Variant_6: 0.006102604117366172
Variant_7: 0.007919532231183185
Variant_8: 0.0021083203395524733
Variant_9: 0.0019289463025225857
Duration: 0.11555223010067436
StartActivity_Order at the counter (shop): 0.006076279318278921
StartActivity_Order by phone: 0.011554864441395252
StartActivity_Start baking pizza: 0.0014807042680782584
StartActivity_Start order website: 0.008915213826414671
StartActivity_Start preparing pizza: 0.008477173060916962
EndActivity_Baking pizza ready: 0.006920382027852382
EndActivity_Payment customer: 0.012124576519381543
EndActivity_Pizza arrives at customer: 0.0015248283502642679
EndActivity_Pizza received: 0.0022897682979831032

```
EndActivity_Start baking pizza: 0.0018563096619559785
===



===
Accuracy: 1.0
Recall: 1.0
Precision: 1.0
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.0
Costs: 0.0
Daytime: 0.0
Profit: 0.0
CustomerType_Adult: 0.0
CustomerType_Senior: 0.0
CustomerType_Student: 0.0
CustomerType_Teenager: 0.0
CustomerLocation_Munich District Five: 0.0
CustomerLocation_Munich District Four: 0.0
CustomerLocation_Munich District One: 0.0
CustomerLocation_Munich District Three: 0.0
CustomerLocation_Munich District Two: 0.0
DistributionChannel_BestOrder Inc.: 0.0
DistributionChannel_Deliver Now Holding: 0.0
DistributionChannel_Deliveruu Inc.: 0.0
DistributionChannel_Feedera SE: 0.0
DistributionChannel_Heropizza Lmtd.: 0.0
DistributionChannel_Orderly SE: 0.0
DistributionChannel_TownExpress Inc.: 0.0
Weekday_Friday: 0.0
Weekday_Monday: 0.0
Weekday_Saturday: 0.0
Weekday_Sunday: 0.0
Weekday_Thursday: 0.0
Weekday_Tuesday: 0.0
Weekday_Wednesday: 0.0
CostFactor_Chef 1: 0.0
CostFactor_Chef 2: 0.0
CostFactor_Delivery Guy 1: 0.0
CostFactor_Delivery Guy 2: 0.0
CostFactor_Delivery Scooters: 0.0
CostFactor_Distribution channel fees: 0.0
CostFactor_Ingredients: 0.0
CostFactor_Phone Bill: 0.0
```

```
CostFactor_Waiter: 0.0
PizzaSize_Large: 0.0
PizzaSize_Medium: 0.0
PizzaSize_Small: 0.0
PizzaType_Calzone: 0.0
PizzaType_Funghi: 0.0
PizzaType_Magherita: 0.0
PizzaType_Paprika: 0.0
PizzaType_Salami: 0.0
PizzaType_Speciale: 0.0
PizzaType_Veggie: 0.0
Variant_1: 0.0
Variant_2: 0.0
Variant_3: 0.0
Variant_4: 0.0
Variant_6: 0.0
Variant_7: 0.0
Variant_8: 0.0
Variant_9: 0.0
IsOrderProfitable: 0.0
Duration: 0.0
StartActivity_Order at the counter (shop): 0.0
StartActivity_Order by phone: 0.0
StartActivity_Start baking pizza: 0.0
StartActivity_Start order website: 0.0
StartActivity_Start preparing pizza: 0.0
EndActivity_Baking pizza ready: 0.0
EndActivity_Payment customer: 0.0
EndActivity_Pizza arrives at customer: 0.0
EndActivity_Pizza received: 0.0
EndActivity_Start baking pizza: 0.0
IsCustomerSatisfied: 0.0
===
```

```
CustomerSatisfaction = 2
```



```
avgProfit = 7.288947677836567 €
```

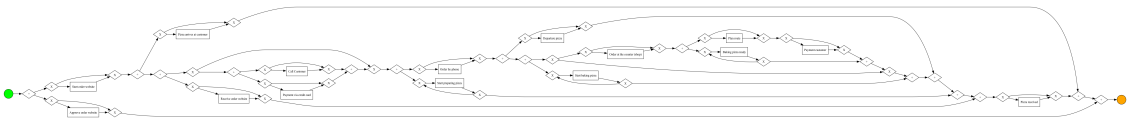
```
avgCosts = 14.920928865373309 €
avgRevenue = 22.209876543209877 €
avgRating = 3.0
 medianDirations = 35.0 minutes


RandomForrest:


parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3269.68it/s]


===
Accuracy: 0.6666666666666666
Recall: 0.5599431818181818
Precision: 0.6883928571428571
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.0
Daytime: 0.08348732247523502
CustomerType_Adult: 0.015778633212559685
CustomerType_Senior: 0.005712516255999609
CustomerType_Student: 0.02112297889789769
CustomerType_Teenager: 0.017704126858252803
CustomerLocation_Munich District Five: 0.010881262569570668
CustomerLocation_Munich District Four: 0.017547110816306617
CustomerLocation_Munich District One: 0.022685435136502327
CustomerLocation_Munich District Three: 0.0175687981564234
CustomerLocation_Munich District Two: 0.01884302158103438
DistributionChannel_BestOrder Inc.: 0.02181967087134919
DistributionChannel_Deliver Now Holding: 0.01950143586552876
DistributionChannel_Deliveruu Inc.: 0.018907659530086475
DistributionChannel_Feedera SE: 0.02252317898695917
DistributionChannel_Heropizza Lmtd.: 0.004150120712540337
DistributionChannel_Orderly SE: 0.007128568818024439
DistributionChannel_TownExpress Inc.: 0.005733706034903947
Weekday_Friday: 0.017744733736729475
Weekday_Monday: 0.005631989642389775
Weekday_Saturday: 0.019534753187261285
Weekday_Sunday: 0.02412772868664312
Weekday_Thursday: 0.00928767177643084
Weekday_Tuesday: 0.01299125777428942
Weekday_Wednesday: 0.013973983350790269
CostFactor_Chef 1: 0.015200373447860335
```

```
CostFactor_Chef 2: 0.018471787155952206
CostFactor_Delivery Guy 1: 0.008079009509041672
CostFactor_Delivery Guy 2: 0.00957522134191619
CostFactor_Delivery Scooters: 0.01802617410859142
CostFactor_Distribution channel fees: 0.00879252022935235
CostFactor_Ingredients: 0.01724583656998762
CostFactor_Phone Bill: 0.013219757122446598
CostFactor_Waiter: 0.015586745890710848
PizzaSize_Large: 0.025235817341915302
PizzaSize_Medium: 0.01829126200394959
PizzaSize_Small: 0.020460227064707088
PizzaType_Calzone: 0.01806636708129809
PizzaType_Funghi: 0.018326010059268254
PizzaType_Magherita: 0.021010636026165732
PizzaType_Paprika: 0.006710417042563786
PizzaType_Salami: 0.02054679820880399
PizzaType_Speciale: 0.00853170230558192
PizzaType_Veggie: 0.012987319464551974
Variant_1: 0.017687459413202055
Variant_2: 0.012243505386323862
Variant_3: 0.00625650063030327
Variant_4: 0.004346377537515088
Variant_6: 0.01120911279151767
Variant_7: 0.007821266384116402
Variant_8: 0.005142354482801114
Variant_9: 0.005427096951348468
Duration: 0.11303449094142834
StartActivity_Approve order website: 0.0007069071580276776
StartActivity_Order at the counter (shop): 0.014264828313259481
StartActivity_Order by phone: 0.01433173511311185
StartActivity_Start baking pizza: 0.0016259218427375933
StartActivity_Start order website: 0.012236338331059545
StartActivity_Start preparing pizza: 0.006938733483410463
EndActivity_Baking pizza ready: 0.012756053324413059
EndActivity_Call Customer: 0.001689580004994167
EndActivity_Payment customer: 0.013186236186172692
EndActivity_Pizza received: 0.0034925200675379447
EndActivity_Plan route: 0.0
EndActivity_Start baking pizza: 0.002713483263709829
EndActivity_Start preparing pizza: 0.004137851484635907
===



===
Accuracy: 1.0
Recall: 1.0
Precision: 1.0
```

```
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.0
Costs: 0.0
Daytime: 0.0
Profit: 0.0
CustomerType_Adult: 0.0
CustomerType_Senior: 0.0
CustomerType_Student: 0.0
CustomerType_Teenager: 0.0
CustomerLocation_Munich District Five: 0.0
CustomerLocation_Munich District Four: 0.0
CustomerLocation_Munich District One: 0.0
CustomerLocation_Munich District Three: 0.0
CustomerLocation_Munich District Two: 0.0
DistributionChannel_BestOrder Inc.: 0.0
DistributionChannel_Deliver Now Holding: 0.0
DistributionChannel_Deliveruu Inc.: 0.0
DistributionChannel_Feedera SE: 0.0
DistributionChannel_Heropizza Lmtd.: 0.0
DistributionChannel_Orderly SE: 0.0
DistributionChannel_TownExpress Inc.: 0.0
Weekday_Friday: 0.0
Weekday_Monday: 0.0
Weekday_Saturday: 0.0
Weekday_Sunday: 0.0
Weekday_Thursday: 0.0
Weekday_Tuesday: 0.0
Weekday_Wednesday: 0.0
CostFactor_Chef 1: 0.0
CostFactor_Chef 2: 0.0
CostFactor_Delivery Guy 1: 0.0
CostFactor_Delivery Guy 2: 0.0
CostFactor_Delivery Scooters: 0.0
CostFactor_Distribution channel fees: 0.0
CostFactor_Ingredients: 0.0
CostFactor_Phone Bill: 0.0
CostFactor_Waiter: 0.0
PizzaSize_Large: 0.0
PizzaSize_Medium: 0.0
PizzaSize_Small: 0.0
PizzaType_Calzone: 0.0
PizzaType_Funghi: 0.0
PizzaType_Magherita: 0.0
PizzaType_Paprika: 0.0
PizzaType_Salami: 0.0
```

```
PizzaType_Speciale: 0.0
PizzaType_Veggie: 0.0
Variant_1: 0.0
Variant_2: 0.0
Variant_3: 0.0
Variant_4: 0.0
Variant_6: 0.0
Variant_7: 0.0
Variant_8: 0.0
Variant_9: 0.0
IsOrderProfitable: 0.0
Duration: 0.0
StartActivity_Approve order website: 0.0
StartActivity_Order at the counter (shop): 0.0
StartActivity_Order by phone: 0.0
StartActivity_Start baking pizza: 0.0
StartActivity_Start order website: 0.0
StartActivity_Start preparing pizza: 0.0
EndActivity_Baking pizza ready: 0.0
EndActivity_Call Customer: 0.0
EndActivity_Payment customer: 0.0
EndActivity_Pizza received: 0.0
EndActivity_Plan route: 0.0
EndActivity_Start baking pizza: 0.0
EndActivity_Start preparing pizza: 0.0
IsCustomerSatisfied: 0.0
===
```

```
CustomerSatisfaction = 3
```



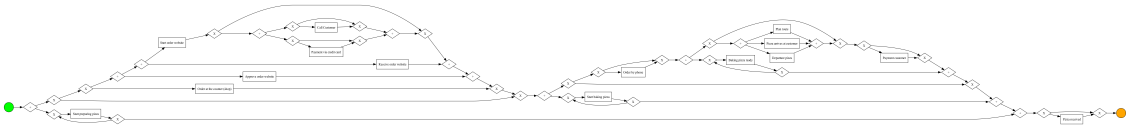
```
avgProfit = 7.183257918552036 €
avgCosts = 15.816176470588236 €
avgRevenue = 22.999434389140273 €
avgRating = 4.0
 medianDirations = 16.0 minutes
```

```
RandomForrest:


parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3280.84it/s]


===
Accuracy: 0.5
Recall: 0.421875
Precision: 0.2755102040816326
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.0
Daytime: 0.08024892457116456
CustomerType_Adult: 0.01642799172482299
CustomerType_Senior: 0.008905129907298874
CustomerType_Student: 0.019556978808651832
CustomerType_Teenager: 0.019734189226729593
CustomerLocation_Munich District Five: 0.01265781796091552
CustomerLocation_Munich District Four: 0.017164235213424184
CustomerLocation_Munich District One: 0.023744874161308674
CustomerLocation_Munich District Three: 0.01982953309442461
CustomerLocation_Munich District Two: 0.01328034062885009
DistributionChannel_BestOrder Inc.: 0.019678571052829236
DistributionChannel_Deliver Now Holding: 0.026559763814274048
DistributionChannel_Deliveruu Inc.: 0.019899532497291646
DistributionChannel_Feedera SE: 0.01848272905488492
DistributionChannel_Heropizza Lmtd.: 0.008883815593757323
DistributionChannel_Orderly SE: 0.014165859040817214
DistributionChannel_TownExpress Inc.: 0.01084586523338851
Weekday_Friday: 0.019584809186178703
Weekday_Monday: 0.005382565955394896
Weekday_Saturday: 0.020488864424791357
Weekday_Sunday: 0.025125785323661422
Weekday_Thursday: 0.012876810265470199
Weekday_Tuesday: 0.006925424585751016
Weekday_Wednesday: 0.007430377614628941
CostFactor_Chef 1: 0.01943699049525355
CostFactor_Chef 2: 0.01769043403942184
CostFactor_Delivery Guy 1: 0.010721294536229187
CostFactor_Delivery Guy 2: 0.015113701343198978
CostFactor_Delivery Scooters: 0.016347793223839915
CostFactor_Distribution channel fees: 0.007494459539394987
CostFactor_Ingredients: 0.015688853956767102
```

```
CostFactor_Phone Bill: 0.01095548266923603
CostFactor_Waiter: 0.012096651305676566
PizzaSize_Large: 0.026002301401314896
PizzaSize_Medium: 0.0191827983805497
PizzaSize_Small: 0.025091119102046325
PizzaType_Calzone: 0.014544975543893618
PizzaType_Funghi: 0.02079755490020505
PizzaType_Magherita: 0.017809099378812965
PizzaType_Paprika: 0.007621036157064947
PizzaType_Salami: 0.022138870995785345
PizzaType_Speciale: 0.012127705334372421
PizzaType_Veggie: 0.007491610546482918
Variant_1: 0.011438029513330727
Variant_2: 0.013947345983884358
Variant_3: 0.011609470739027692
Variant_6: 0.0034230861961126674
Variant_7: 0.0021472425212277525
Variant_8: 0.004735416283276255
Variant_9: 0.0004909254821966148
Duration: 0.11384250868393202
StartActivity_Approve order website: 0.0014532280233166832
StartActivity_Order at the counter (shop): 0.018604846528938356
StartActivity_Order by phone: 0.014430399163302963
StartActivity_Start baking pizza: 0.002705257869746272
StartActivity_Start order website: 0.007670036526030303
StartActivity_Start preparing pizza: 0.012828589758088637
EndActivity_Baking pizza ready: 0.013433212237668767
EndActivity_Call Customer: 0.0016206093836957861
EndActivity_Payment customer: 0.014395562219631324
EndActivity_Pizza arrives at customer: 0.0017324132430333401
EndActivity_Pizza received: 0.003258297853302576
===



===
Accuracy: 1.0
Recall: 1.0
Precision: 1.0
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.0
Costs: 0.0
Daytime: 0.0
Profit: 0.0
CustomerType_Adult: 0.0
```

```
CustomerType_Senior: 0.0
CustomerType_Student: 0.0
CustomerType_Teenager: 0.0
CustomerLocation_Munich District Five: 0.0
CustomerLocation_Munich District Four: 0.0
CustomerLocation_Munich District One: 0.0
CustomerLocation_Munich District Three: 0.0
CustomerLocation_Munich District Two: 0.0
DistributionChannel_BestOrder Inc.: 0.0
DistributionChannel_Deliver Now Holding: 0.0
DistributionChannel_Deliveruu Inc.: 0.0
DistributionChannel_Feedera SE: 0.0
DistributionChannel_Heropizza Lmtd.: 0.0
DistributionChannel_Orderly SE: 0.0
DistributionChannel_TownExpress Inc.: 0.0
Weekday_Friday: 0.0
Weekday_Monday: 0.0
Weekday_Saturday: 0.0
Weekday_Sunday: 0.0
Weekday_Thursday: 0.0
Weekday_Tuesday: 0.0
Weekday_Wednesday: 0.0
CostFactor_Chef 1: 0.0
CostFactor_Chef 2: 0.0
CostFactor_Delivery Guy 1: 0.0
CostFactor_Delivery Guy 2: 0.0
CostFactor_Delivery Scooters: 0.0
CostFactor_Distribution channel fees: 0.0
CostFactor_Ingredients: 0.0
CostFactor_Phone Bill: 0.0
CostFactor_Waiter: 0.0
PizzaSize_Large: 0.0
PizzaSize_Medium: 0.0
PizzaSize_Small: 0.0
PizzaType_Calzone: 0.0
PizzaType_Funghi: 0.0
PizzaType_Magherita: 0.0
PizzaType_Paprika: 0.0
PizzaType_Salami: 0.0
PizzaType_Speciale: 0.0
PizzaType_Veggie: 0.0
Variant_1: 0.0
Variant_2: 0.0
Variant_3: 0.0
Variant_6: 0.0
Variant_7: 0.0
Variant_8: 0.0
Variant_9: 0.0
```

```
IsOrderProfitable: 0.0
Duration: 0.0
StartActivity_Approve order website: 0.0
StartActivity_Order at the counter (shop): 0.0
StartActivity_Order by phone: 0.0
StartActivity_Start baking pizza: 0.0
StartActivity_Start order website: 0.0
StartActivity_Start preparing pizza: 0.0
EndActivity_Baking pizza ready: 0.0
EndActivity_Call Customer: 0.0
EndActivity_Payment customer: 0.0
EndActivity_Pizza arrives at customer: 0.0
EndActivity_Pizza received: 0.0
IsCustomerSatisfied: 0.0
===



CustomerSatisfaction = 4
```



```
avgProfit = 9.03257529194837 €
avgCosts = 14.558696988322065 €
avgRevenue = 23.591272280270438 €
avgRating = 5.0
 medianDirations = 33.0 minutes


RandomForrest:



parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3803.30it/s]



===
Accuracy: 0.5952380952380952
Recall: 0.47777777777777775
```

```
Precision: 0.4407894736842105
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.0
Daytime: 0.07376641728275782
CustomerType_Adult: 0.014125193296835594
CustomerType_Senior: 0.010084401072462224
CustomerType_Student: 0.026593130731136956
CustomerType_Teenager: 0.026705398905367744
CustomerLocation_Munich District Five: 0.01180876240339037
CustomerLocation_Munich District Four: 0.012337936362877807
CustomerLocation_Munich District One: 0.034963436645992475
CustomerLocation_Munich District Three: 0.0175590913309421
CustomerLocation_Munich District Two: 0.023484809911168632
DistributionChannel_BestOrder Inc.: 0.0191738224242569
DistributionChannel_Deliver Now Holding: 0.016221740977598143
DistributionChannel_Deliveruu Inc.: 0.010594536078685345
DistributionChannel_Feedera SE: 0.02697746788923488
DistributionChannel_Heropizza Lmtd.: 0.0045738766148292875
DistributionChannel_Orderly SE: 0.013285121693213268
DistributionChannel_TownExpress Inc.: 0.003806757934767438
Weekday_Friday: 0.021677179132160492
Weekday_Monday: 0.003319315469856659
Weekday_Saturday: 0.026082157759641688
Weekday_Sunday: 0.01857451626420975
Weekday_Thursday: 0.008358216546419097
Weekday_Tuesday: 0.00720219774496674
Weekday_Wednesday: 0.007022172963459067
CostFactor_Chef 1: 0.014032595187258523
CostFactor_Chef 2: 0.023118829310912338
CostFactor_Delivery Guy 1: 0.007268796499171087
CostFactor_Delivery Guy 2: 0.02130741899570338
CostFactor_Delivery Scooters: 0.02303323301263768
CostFactor_Distribution channel fees: 0.0016056763434337449
CostFactor_Ingredients: 0.015224443956193243
CostFactor_Phone Bill: 0.01035695341510868
CostFactor_Waiter: 0.02376712272194821
PizzaSize_Large: 0.011789210178450103
PizzaSize_Medium: 0.01843669837615993
PizzaSize_Small: 0.02107644259243147
PizzaType_Calzone: 0.009388089266071814
PizzaType_Funghi: 0.021202245568483744
PizzaType_Magherita: 0.01895253708639533
PizzaType_Paprika: 0.008590548637544194
PizzaType_Salami: 0.020572579894014696
PizzaType_Speciale: 0.01155169593230299
```

```
PizzaType_Veggie: 0.006182252904101507
Variant_1: 0.014254852596071576
Variant_2: 0.013658637494485029
Variant_3: 0.009468715821576521
Variant_6: 0.007582519386104517
Variant_7: 0.00595762766296374
Variant_8: 0.010780487552553017
Variant_9: 0.005434363638889287
Duration: 0.09175677685554297
StartActivity_Approve order website: 0.0022715956281417066
StartActivity_Order at the counter (shop): 0.012605348905369225
StartActivity_Order by phone: 0.02372135095044188
StartActivity_Receive order website: 0.0
StartActivity_Start baking pizza: 0.0
StartActivity_Start order website: 0.015146591482406704
StartActivity_Start preparing pizza: 0.014225177912586635
EndActivity_Baking pizza ready: 0.011629490422869813
EndActivity_Payment customer: 0.01680343601823115
EndActivity_Pizza arrives at customer: 0.0020455345743383042
EndActivity_Pizza received: 0.008800150354107436
EndActivity_Start baking pizza: 0.004411904949251931
EndActivity_Start preparing pizza: 0.0036904104795154125
===



===
Accuracy: 1.0
Recall: 1.0
Precision: 1.0
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.0
Costs: 0.0
Daytime: 0.0
Profit: 0.0
CustomerType_Adult: 0.0
CustomerType_Senior: 0.0
CustomerType_Student: 0.0
CustomerType_Teenager: 0.0
CustomerLocation_Munich District Five: 0.0
CustomerLocation_Munich District Four: 0.0
CustomerLocation_Munich District One: 0.0
CustomerLocation_Munich District Three: 0.0
CustomerLocation_Munich District Two: 0.0
DistributionChannel_BestOrder Inc.: 0.0
```

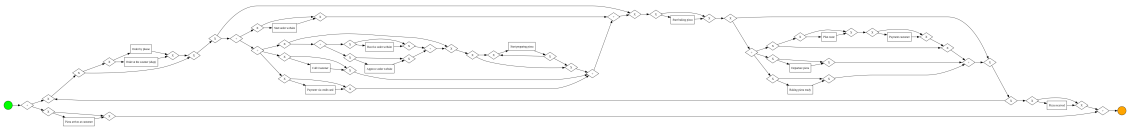
DistributionChannel_Deliver Now Holding: 0.0
DistributionChannel_Deliveruu Inc.: 0.0
DistributionChannel_Feedera SE: 0.0
DistributionChannel_Heropizza Lmtd.: 0.0
DistributionChannel_Orderly SE: 0.0
DistributionChannel_TownExpress Inc.: 0.0
Weekday_Friday: 0.0
Weekday_Monday: 0.0
Weekday_Saturday: 0.0
Weekday_Sunday: 0.0
Weekday_Thursday: 0.0
Weekday_Tuesday: 0.0
Weekday_Wednesday: 0.0
CostFactor_Chef 1: 0.0
CostFactor_Chef 2: 0.0
CostFactor_Delivery Guy 1: 0.0
CostFactor_Delivery Guy 2: 0.0
CostFactor_Delivery Scooters: 0.0
CostFactor_Distribution channel fees: 0.0
CostFactor_Ingredients: 0.0
CostFactor_Phone Bill: 0.0
CostFactor_Waiter: 0.0
PizzaSize_Large: 0.0
PizzaSize_Medium: 0.0
PizzaSize_Small: 0.0
PizzaType_Calzone: 0.0
PizzaType_Funghi: 0.0
PizzaType_Magherita: 0.0
PizzaType_Paprika: 0.0
PizzaType_Salami: 0.0
PizzaType_Speciale: 0.0
PizzaType_Veggie: 0.0
Variant_1: 0.0
Variant_2: 0.0
Variant_3: 0.0
Variant_6: 0.0
Variant_7: 0.0
Variant_8: 0.0
Variant_9: 0.0
IsOrderProfitable: 0.0
Duration: 0.0
StartActivity_Approve order website: 0.0
StartActivity_Order at the counter (shop): 0.0
StartActivity_Order by phone: 0.0
StartActivity_Receive order website: 0.0
StartActivity_Start baking pizza: 0.0
StartActivity_Start order website: 0.0
StartActivity_Start preparing pizza: 0.0

```
EndActivity_Baking pizza ready: 0.0
EndActivity_Payment customer: 0.0
EndActivity_Pizza arrives at customer: 0.0
EndActivity_Pizza received: 0.0
EndActivity_Start baking pizza: 0.0
EndActivity_Start preparing pizza: 0.0
IsCustomerSatisfied: 0.0
===



CustomerSatisfaction = 5
```

0.3 Analyse by Customer IsSatisfied

[ ]:
```
queries = [f"CustomerSatisfaction >= 3", f"CustomerSatisfaction <= 3"]

print(queries)

for query in queries:
        query2Info(query)
        print(query)
        print()
        print()
```

```
['CustomerSatisfaction >= 3', 'CustomerSatisfaction <= 3']
```



```
avgProfit = 7.6788288951007795 €
avgCosts = 15.067088421362365 €
avgRevenue = 22.745917316463146 €
avgRating = 3.7388553773723703
 medianDirations = 28.0 minutes



RandomForrest:



parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
```

```
3818.99it/s]


===
Accuracy: 0.6043956043956044
Recall: 0.4647926140278352
Precision: 0.4244306418219462
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.03738419463153925
Daytime: 0.08439299266528824
CustomerType_Adult: 0.013604532584970304
CustomerType_Senior: 0.007774631718975327
CustomerType_Student: 0.020993780343775623
CustomerType_Teenager: 0.01456262480847914
CustomerLocation_Munich District Five: 0.01170887998092948
CustomerLocation_Munich District Four: 0.01572497990791911
CustomerLocation_Munich District One: 0.02241300574287606
CustomerLocation_Munich District Three: 0.017793178497731654
CustomerLocation_Munich District Two: 0.017313330077341652
DistributionChannel_BestOrder Inc.: 0.018482716643866796
DistributionChannel_Deliver Now Holding: 0.01960951291523129
DistributionChannel_Deliveruu Inc.: 0.015764167244242178
DistributionChannel_Feedera SE: 0.020571978433820165
DistributionChannel_Heropizza Lmtd.: 0.005518464988611882
DistributionChannel_Orderly SE: 0.010033347691172447
DistributionChannel_TownExpress Inc.: 0.0074933674124348145
Weekday_Friday: 0.020024259741838205
Weekday_Monday: 0.005385793825467393
Weekday_Saturday: 0.01978311693109073
Weekday_Sunday: 0.02348801334471245
Weekday_Thursday: 0.007859827892827664
Weekday_Tuesday: 0.005939563219746253
Weekday_Wednesday: 0.012351123592350322
CostFactor_Chef 1: 0.01934985176222571
CostFactor_Chef 2: 0.0188275313361836
CostFactor_Delivery Guy 1: 0.010575729676173415
CostFactor_Delivery Guy 2: 0.016012055445847495
CostFactor_Delivery Scooters: 0.015503218751166644
CostFactor_Distribution channel fees: 0.005325218034928025
CostFactor_Ingredients: 0.014858854070674436
CostFactor_Phone Bill: 0.015156970296304204
CostFactor_Waiter: 0.014358709749250702
PizzaSize_Large: 0.02127723994305604
PizzaSize_Medium: 0.019293129434629217
```

PizzaSize_Small: 0.0220374982386476
PizzaType_Calzone: 0.01438589473766952
PizzaType_Funghi: 0.01938269243558428
PizzaType_Magherita: 0.016384628103312492
PizzaType_Paprika: 0.008575777249657184
PizzaType_Salami: 0.021738457711465632
PizzaType_Speciale: 0.012139575390810696
PizzaType_Veggie: 0.008723368441293448
Variant_1: 0.013952263819077113
Variant_2: 0.010683383938236361
Variant_3: 0.009172670282590471
Variant_4: 0.004683679660043588
Variant_6: 0.007022587105884745
Variant_7: 0.005525333160503545
Variant_8: 0.005838876240355455
Variant_9: 0.00355603272926881
Duration: 0.10691034263007154
StartActivity_Approve order website: 0.002073373875140425
StartActivity_Order at the counter (shop): 0.010886568983037607
StartActivity_Order by phone: 0.011851251949137394
StartActivity_Receive order website: 0.0002867802815328863
StartActivity_Start baking pizza: 0.003472219677881204
StartActivity_Start order website: 0.008271171829330145
StartActivity_Start preparing pizza: 0.009559151079775884
EndActivity_Baking pizza ready: 0.010453235937036495
EndActivity_Call Customer: 0.0015254933509890104
EndActivity_Payment customer: 0.013148795175365578
EndActivity_Pizza arrives at customer: 0.0011510492382062053
EndActivity_Pizza received: 0.004165542230728196
EndActivity_Plan route: 0.0
EndActivity_Start baking pizza: 0.0034883257389844487
EndActivity_Start preparing pizza: 0.0024440854407040617
===

===
Accuracy: 0.45054945054945056
Recall: 0.3785825737045249
Precision: 0.3626517273576097

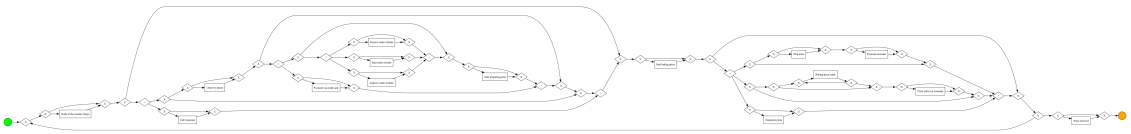
Column: CustomerSatisfaction

Feature Importances:
Revenue: 0.0689679292896753
Costs: 0.0684127768128392
Daytime: 0.05856572387490413
Profit: 0.07429671131476064

CustomerType_Adult: 0.013542936124865337
CustomerType_Senior: 0.007162930146522261
CustomerType_Student: 0.018110047392785815
CustomerType_Teenager: 0.014174548088602443
CustomerLocation_Munich District Five: 0.009671209208888868
CustomerLocation_Munich District Four: 0.010393818466633143
CustomerLocation_Munich District One: 0.017503733457197346
CustomerLocation_Munich District Three: 0.013997567943622861
CustomerLocation_Munich District Two: 0.01607159257316809
DistributionChannel_BestOrder Inc.: 0.01525141174569496
DistributionChannel_Deliver Now Holding: 0.015475413596982268
DistributionChannel_Deliveruu Inc.: 0.010929614571434884
DistributionChannel_Feedera SE: 0.016278933247135752
DistributionChannel_Heropizza Lmtd.: 0.004716059789248387
DistributionChannel_Orderly SE: 0.006874439673545778
DistributionChannel_TownExpress Inc.: 0.00856712846992893
Weekday_Friday: 0.017319012013342225
Weekday_Monday: 0.004101579789475026
Weekday_Saturday: 0.01734832212312958
Weekday_Sunday: 0.017929388981056577
Weekday_Thursday: 0.005725144766519154
Weekday_Tuesday: 0.0037141423868084973
Weekday_Wednesday: 0.009552779057962207
CostFactor_Chef 1: 0.014357171040296912
CostFactor_Chef 2: 0.015829275055718475
CostFactor_Delivery Guy 1: 0.007250356294016141
CostFactor_Delivery Guy 2: 0.008973003380382233
CostFactor_Delivery Scooters: 0.01502271872716437
CostFactor_Distribution channel fees: 0.0036803260670830473
CostFactor_Ingredients: 0.013929321327464097
CostFactor_Phone Bill: 0.008855794804752737
CostFactor_Waiter: 0.012110868150385931
PizzaSize_Large: 0.017906065900131603
PizzaSize_Medium: 0.015108254042061325
PizzaSize_Small: 0.01805584038381637
PizzaType_Calzone: 0.011160380808626627
PizzaType_Funghi: 0.015347222361694684
PizzaType_Magherita: 0.012845068583421907
PizzaType_Paprika: 0.007604705966511252
PizzaType_Salami: 0.0150495069201186
PizzaType_Speciale: 0.009608678643094509
PizzaType_Veggie: 0.006571382486369828
Variant_1: 0.008946263301954683
Variant_2: 0.017378286398716712
Variant_3: 0.010414941436101277
Variant_4: 0.004204691619268136
Variant_6: 0.00434580238546676
Variant_7: 0.0028774706477387945

```
Variant_8: 0.003472473236918484
Variant_9: 0.0022009038750092367
IsOrderProfitable: 0.013256001258250943
Duration: 0.08584911680674906
StartActivity_Approve order website: 0.0013170513395437406
StartActivity_Order at the counter (shop): 0.016362886812185208
StartActivity_Order by phone: 0.010136999615229356
StartActivity_Receive order website: 0.000397900425215887
StartActivity_Start baking pizza: 0.00055585743774679
StartActivity_Start order website: 0.009920936159745623
StartActivity_Start preparing pizza: 0.00797277046386349
EndActivity_Baking pizza ready: 0.00572326747750559
EndActivity_Call Customer: 0.0003867914277855936
EndActivity_Payment customer: 0.011154754593819911
EndActivity_Pizza arrives at customer: 0.002099051425745768
EndActivity_Pizza received: 0.0032337457094091904
EndActivity_Plan route: 0.0
EndActivity_Start baking pizza: 0.0034797801094300497
EndActivity_Start preparing pizza: 0.0003914201867595281
IsCustomerSatisfied: 0.0
===
```

```
CustomerSatisfaction >= 3
```



```
avgProfit = 7.898985016916384 €
avgCosts = 15.257854035766071 €
avgRevenue = 23.156839052682454 €
avgRating = 1.4898501691638473
 medianDirations = 47.0 minutes
```

```
RandomForrest:
```

```
parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3801.76it/s]
```

```
===
Accuracy: 0.6346863468634686
Recall: 0.48174366616989567
Precision: 0.43859649122807015
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.045797304376697705
Daytime: 0.07813766309911102
CustomerType_Adult: 0.016220707897722553
CustomerType_Senior: 0.00743842477622985
CustomerType_Student: 0.02173000434997572
CustomerType_Teenager: 0.017013010149676832
CustomerLocation_Munich District Five: 0.010769532392835608
CustomerLocation_Munich District Four: 0.015530442073208863
CustomerLocation_Munich District One: 0.021348395127581635
CustomerLocation_Munich District Three: 0.016992389408484763
CustomerLocation_Munich District Two: 0.014680851402325746
DistributionChannel_BestOrder Inc.: 0.01813510384906172
DistributionChannel_Deliver Now Holding: 0.019751519693239506
DistributionChannel_Deliveruu Inc.: 0.01197396935920206
DistributionChannel_Feedera SE: 0.02024056849091571
DistributionChannel_Heropizza Lmtd.: 0.009082205461307127
DistributionChannel_Orderly SE: 0.007730265971981751
DistributionChannel_TownExpress Inc.: 0.006828367272476066
Weekday_Friday: 0.02071961668966051
Weekday_Monday: 0.006863418687761444
Weekday_Saturday: 0.018815284234639348
Weekday_Sunday: 0.020338078051148782
Weekday_Thursday: 0.008504505407220373
Weekday_Tuesday: 0.007454546095948735
Weekday_Wednesday: 0.012991250448560344
CostFactor_Chef 1: 0.016841135415570533
CostFactor_Chef 2: 0.01879671001281194
CostFactor_Delivery Guy 1: 0.009293830259359735
CostFactor_Delivery Guy 2: 0.01106358530360392
CostFactor_Delivery Scooters: 0.014875237159334666
CostFactor_Distribution channel fees: 0.0025270397811805877
CostFactor_Ingredients: 0.017341766817123433
CostFactor_Phone Bill: 0.013524021430978073
CostFactor_Waiter: 0.016482658952996446
PizzaSize_Large: 0.02025035139379795
PizzaSize_Medium: 0.01889008039340164
PizzaSize_Small: 0.02181970033073744
PizzaType_Calzone: 0.013628404109804043
```

PizzaType_Funghi: 0.02041789058479379
PizzaType_Magherita: 0.01861526841347622
PizzaType_Paprika: 0.009302403913872373
PizzaType_Salami: 0.019892324719830035
PizzaType_Speciale: 0.011552055176709345
PizzaType_Veggie: 0.007826751752935141
Variant_1: 0.015784661737641276
Variant_2: 0.005094340442545637
Variant_3: 0.015708829713076453
Variant_4: 0.018235477545261915
Variant_6: 0.009334277711353735
Variant_7: 0.005879539657445088
Variant_8: 0.003885513145780155
Variant_9: 0.002511928912153815
Duration: 0.11850437466455796
StartActivity_Approve order website: 0.000620806905118538
StartActivity_Call Customer: 0.00011686498723067768
StartActivity_Order at the counter (shop): 0.007111462945045904
StartActivity_Order by phone: 0.014310344510180185
StartActivity_Receive order website: 0.0005228351092988325
StartActivity_Start baking pizza: 0.0020503621405206034
StartActivity_Start order website: 0.010520668926919097
StartActivity_Start preparing pizza: 0.008473786333544587
EndActivity_Baking pizza ready: 0.003830147548288783
EndActivity_Call Customer: 0.001292056869271466
EndActivity_Departure pizza: 0.0006294922893388577
EndActivity_Payment customer: 0.008947120971617917
EndActivity_Pizza arrives at customer: 0.0014859792129468146
EndActivity_Pizza received: 0.003204304982258282
EndActivity_Plan route: 0.0
EndActivity_Start baking pizza: 0.0029844232643519986
EndActivity_Start preparing pizza: 0.0009317587849604022
===

===
Accuracy: 0.6309963099630996
Recall: 0.5574336343732895
Precision: 0.5713075123666488

Column: CustomerSatisfaction

Feature Importances:
Revenue: 0.05012688515351516
Costs: 0.04630078948039723
Daytime: 0.039295457613215776
Profit: 0.05577990885923766

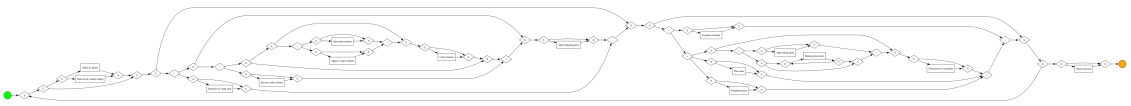
CustomerType_Adult: 0.009398125938173017
CustomerType_Senior: 0.003445659709532001
CustomerType_Student: 0.011781842464882333
CustomerType_Teenager: 0.010584050311257007
CustomerLocation_Munich District Five: 0.006669723951423016
CustomerLocation_Munich District Four: 0.008678815366508441
CustomerLocation_Munich District One: 0.012695604630428474
CustomerLocation_Munich District Three: 0.011145552937449265
CustomerLocation_Munich District Two: 0.00910804019172307
DistributionChannel_BestOrder Inc.: 0.012255049327265153
DistributionChannel_Deliver Now Holding: 0.011175267295062893
DistributionChannel_Deliveruu Inc.: 0.006112187274685306
DistributionChannel_Feedera SE: 0.011974147390034997
DistributionChannel_Heropizza Lmtd.: 0.0033839564778386233
DistributionChannel_Orderly SE: 0.00435992745693679
DistributionChannel_TownExpress Inc.: 0.00471322630174288
Weekday_Friday: 0.011304786321306883
Weekday_Monday: 0.0026442015588230166
Weekday_Saturday: 0.010865192607026477
Weekday_Sunday: 0.012503768660210253
Weekday_Thursday: 0.005432189927470457
Weekday_Tuesday: 0.004523603252225038
Weekday_Wednesday: 0.007496309077813361
CostFactor_Chef 1: 0.00903262815566229
CostFactor_Chef 2: 0.010069613382699918
CostFactor_Delivery Guy 1: 0.004896236804702837
CostFactor_Delivery Guy 2: 0.005501098634892463
CostFactor_Delivery Scooters: 0.008577225838212521
CostFactor_Distribution channel fees: 0.0024784821109393594
CostFactor_Ingredients: 0.010224579860635236
CostFactor_Phone Bill: 0.00848096165921893
CostFactor_Waiter: 0.009407628235225956
PizzaSize_Large: 0.011855159722028642
PizzaSize_Medium: 0.009682083189731835
PizzaSize_Small: 0.0115833398888889
PizzaType_Calzone: 0.007079675018364122
PizzaType_Funghi: 0.011133337399870784
PizzaType_Magherita: 0.010456567763566621
PizzaType_Paprika: 0.004036815416866102
PizzaType_Salami: 0.011263003183566003
PizzaType_Speciale: 0.007830726320871556
PizzaType_Veggie: 0.004815078743789788
Variant_1: 0.013702190797958194
Variant_2: 0.016854247224914052
Variant_3: 0.014958398915158686
Variant_4: 0.015043361437456645
Variant_6: 0.0030420266249943434
Variant_7: 0.0029888617083423095

```
Variant_8: 0.0014698254938734895
Variant_9: 0.0010286687468898444
IsOrderProfitable: 0.00948996828078623
Duration: 0.07075943109220048
StartActivity_Approve order website: 0.0005445485434488882
StartActivity_Call Customer: 4.669749196534903e-05
StartActivity_Order at the counter (shop): 0.014737299197784081
StartActivity_Order by phone: 0.01758116987471895
StartActivity_Receive order website: 0.00020667210235353984
StartActivity_Start baking pizza: 0.0007531184898219346
StartActivity_Start order website: 0.005948096101076509
StartActivity_Start preparing pizza: 0.0048063544976985045
EndActivity_Baking pizza ready: 0.0024754552805098923
EndActivity_Call Customer: 0.00015167225459702672
EndActivity_Departure pizza: 0.00016212101244516696
EndActivity_Payment customer: 0.0033527636243928837
EndActivity_Pizza arrives at customer: 0.0005335441664427013
EndActivity_Pizza received: 0.0015684717307174196
EndActivity_Plan route: 0.0
EndActivity_Start baking pizza: 0.001137977523649137
EndActivity_Start preparing pizza: 9.548606326464603e-05
IsCustomerSatisfied: 0.25440306085662073
===
```

```
CustomerSatisfaction <= 3
```

0.4 Analyse by Profit

[ ]:
```
queries = ["Profit > 0", "Profit < 0"]

for query in queries:
        query2Info(query)
        print(query)
        print()
        print()
```



```
avgProfit = 19.102536997885835 €
```

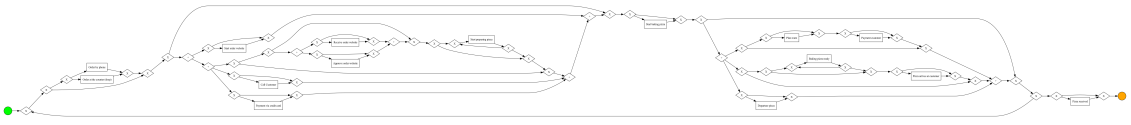
```
avgCosts = 8.920046127234288 €
avgRevenue = 28.02258312512012 €
avgRating = 2.119450317124736
 medianDirations = 43.0 minutes


RandomForrest:


parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3270.26it/s]


===
Accuracy: 1.0
Recall: 1.0
Precision: 1.0
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.0
Daytime: 0.0
CustomerType_Adult: 0.0
CustomerType_Senior: 0.0
CustomerType_Student: 0.0
CustomerType_Teenager: 0.0
CustomerLocation_Munich District Five: 0.0
CustomerLocation_Munich District Four: 0.0
CustomerLocation_Munich District One: 0.0
CustomerLocation_Munich District Three: 0.0
CustomerLocation_Munich District Two: 0.0
DistributionChannel_BestOrder Inc.: 0.0
DistributionChannel_Deliver Now Holding: 0.0
DistributionChannel_Deliveruu Inc.: 0.0
DistributionChannel_Feedera SE: 0.0
DistributionChannel_Heropizza Lmtd.: 0.0
DistributionChannel_Orderly SE: 0.0
DistributionChannel_TownExpress Inc.: 0.0
Weekday_Friday: 0.0
Weekday_Monday: 0.0
Weekday_Saturday: 0.0
Weekday_Sunday: 0.0
Weekday_Thursday: 0.0
Weekday_Tuesday: 0.0
Weekday_Wednesday: 0.0
CostFactor_Chef 1: 0.0
```

```
CostFactor_Chef 2: 0.0
CostFactor_Delivery Guy 1: 0.0
CostFactor_Delivery Guy 2: 0.0
CostFactor_Delivery Scooters: 0.0
CostFactor_Distribution channel fees: 0.0
CostFactor_Ingredients: 0.0
CostFactor_Phone Bill: 0.0
CostFactor_Waiter: 0.0
PizzaSize_Large: 0.0
PizzaSize_Medium: 0.0
PizzaSize_Small: 0.0
PizzaType_Calzone: 0.0
PizzaType_Funghi: 0.0
PizzaType_Magherita: 0.0
PizzaType_Paprika: 0.0
PizzaType_Salami: 0.0
PizzaType_Speciale: 0.0
PizzaType_Veggie: 0.0
Variant_1: 0.0
Variant_2: 0.0
Variant_3: 0.0
Variant_4: 0.0
Variant_6: 0.0
Variant_7: 0.0
Variant_8: 0.0
Variant_9: 0.0
Duration: 0.0
StartActivity_Approve order website: 0.0
StartActivity_Call Customer: 0.0
StartActivity_Order at the counter (shop): 0.0
StartActivity_Order by phone: 0.0
StartActivity_Receive order website: 0.0
StartActivity_Start baking pizza: 0.0
StartActivity_Start order website: 0.0
StartActivity_Start preparing pizza: 0.0
EndActivity_Baking pizza ready: 0.0
EndActivity_Call Customer: 0.0
EndActivity_Payment customer: 0.0
EndActivity_Pizza arrives at customer: 0.0
EndActivity_Pizza received: 0.0
EndActivity_Start baking pizza: 0.0
EndActivity_Start preparing pizza: 0.0
===



===
Accuracy: 0.4625
```

```
Recall: 0.42320017737974397
Precision: 0.44613598207348204
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.05684159770439558
Costs: 0.05078122596150818
Daytime: 0.04984956446482773
Profit: 0.06201653236276743
CustomerType_Adult: 0.010245960482016737
CustomerType_Senior: 0.004664382724745265
CustomerType_Student: 0.014827860502902064
CustomerType_Teenager: 0.012573158731866079
CustomerLocation_Munich District Five: 0.007286258209451038
CustomerLocation_Munich District Four: 0.008800069009571108
CustomerLocation_Munich District One: 0.016600168385987588
CustomerLocation_Munich District Three: 0.012194618413173732
CustomerLocation_Munich District Two: 0.012851839567530898
DistributionChannel_BestOrder Inc.: 0.014102455142357938
DistributionChannel_Deliver Now Holding: 0.013209136451506056
DistributionChannel_Deliveruu Inc.: 0.008432799350836333
DistributionChannel_Feedera SE: 0.014463357529881357
DistributionChannel_Heropizza Lmtd.: 0.003748923487843309
DistributionChannel_Orderly SE: 0.00830671424138897
DistributionChannel_TownExpress Inc.: 0.006257734300347123
Weekday_Friday: 0.014054095783518168
Weekday_Monday: 0.002857592305878325
Weekday_Saturday: 0.013937468779446982
Weekday_Sunday: 0.015141224104352806
Weekday_Thursday: 0.004822154825473812
Weekday_Tuesday: 0.0038494073077728354
Weekday_Wednesday: 0.009889045353845776
CostFactor_Chef 1: 0.011827124239023736
CostFactor_Chef 2: 0.014044225749842196
CostFactor_Delivery Guy 1: 0.005866761212916398
CostFactor_Delivery Guy 2: 0.007595953647881479
CostFactor_Delivery Scooters: 0.010392955593332469
CostFactor_Distribution channel fees: 0.003678232018522538
CostFactor_Ingredients: 0.011304753922138462
CostFactor_Phone Bill: 0.009806119729990055
CostFactor_Waiter: 0.009358452232809135
PizzaSize_Large: 0.013841417780809733
PizzaSize_Medium: 0.01303724676587559
PizzaSize_Small: 0.014988203239032777
PizzaType_Calzone: 0.010100983667822173
PizzaType_Funghi: 0.013307864659474377
PizzaType_Magherita: 0.013741473063136549
```

PizzaType_Paprika: 0.004223615927502717
PizzaType_Salami: 0.014791491541215196
PizzaType_Speciale: 0.00883255968255672
PizzaType_Veggie: 0.0046977765056355645
Variant_1: 0.012097657448978217
Variant_2: 0.016151135075778186
Variant_3: 0.014771580319268842
Variant_4: 0.01272927996573055
Variant_6: 0.003728861951371214
Variant_7: 0.003350697680337266
Variant_8: 0.0014315858180599104
Variant_9: 0.0015169423073668308
IsOrderProfitable: 0.0
Duration: 0.07941833049150322
StartActivity_Approve order website: 0.0007076007177902581
StartActivity_Call Customer: 0.00012525011153096207
StartActivity_Order at the counter (shop): 0.01226001378162948
StartActivity_Order by phone: 0.014458384330026221
StartActivity_Receive order website: 2.0089911576450206e-05
StartActivity_Start baking pizza: 0.0007782653261683023
StartActivity_Start order website: 0.007483622933920108
StartActivity_Start preparing pizza: 0.0067461548921864
EndActivity_Baking pizza ready: 0.002877310623590264
EndActivity_Call Customer: 0.00014732395729690517
EndActivity_Payment customer: 0.006400927496700922
EndActivity_Pizza arrives at customer: 0.0009921297506435107
EndActivity_Pizza received: 0.0018282417281767585
EndActivity_Start baking pizza: 0.0017155268054203476
EndActivity_Start preparing pizza: 0.0
IsCustomerSatisfied: 0.15022052991023785
===

Profit > 0



avgProfit = -14.937258097372174 €
avgCosts = 28.940313709513138 €
avgRevenue = 14.003055612140965 €

```
avgRating = 2.157262171521695
 medianDirations = 42.0 minutes


RandomForrest:


parsing log, completed traces :: 100%|      | 1826/1826 [00:00<00:00,
3797.15it/s]


===
Accuracy: 1.0
Recall: 1.0
Precision: 1.0
----
Column: IsOrderProfitable
----
Feature Importances:
CustomerSatisfaction: 0.0
Daytime: 0.0
CustomerType_Adult: 0.0
CustomerType_Senior: 0.0
CustomerType_Student: 0.0
CustomerType_Teenager: 0.0
CustomerLocation_Munich District Five: 0.0
CustomerLocation_Munich District Four: 0.0
CustomerLocation_Munich District One: 0.0
CustomerLocation_Munich District Three: 0.0
CustomerLocation_Munich District Two: 0.0
DistributionChannel_BestOrder Inc.: 0.0
DistributionChannel_Deliver Now Holding: 0.0
DistributionChannel_Deliveruu Inc.: 0.0
DistributionChannel_Feedera SE: 0.0
DistributionChannel_Heropizza Lmtd.: 0.0
DistributionChannel_Orderly SE: 0.0
DistributionChannel_TownExpress Inc.: 0.0
Weekday_Friday: 0.0
Weekday_Monday: 0.0
Weekday_Saturday: 0.0
Weekday_Sunday: 0.0
Weekday_Thursday: 0.0
Weekday_Tuesday: 0.0
Weekday_Wednesday: 0.0
CostFactor_Chef 1: 0.0
CostFactor_Chef 2: 0.0
CostFactor_Delivery Guy 1: 0.0
```

```
CostFactor_Delivery Guy 2: 0.0
CostFactor_Delivery Scooters: 0.0
CostFactor_Distribution channel fees: 0.0
CostFactor_Ingredients: 0.0
CostFactor_Phone Bill: 0.0
CostFactor_Waiter: 0.0
PizzaSize_Large: 0.0
PizzaSize_Medium: 0.0
PizzaSize_Small: 0.0
PizzaType_Calzone: 0.0
PizzaType_Funghi: 0.0
PizzaType_Magherita: 0.0
PizzaType_Paprika: 0.0
PizzaType_Salami: 0.0
PizzaType_Speciale: 0.0
PizzaType_Veggie: 0.0
Variant_1: 0.0
Variant_2: 0.0
Variant_3: 0.0
Variant_4: 0.0
Variant_6: 0.0
Variant_7: 0.0
Variant_8: 0.0
Variant_9: 0.0
Duration: 0.0
StartActivity_Approve order website: 0.0
StartActivity_Order at the counter (shop): 0.0
StartActivity_Order by phone: 0.0
StartActivity_Receive order website: 0.0
StartActivity_Start baking pizza: 0.0
StartActivity_Start order website: 0.0
StartActivity_Start preparing pizza: 0.0
EndActivity_Baking pizza ready: 0.0
EndActivity_Call Customer: 0.0
EndActivity_Departure pizza: 0.0
EndActivity_Payment customer: 0.0
EndActivity_Pizza arrives at customer: 0.0
EndActivity_Pizza received: 0.0
EndActivity_Plan route: 0.0
EndActivity_Start baking pizza: 0.0
EndActivity_Start preparing pizza: 0.0
===



===
Accuracy: 0.41228070175438597
Recall: 0.3777513062410088
```

```
Precision: 0.3987773487773488
----
Column: CustomerSatisfaction
----
Feature Importances:
Revenue: 0.05292501499147287
Costs: 0.06096466885566762
Daytime: 0.0457734677887205
Profit: 0.0592123831503258
CustomerType_Adult: 0.01112008674066127
CustomerType_Senior: 0.005517757246066802
CustomerType_Student: 0.01878004158326003
CustomerType_Teenager: 0.01231210196469475
CustomerLocation_Munich District Five: 0.008161317644301043
CustomerLocation_Munich District Four: 0.009836382571927186
CustomerLocation_Munich District One: 0.015932027323669624
CustomerLocation_Munich District Three: 0.012837008528980363
CustomerLocation_Munich District Two: 0.01051362287654471
DistributionChannel_BestOrder Inc.: 0.013907174352454305
DistributionChannel_Deliver Now Holding: 0.01255318562253158
DistributionChannel_Deliveruu Inc.: 0.008190555340192075
DistributionChannel_Feedera SE: 0.014387990367890074
DistributionChannel_Heropizza Lmtd.: 0.004978774447436636
DistributionChannel_Orderly SE: 0.004660211666801002
DistributionChannel_TownExpress Inc.: 0.006049788127610225
Weekday_Friday: 0.015337193290402779
Weekday_Monday: 0.005727947875955386
Weekday_Saturday: 0.017144200798722413
Weekday_Sunday: 0.01581523304104384
Weekday_Thursday: 0.006519913306537214
Weekday_Tuesday: 0.004578453638856565
Weekday_Wednesday: 0.007527818600132557
CostFactor_Chef 1: 0.012218925434192767
CostFactor_Chef 2: 0.012576853487219574
CostFactor_Delivery Guy 1: 0.005922620872004921
CostFactor_Delivery Guy 2: 0.008808321558217758
CostFactor_Delivery Scooters: 0.009836617623156005
CostFactor_Distribution channel fees: 0.0033056477858786613
CostFactor_Ingredients: 0.00948408697556389
CostFactor_Phone Bill: 0.008604141253498138
CostFactor_Waiter: 0.010279284792767004
PizzaSize_Large: 0.015204739278248391
PizzaSize_Medium: 0.014694496836857536
PizzaSize_Small: 0.01620062865634609
PizzaType_Calzone: 0.00951740884300533
PizzaType_Funghi: 0.013852098494137264
PizzaType_Magherita: 0.012901125256433681
PizzaType_Paprika: 0.005529109987724613
```

```
PizzaType_Salami: 0.012780544693118347
PizzaType_Speciale: 0.0099167922250604
PizzaType_Veggie: 0.005466914171904729
Variant_1: 0.011337985678947102
Variant_2: 0.01790980033537512
Variant_3: 0.014373047037833262
Variant_4: 0.013659048699786928
Variant_6: 0.004552936561755369
Variant_7: 0.001934471689935959
Variant_8: 0.002845511723083237
Variant_9: 0.0017816228779110519
IsOrderProfitable: 0.0
Duration: 0.07440283410027519
StartActivity_Approve order website: 0.00047545643256422936
StartActivity_Order at the counter (shop): 0.014108803642714598
StartActivity_Order by phone: 0.01661734868343743
StartActivity_Receive order website: 0.00018296946512654226
StartActivity_Start baking pizza: 0.0008023037136973906
StartActivity_Start order website: 0.007595079046620165
StartActivity_Start preparing pizza: 0.003987949802078576
EndActivity_Baking pizza ready: 0.003728362278197984
EndActivity_Call Customer: 0.0005488158035029465
EndActivity_Departure pizza: 7.566981458035659e-05
EndActivity_Payment customer: 0.0072036137595326575
EndActivity_Pizza arrives at customer: 0.0006436759081379853
EndActivity_Pizza received: 0.0024974585472889435
EndActivity_Plan route: 0.0
EndActivity_Start baking pizza: 0.001086573333233564
EndActivity_Start preparing pizza: 0.0012701299812180242
IsCustomerSatisfied: 0.1380138511149711
===



Profit < 0
```

1 Analyse Influence factors on Profit

1.1 Analyse Influence on profit segmented on profit

[ ]:
```
profitByVariant = pd.read_sql_query("""SELECT Variant, AVG(Revenue - Costs) AS␣
 ↪AvgProfit
FROM Pizza_Case
GROUP BY Variant""", con)
profitByVariant
```

[ ]:

	Variant	AvgProfit
0	1	7.932961
1	2	6.656331
2	3	7.183230
3	4	8.093023
4	5	5.029070
5	6	9.751938
6	7	10.930233
7	8	6.359375
8	9	8.558140

[ ]:
```
def profitBy(attribute, where="1=1"):
    return pd.read_sql_query(f"""SELECT {attribute}, AVG(Revenue - Costs) AS␣
 ↪AvgProfit, *
    FROM Pizza_Case
    where {where}
    GROUP BY {attribute}
    order by AvgProfit
    """, con)
```

[ ]:
```
def analyseProfitBy(column, wheres=["1=1"], keepFields=[], keepAll=False):
    assert type(keepFields) == list, "field list must be LIST not " +␣
 ↪str(type(keepFields))
    assert type(wheres) == list, "where must be a list of where clauses not␣
 ↪"+str(type(wheres))
    profitByVariant = pd.DataFrame()
    for i in wheres:
        res = profitBy(column, i)
        profitByVariant = pd.concat([profitByVariant, res])
    keepCols = profitByVariant[keepFields + ["AvgProfit", column]]
    # delete all rows where avgprofit is bigger than 0
    if keepAll == False:
        keepCols = keepCols[keepCols["AvgProfit"] < 0]
    return keepCols
```

[ ]:
```
analyseProfitBy("CustomerType", [f"Variant = {i}" for i in range(0, 9)],␣
 ↪["Variant"])
```

```
/var/folders/1g/13_jxrtx2wq280_54dl058f40000gn/T/ipykernel_61194/2554609236.py:7
: FutureWarning: The behavior of DataFrame concatenation with empty or all-NA
entries is deprecated. In a future version, this will no longer exclude empty or
all-NA columns when determining the result dtypes. To retain the old behavior,
exclude the relevant entries before the concat operation.
  profitByVariant = pd.concat([profitByVariant, res])
```

[ ]:
```
Empty DataFrame
Columns: [Variant, AvgProfit, CustomerType, CustomerType]
Index: []
```

[ ]:
```
analyseProfitBy("CustomerLocation", [f"Variant = {i}" for i in range(0, 9)],␣
↪["Variant"], keepAll=True)
```

```
/var/folders/1g/13_jxrtx2wq280_54dl058f40000gn/T/ipykernel_61194/2554609236.py:7
: FutureWarning: The behavior of DataFrame concatenation with empty or all-NA
entries is deprecated. In a future version, this will no longer exclude empty or
all-NA columns when determining the result dtypes. To retain the old behavior,
exclude the relevant entries before the concat operation.
  profitByVariant = pd.concat([profitByVariant, res])
```

[ ]:

	Variant	AvgProfit	CustomerLocation	CustomerLocation
0	1	6.527559	Munich District One	Munich District One
1	1	7.037736	Munich District Four	Munich District Four
2	1	7.122449	Munich District Five	Munich District Five
3	1	10.091954	Munich District Two	Munich District Two
4	1	10.659574	Munich District Three	Munich District Three
0	2	2.896552	Munich District Five	Munich District Five
1	2	5.112676	Munich District Three	Munich District Three
2	2	5.309942	Munich District One	Munich District One
3	2	10.000000	Munich District Two	Munich District Two
4	2	11.129630	Munich District Four	Munich District Four
0	3	3.545455	Munich District Four	Munich District Four
1	3	4.521739	Munich District Five	Munich District Five
2	3	7.052632	Munich District Three	Munich District Three
3	3	7.372881	Munich District Two	Munich District Two
4	3	8.366667	Munich District One	Munich District One
0	4	4.090909	Munich District Four	Munich District Four
1	4	6.600000	Munich District One	Munich District One
2	4	7.360000	Munich District Three	Munich District Three
3	4	13.764706	Munich District Five	Munich District Five
4	4	13.767442	Munich District Two	Munich District Two
0	5	2.563218	Munich District One	Munich District One
1	5	4.562500	Munich District Four	Munich District Four
2	5	4.739130	Munich District Three	Munich District Three
3	5	9.615385	Munich District Five	Munich District Five
4	5	10.151515	Munich District Two	Munich District Two
0	6	5.192308	Munich District Three	Munich District Three
1	6	8.833333	Munich District One	Munich District One
2	6	9.400000	Munich District Four	Munich District Four
3	6	13.086957	Munich District Two	Munich District Two
4	6	18.545455	Munich District Five	Munich District Five
0	7	5.900000	Munich District Four	Munich District Four
1	7	9.428571	Munich District Five	Munich District Five
2	7	10.857143	Munich District One	Munich District One
3	7	11.833333	Munich District Three	Munich District Three
4	7	13.875000	Munich District Two	Munich District Two
0	8	-10.571429	Munich District Four	Munich District Four
1	8	1.200000	Munich District Five	Munich District Five

```
2        8   4.571429  Munich District Three  Munich District Three
3        8   9.178571    Munich District One    Munich District One
4        8  15.400000    Munich District Two    Munich District Two
```

[ ]:
```
analyseProfitBy("DistributionChannel", [f"Variant = {i}" for i in range(0, 9)],␣
↪["Variant"], keepAll=True)
```

```
/var/folders/1g/13_jxrtx2wq280_54dl058f40000gn/T/ipykernel_61194/2554609236.py:7
: FutureWarning: The behavior of DataFrame concatenation with empty or all-NA
entries is deprecated. In a future version, this will no longer exclude empty or
all-NA columns when determining the result dtypes. To retain the old behavior,
exclude the relevant entries before the concat operation.
  profitByVariant = pd.concat([profitByVariant, res])
```

[ ]:

	Variant	AvgProfit	DistributionChannel	DistributionChannel
0	1	3.784314	Deliveruu Inc.	Deliveruu Inc.
1	1	5.828571	Deliver Now Holding	Deliver Now Holding
2	1	6.863636	Orderly SE	Orderly SE
3	1	7.678571	TownExpress Inc.	TownExpress Inc.
4	1	8.677419	Feedera SE	Feedera SE
5	1	10.333333	Heropizza Lmtd.	Heropizza Lmtd.
6	1	10.992063	BestOrder Inc.	BestOrder Inc.
0	2	-2.444444	Heropizza Lmtd.	Heropizza Lmtd.
1	2	-0.058824	Orderly SE	Orderly SE
2	2	6.510417	BestOrder Inc.	BestOrder Inc.
3	2	6.535354	Feedera SE	Feedera SE
4	2	7.580952	Deliver Now Holding	Deliver Now Holding
5	2	7.857143	TownExpress Inc.	TownExpress Inc.
6	2	8.957447	Deliveruu Inc.	Deliveruu Inc.
0	3	1.400000	Heropizza Lmtd.	Heropizza Lmtd.
1	3	4.460674	Feedera SE	Feedera SE
2	3	5.478873	Deliver Now Holding	Deliver Now Holding
3	3	9.662651	BestOrder Inc.	BestOrder Inc.
4	3	10.333333	Orderly SE	Orderly SE
5	3	11.250000	Deliveruu Inc.	Deliveruu Inc.
6	3	11.421053	TownExpress Inc.	TownExpress Inc.
0	4	0.454545	TownExpress Inc.	TownExpress Inc.
1	4	3.538462	Heropizza Lmtd.	Heropizza Lmtd.
2	4	7.074627	Deliver Now Holding	Deliver Now Holding
3	4	9.153846	BestOrder Inc.	BestOrder Inc.
4	4	9.191176	Feedera SE	Feedera SE
5	4	9.933333	Orderly SE	Orderly SE
6	4	10.210526	Deliveruu Inc.	Deliveruu Inc.
0	5	-2.142857	Orderly SE	Orderly SE
1	5	-1.875000	Feedera SE	Feedera SE
2	5	6.116279	BestOrder Inc.	BestOrder Inc.
3	5	6.363636	TownExpress Inc.	TownExpress Inc.
4	5	7.166667	Deliver Now Holding	Deliver Now Holding

```
5       5  11.533333       Deliveruu Inc.       Deliveruu Inc.
6       5  27.166667      Heropizza Lmtd.      Heropizza Lmtd.
0       6   5.041667       BestOrder Inc.       BestOrder Inc.
1       6   6.000000      Heropizza Lmtd.      Heropizza Lmtd.
2       6   9.230769       Deliveruu Inc.       Deliveruu Inc.
3       6  10.222222     TownExpress Inc.     TownExpress Inc.
4       6  11.243902           Feedera SE           Feedera SE
5       6  11.500000  Deliver Now Holding  Deliver Now Holding
6       6  12.000000           Orderly SE           Orderly SE
0       7 -10.000000           Orderly SE           Orderly SE
1       7  -0.666667      Heropizza Lmtd.      Heropizza Lmtd.
2       7   3.285714       Deliveruu Inc.       Deliveruu Inc.
3       7  12.571429     TownExpress Inc.     TownExpress Inc.
4       7  12.736842       BestOrder Inc.       BestOrder Inc.
5       7  12.933333           Feedera SE           Feedera SE
6       7  13.588235  Deliver Now Holding  Deliver Now Holding
0       8  -2.500000           Orderly SE           Orderly SE
1       8   0.571429       BestOrder Inc.       BestOrder Inc.
2       8   3.833333       Deliveruu Inc.       Deliveruu Inc.
3       8   5.666667           Feedera SE           Feedera SE
4       8   7.000000      Heropizza Lmtd.      Heropizza Lmtd.
5       8  13.307692  Deliver Now Holding  Deliver Now Holding
6       8  19.000000     TownExpress Inc.     TownExpress Inc.
```

[ ]:
```
analyseProfitBy("Weekday", [f"Variant = {i}" for i in range(0, 9)],␣
↪["Variant"], keepAll=True)
```

```
/var/folders/1g/13_jxrtx2wq280_54dl058f40000gn/T/ipykernel_61194/2554609236.py:7
: FutureWarning: The behavior of DataFrame concatenation with empty or all-NA
entries is deprecated. In a future version, this will no longer exclude empty or
all-NA columns when determining the result dtypes. To retain the old behavior,
exclude the relevant entries before the concat operation.
  profitByVariant = pd.concat([profitByVariant, res])
```

[ ]:
```
   Variant  AvgProfit    Weekday    Weekday
0        1   0.812500    Tuesday    Tuesday
1        1   6.444444     Monday     Monday
2        1   6.550000   Thursday   Thursday
3        1   6.978102   Saturday   Saturday
4        1   7.708333     Sunday     Sunday
5        1   8.894737  Wednesday  Wednesday
6        1  10.078571     Friday     Friday
0        2   3.176471   Thursday   Thursday
1        2   3.882353     Friday     Friday
2        2   5.230159     Sunday     Sunday
3        2   9.010101   Saturday   Saturday
4        2   9.166667    Tuesday    Tuesday
5        2  10.454545  Wednesday  Wednesday
```

6	2	12.400000	Monday	Monday
0	3	4.454545	Monday	Monday
1	3	4.752381	Sunday	Sunday
2	3	7.746032	Saturday	Saturday
3	3	7.777778	Friday	Friday
4	3	8.230769	Tuesday	Tuesday
5	3	10.375000	Wednesday	Wednesday
6	3	12.235294	Thursday	Thursday
0	4	-3.600000	Monday	Monday
1	4	-0.916667	Thursday	Thursday
2	4	4.468750	Sunday	Sunday
3	4	7.428571	Tuesday	Tuesday
4	4	8.161290	Saturday	Saturday
5	4	10.194805	Friday	Friday
6	4	15.741935	Wednesday	Wednesday
0	5	-5.909091	Wednesday	Wednesday
1	5	-5.000000	Tuesday	Tuesday
2	5	-0.250000	Monday	Monday
3	5	3.950000	Saturday	Saturday
4	5	5.134615	Sunday	Sunday
5	5	7.800000	Friday	Friday
6	5	16.500000	Thursday	Thursday
0	6	1.500000	Tuesday	Tuesday
1	6	6.282051	Saturday	Saturday
2	6	7.833333	Friday	Friday
3	6	13.103448	Sunday	Sunday
4	6	13.777778	Wednesday	Wednesday
5	6	15.600000	Thursday	Thursday
6	6	31.500000	Monday	Monday
0	7	-3.000000	Tuesday	Tuesday
1	7	7.000000	Friday	Friday
2	7	10.600000	Monday	Monday
3	7	11.000000	Thursday	Thursday
4	7	12.111111	Wednesday	Wednesday
5	7	13.000000	Sunday	Sunday
6	7	16.200000	Saturday	Saturday
0	8	-2.562500	Sunday	Sunday
1	8	4.705882	Saturday	Saturday
2	8	5.500000	Wednesday	Wednesday
3	8	10.000000	Thursday	Thursday
4	8	11.062500	Friday	Friday
5	8	18.000000	Monday	Monday
6	8	36.000000	Tuesday	Tuesday

[ ]:
```
analyseProfitBy("CostFactor", [f"Variant = {i}" for i in range(0, 9)],␣
↪["Variant"], keepAll=True)
```

```
/var/folders/1g/13_jxrtx2wq280_54dl058f40000gn/T/ipykernel_61194/2554609236.py:7
```

```
: FutureWarning: The behavior of DataFrame concatenation with empty or all-NA
entries is deprecated. In a future version, this will no longer exclude empty or
all-NA columns when determining the result dtypes. To retain the old behavior,
exclude the relevant entries before the concat operation.
  profitByVariant = pd.concat([profitByVariant, res])
```

[ ]:

	Variant	AvgProfit	CostFactor	CostFactor
0	1	4.044444	Delivery Guy 2	Delivery Guy 2
1	1	6.451327	Chef 2	Chef 2
2	1	7.824561	Waiter	Waiter
3	1	7.863636	Delivery Scooters	Delivery Scooters
4	1	8.111111	Ingredients	Ingredients
5	1	8.639175	Chef 1	Chef 1
6	1	9.711864	Phone Bill	Phone Bill
7	1	13.000000	Distribution channel fees	Distribution channel fees
8	1	14.190476	Delivery Guy 1	Delivery Guy 1
0	2	-2.909091	Distribution channel fees	Distribution channel fees
1	2	-2.529412	Delivery Guy 1	Delivery Guy 1
2	2	4.333333	Ingredients	Ingredients
3	2	6.746269	Chef 1	Chef 1
4	2	7.396226	Waiter	Waiter
5	2	7.698113	Delivery Scooters	Delivery Scooters
6	2	8.068493	Chef 2	Chef 2
7	2	9.151515	Delivery Guy 2	Delivery Guy 2
8	2	9.896552	Phone Bill	Phone Bill
0	3	-3.000000	Distribution channel fees	Distribution channel fees
1	3	4.111111	Waiter	Waiter
2	3	4.696429	Chef 1	Chef 1
3	3	7.062500	Phone Bill	Phone Bill
4	3	7.085714	Chef 2	Chef 2
5	3	7.444444	Ingredients	Ingredients
6	3	7.611111	Delivery Scooters	Delivery Scooters
7	3	12.454545	Delivery Guy 2	Delivery Guy 2
8	3	12.500000	Delivery Guy 1	Delivery Guy 1
0	4	-2.428571	Delivery Guy 2	Delivery Guy 2
1	4	5.750000	Chef 1	Chef 1
2	4	6.222222	Waiter	Waiter
3	4	9.071429	Phone Bill	Phone Bill
4	4	9.911765	Delivery Scooters	Delivery Scooters
5	4	10.023256	Chef 2	Chef 2
6	4	10.045455	Ingredients	Ingredients
7	4	12.400000	Distribution channel fees	Distribution channel fees
8	4	22.714286	Delivery Guy 1	Delivery Guy 1
0	5	1.904762	Waiter	Waiter
1	5	1.933333	Chef 2	Chef 2
2	5	2.677419	Ingredients	Ingredients
3	5	3.363636	Delivery Guy 1	Delivery Guy 1

```
4       5   5.052632                Phone Bill                Phone Bill
5       5   6.291667                    Chef 1                    Chef 1
6       5   7.777778             Delivery Guy 2             Delivery Guy 2
7       5  14.000000  Distribution channel fees  Distribution channel fees
8       5  14.533333          Delivery Scooters          Delivery Scooters
0       6  -7.000000  Distribution channel fees  Distribution channel fees
1       6   4.545455          Delivery Scooters          Delivery Scooters
2       6   4.600000             Delivery Guy 1             Delivery Guy 1
3       6   7.360000                    Chef 2                    Chef 2
4       6   7.800000                    Waiter                    Waiter
5       6   9.176471               Ingredients               Ingredients
6       6   9.714286                Phone Bill                Phone Bill
7       6  16.280000                    Chef 1                    Chef 1
8       6  19.727273             Delivery Guy 2             Delivery Guy 2
0       7 -17.000000             Delivery Guy 1             Delivery Guy 1
1       7   2.666667               Ingredients               Ingredients
2       7   3.000000  Distribution channel fees  Distribution channel fees
3       7   4.909091                    Waiter                    Waiter
4       7  10.631579                    Chef 1                    Chef 1
5       7  12.384615          Delivery Scooters          Delivery Scooters
6       7  16.428571             Delivery Guy 2             Delivery Guy 2
7       7  18.428571                Phone Bill                Phone Bill
8       7  18.937500                    Chef 2                    Chef 2
0       8 -18.000000             Delivery Guy 2             Delivery Guy 2
1       8 -17.000000             Delivery Guy 1             Delivery Guy 1
2       8 -12.500000  Distribution channel fees  Distribution channel fees
3       8  -1.000000                Phone Bill                Phone Bill
4       8   3.666667                    Waiter                    Waiter
5       8   4.076923                    Chef 2                    Chef 2
6       8  10.222222                    Chef 1                    Chef 1
7       8  14.150000               Ingredients               Ingredients
8       8  14.333333          Delivery Scooters          Delivery Scooters
```

[ ]:
```
analyseProfitBy("PizzaSize", [f"Variant = {i}" for i in range(0, 9)],␣
↪["Variant"], keepAll=True)
```

```
/var/folders/1g/13_jxrtx2wq280_54dl058f40000gn/T/ipykernel_61194/2554609236.py:7
: FutureWarning: The behavior of DataFrame concatenation with empty or all-NA
entries is deprecated. In a future version, this will no longer exclude empty or
all-NA columns when determining the result dtypes. To retain the old behavior,
exclude the relevant entries before the concat operation.
  profitByVariant = pd.concat([profitByVariant, res])
```

[ ]:
```
  Variant  AvgProfit PizzaSize PizzaSize
0       1   7.609649     Small     Small
1       1   7.978378     Large     Large
2       1   8.459677    Medium    Medium
0       2   6.342857    Medium    Medium
```

```
1       2   6.471698     Large     Large
2       2   6.954545     Small     Small
0       3   5.035211     Small     Small
1       3   7.964706     Large     Large
2       3   9.694737    Medium    Medium
0       4   3.018519    Medium    Medium
1       4   9.000000     Small     Small
2       4  10.011364     Large     Large
0       5   3.605263    Medium    Medium
1       5   4.828947     Small     Small
2       5   6.224138     Large     Large
0       6   8.000000     Small     Small
1       6   8.964286    Medium    Medium
2       6  12.627907     Large     Large
0       7   8.583333     Large     Large
1       7  10.340909     Small     Small
2       7  15.500000    Medium    Medium
0       8   3.411765    Medium    Medium
1       8   4.307692     Small     Small
2       8  11.285714     Large     Large
```

[ ]:
```
analyseProfitBy("PizzaType", [f"Variant = {i}" for i in range(0, 9)],␣
↪["Variant"], keepAll=True)
```

```
/var/folders/1g/13_jxrtx2wq280_54dl058f40000gn/T/ipykernel_61194/2554609236.py:7
: FutureWarning: The behavior of DataFrame concatenation with empty or all-NA
entries is deprecated. In a future version, this will no longer exclude empty or
all-NA columns when determining the result dtypes. To retain the old behavior,
exclude the relevant entries before the concat operation.
  profitByVariant = pd.concat([profitByVariant, res])
```

[ ]:
```
   Variant  AvgProfit  PizzaType  PizzaType
0        1   6.163636   Speciale   Speciale
1        1   6.500000    Paprika    Paprika
2        1   7.275229     Funghi     Funghi
3        1   7.784314  Magherita  Magherita
4        1   8.125828     Salami     Salami
5        1   9.260870     Veggie     Veggie
6        1  10.682540    Calzone    Calzone
0        2   0.466667    Paprika    Paprika
1        2   4.428571   Speciale   Speciale
2        2   5.107143     Salami     Salami
3        2   7.196970  Magherita  Magherita
4        2   7.639535     Funghi     Funghi
5        2   8.384615     Veggie     Veggie
6        2  10.468085    Calzone    Calzone
0        3  -1.833333     Veggie     Veggie
1        3   5.050633     Funghi     Funghi
```

```
2       3   6.343750    Calzone    Calzone
3       3   6.705882    Paprika    Paprika
4       3   8.076923  Magherita  Magherita
5       3   8.673913     Salami     Salami
6       3  11.840000   Speciale   Speciale
0       4   0.500000    Paprika    Paprika
1       4   3.897059     Salami     Salami
2       4   5.933333     Veggie     Veggie
3       4   7.660714  Magherita  Magherita
4       4   8.555556    Calzone    Calzone
5       4   9.310345   Speciale   Speciale
6       4  14.052632     Funghi     Funghi
0       5  -6.200000     Veggie     Veggie
1       5  -2.333333    Calzone    Calzone
2       5   2.823529  Magherita  Magherita
3       5   4.477273     Funghi     Funghi
4       5   4.523810   Speciale   Speciale
5       5   7.375000    Paprika    Paprika
6       5   9.937500     Salami     Salami
0       6  -2.400000    Paprika    Paprika
1       6   2.000000     Veggie     Veggie
2       6   7.000000     Salami     Salami
3       6   8.578947  Magherita  Magherita
4       6  12.653846     Funghi     Funghi
5       6  14.666667   Speciale   Speciale
6       6  16.285714    Calzone    Calzone
0       7  -9.000000    Paprika    Paprika
1       7   5.894737     Salami     Salami
2       7   8.777778     Funghi     Funghi
3       7  11.826087  Magherita  Magherita
4       7  11.888889   Speciale   Speciale
5       7  16.636364    Calzone    Calzone
6       7  23.400000     Veggie     Veggie
0       8  -5.500000     Funghi     Funghi
1       8   6.421053     Salami     Salami
2       8   6.583333  Magherita  Magherita
3       8   9.000000    Paprika    Paprika
4       8  10.857143   Speciale   Speciale
5       8  11.500000    Calzone    Calzone
6       8  14.333333     Veggie     Veggie
```

[ ]:

[ ]:

[ ]:

[ ]: