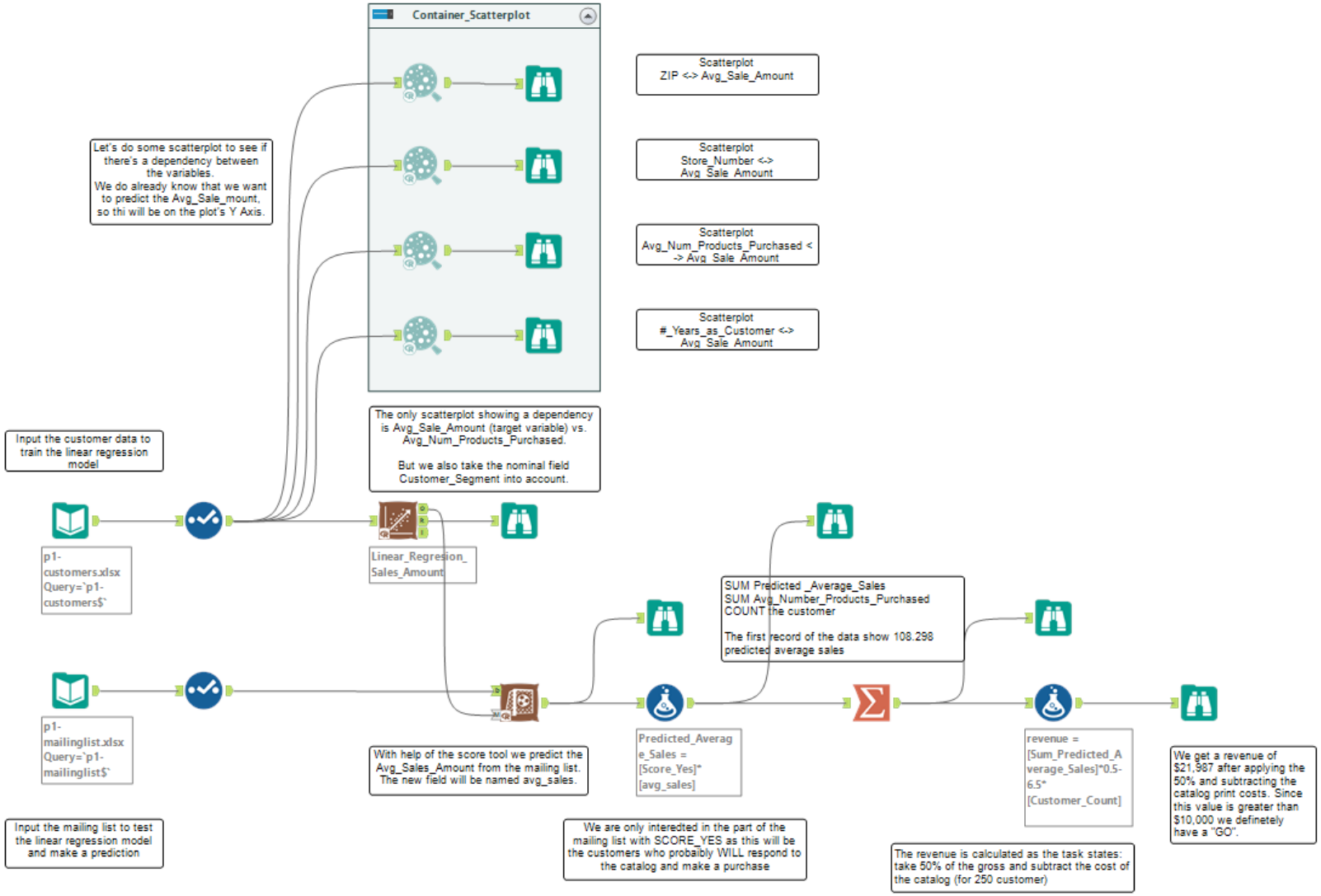
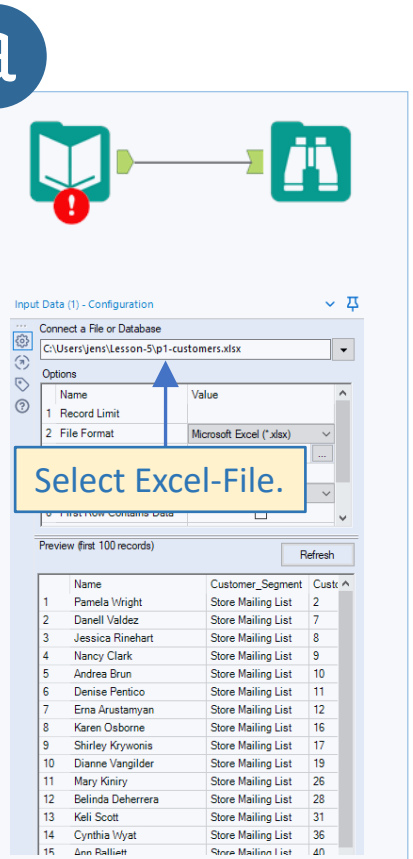
# Workflow-Comparison
## Alteryx, Knime & Python
## by @Jens Gaulke

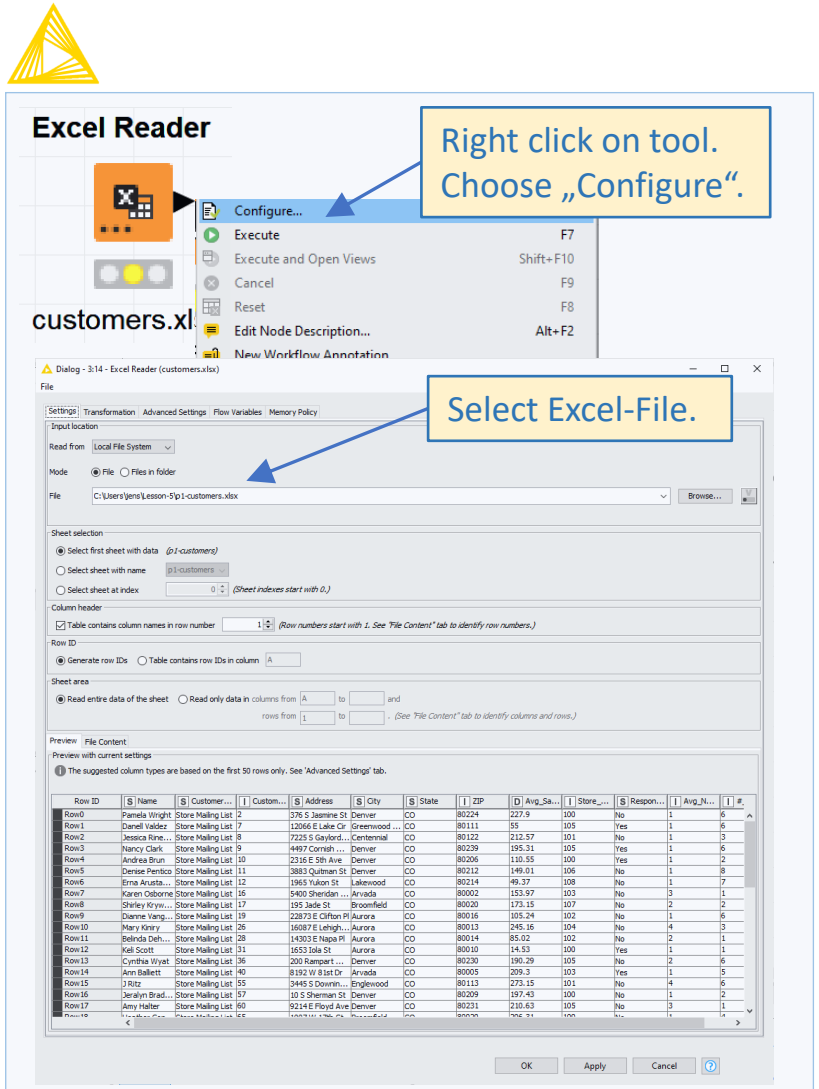
using the example of lesson 5

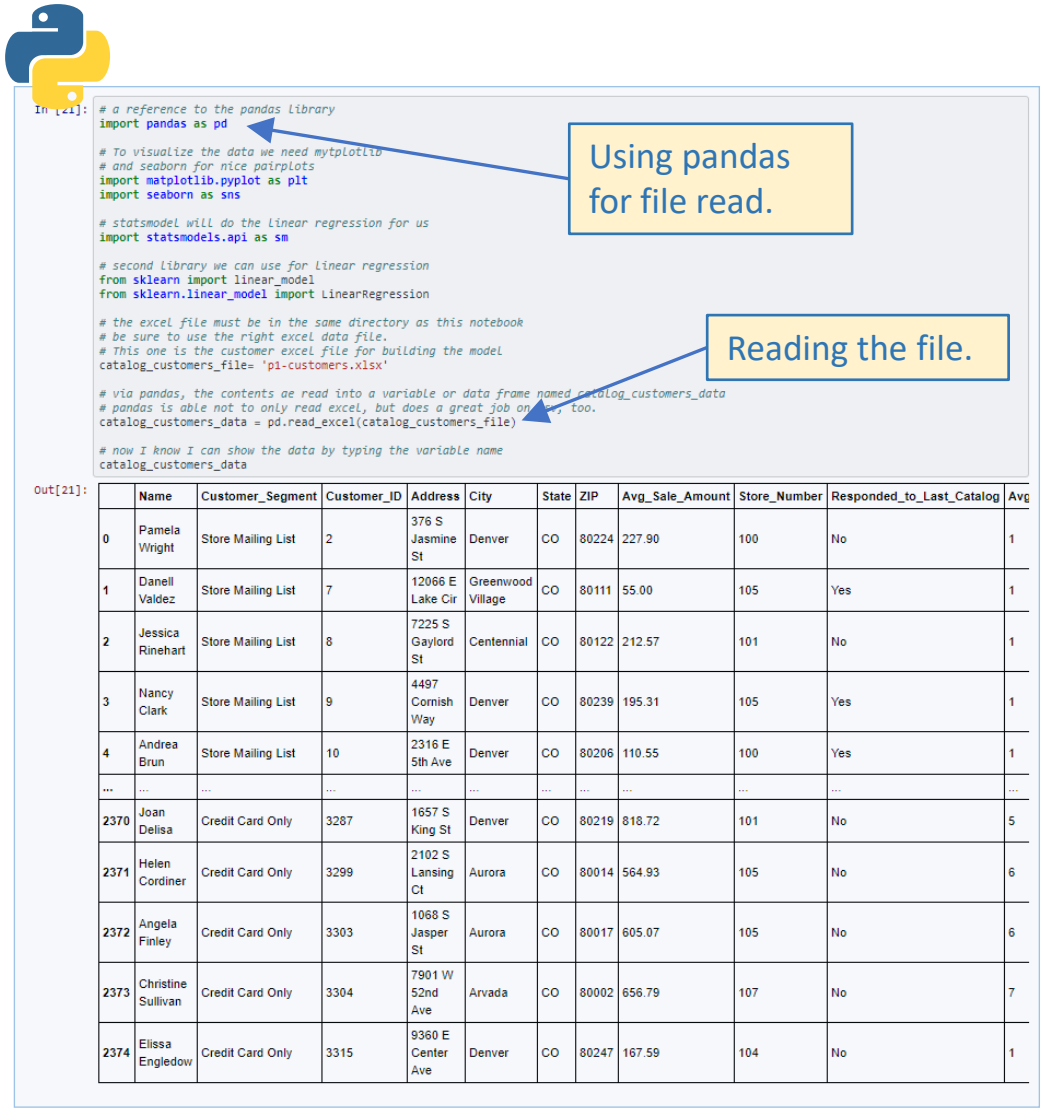
# The Alteryx Workflow of Lesson 5



# The input tools

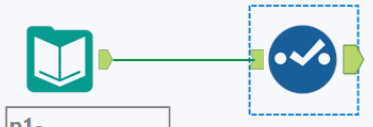


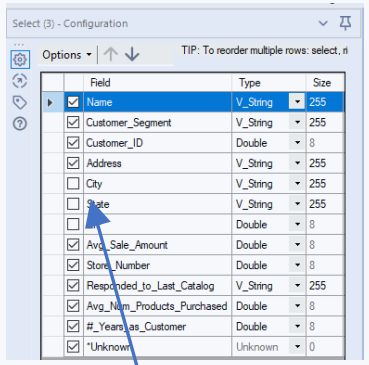



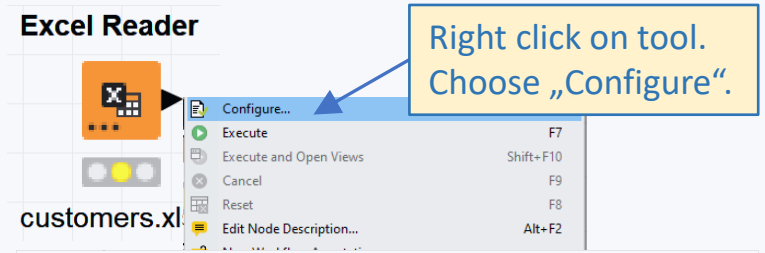

| | Name | Customer_Segment | Customer_ID | Address | City | State | ZIP | Avg_Sale_Amount | Store_Number | Responded_to_Last_Catalog | Avg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Pamela Wright | Store Mailing List | 2 | 376 S Jasmine St | Denver | CO | 80224 | 227.90 | 100 | No | 1 |
| 1 | Danell Valdez | Store Mailing List | 7 | 12066 E Lake Cir | Greenwood Village | CO | 80111 | 55.00 | 105 | Yes | 1 |
| 2 | Jessica Rinehart | Store Mailing List | 8 | 7225 S Gaylord St | Centennial | CO | 80122 | 212.57 | 101 | No | 1 |
| 3 | Nancy Clark | Store Mailing List | 9 | 4497 Cornish Way | Denver | CO | 80239 | 195.31 | 105 | Yes | 1 |
| 4 | Andrea Brun | Store Mailing List | 10 | 2316 E 5th Ave | Denver | CO | 80206 | 110.55 | 100 | Yes | 1 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 2370 | Joan Delisa | Credit Card Only | 3287 | 1657 S King St | Denver | CO | 80219 | 818.72 | 101 | No | 5 |
| 2371 | Helen Cordiner | Credit Card Only | 3299 | 2102 S Lansing Ct | Aurora | CO | 80014 | 564.93 | 105 | No | 6 |
| 2372 | Angela Finley | Credit Card Only | 3303 | 1068 S Jasper St | Aurora | CO | 80017 | 605.07 | 105 | No | 6 |
| 2373 | Christine Sullivan | Credit Card Only | 3304 | 7901 W 52nd Ave | Arvada | CO | 80002 | 656.79 | 107 | No | 7 |
| 2374 | Elissa Engledow | Credit Card Only | 3315 | 9360 E Center Ave | Denver | CO | 80247 | 167.59 | 104 | No | 1 |

# The select tools

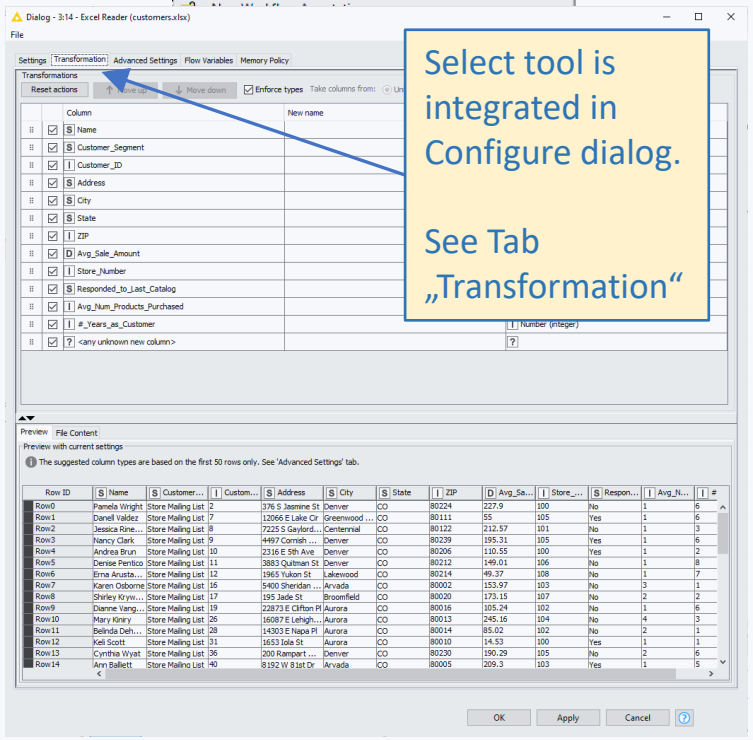



(De-)Select your columns.




Right click on tool. Choose „Configure“.




Select tool is integrated in Configure dialog.

See Tab „Transformation“

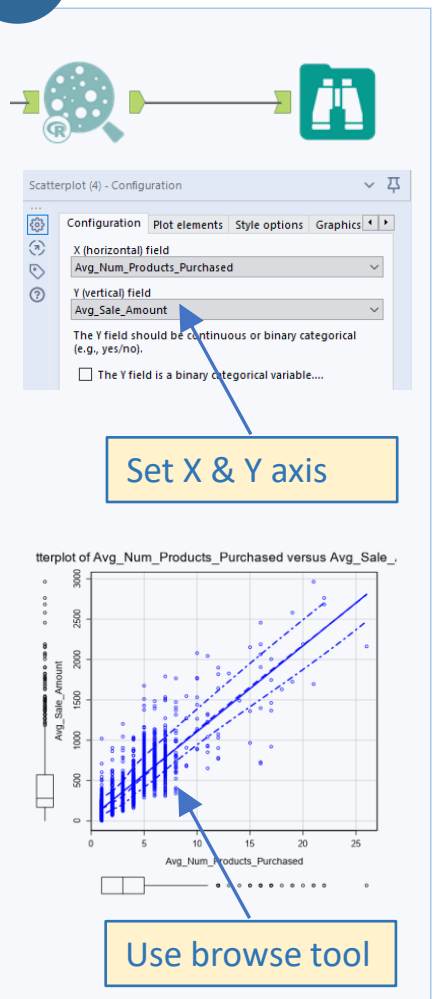
```
In [73]: # We drop the columns without statistical significance from our dataset
cleaned_customers_data = catalog_customers_data.drop(['Customer_ID', 'ZIP', 'Store_Number', '#_Years_as_Customer'], axis=1)
#we also can drop the nominal data without significance as described in analysis section
cleaned_customers_data = cleaned_customers_data.drop(['Name', 'Address', 'City', 'State', 'Responded_to_Last_Catalog'], axis=1)

# we still have nominal data in the dataset, namely Customer_Segment
# As this column is relevant for us, we have to create dummy variables
# and we have to drop "Credit card only" as stated in the task description
cleaned_customers_data = pd.get_dummies(cleaned_customers_data, columns=['Customer_Segment'], drop_first=True)

# set the target variable
Y = cleaned_customers_data['Avg_Sale_Amount']
# set the predictor variables
X = cleaned_customers_data.drop(['Avg_Sale_Amount'], axis=1)

# let's to the evaluation with statsmodels
# we have to add a constant to the calculation or
# we do not have a Y-intercept
X = sm.add_constant(X)

# build the model
model = sm.OLS(Y,X).fit()
model_prediction = model.predict(X)
model_details = model.summary()

# print the details, so we can compare to alteryx
model_details

X
```

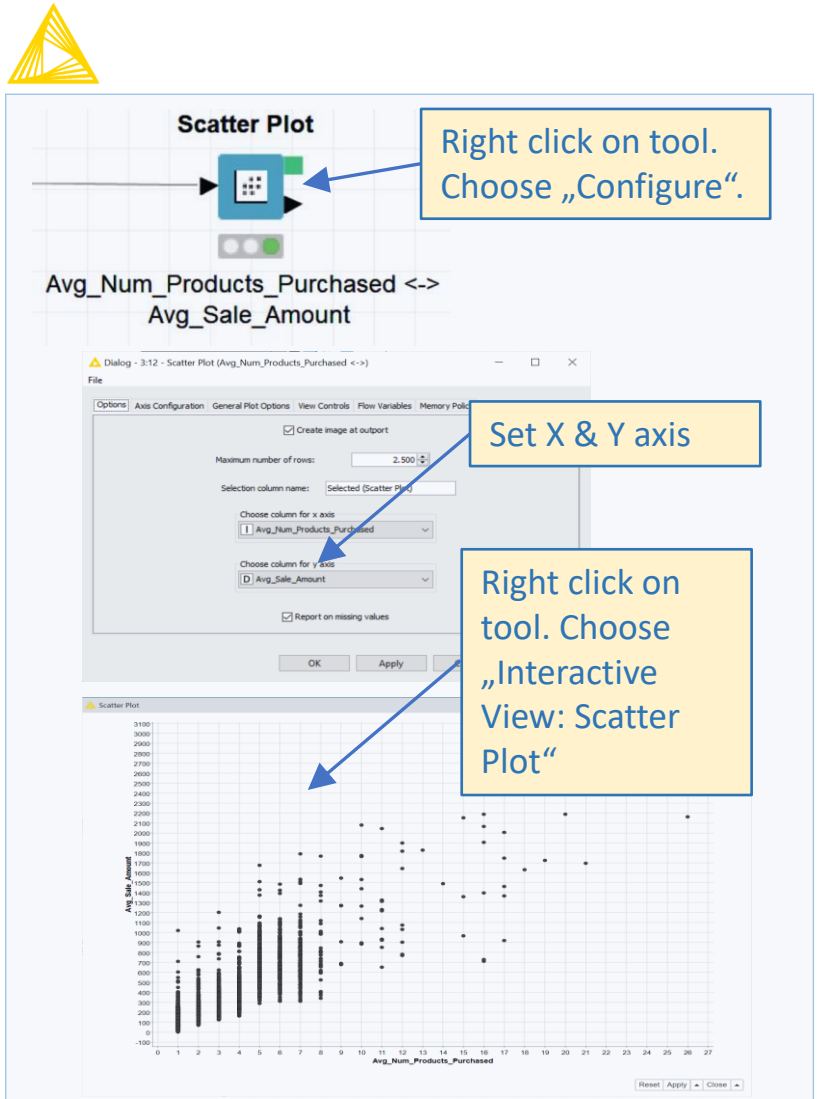
2) … and assign the remaining columns to a new dataframe

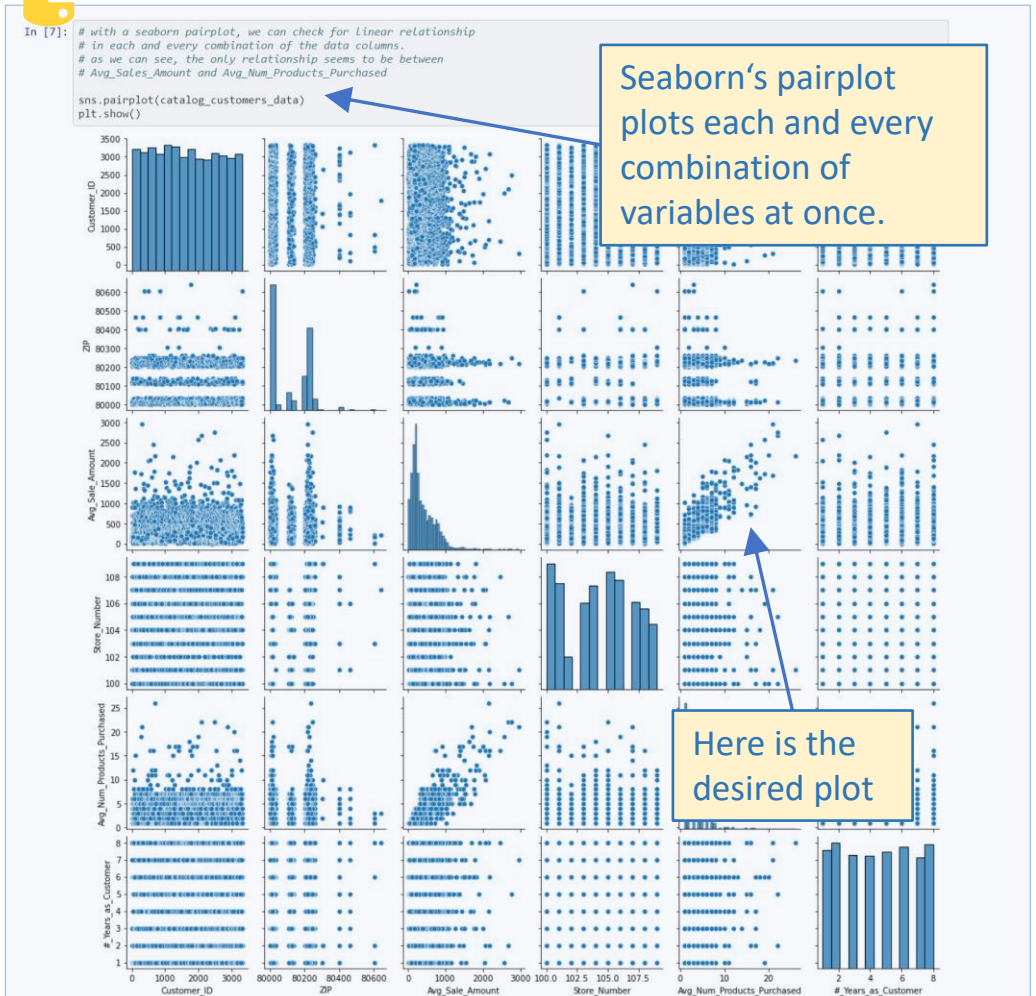
1) Drop columns from pandas dataframe…

3) Expand dataframe by simply adding new columns from another dataset

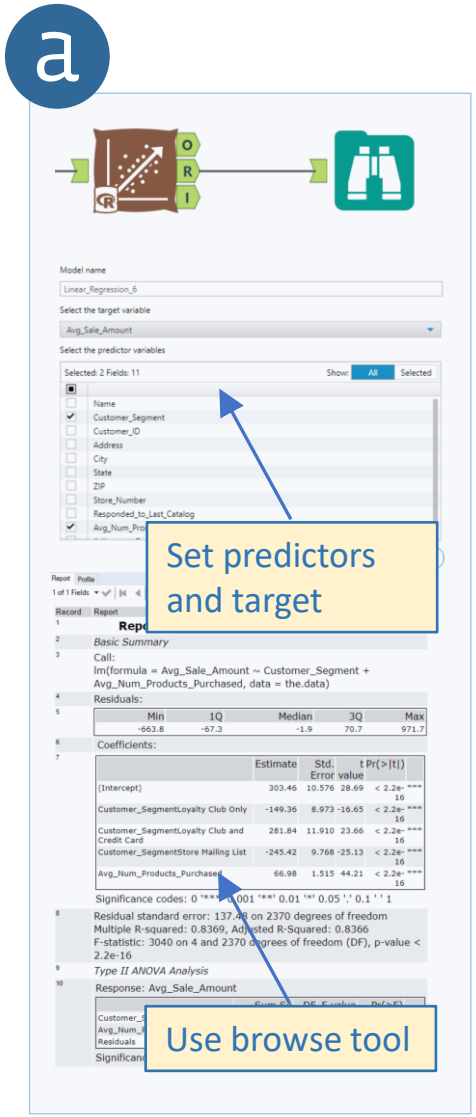
# The scatterplot tools

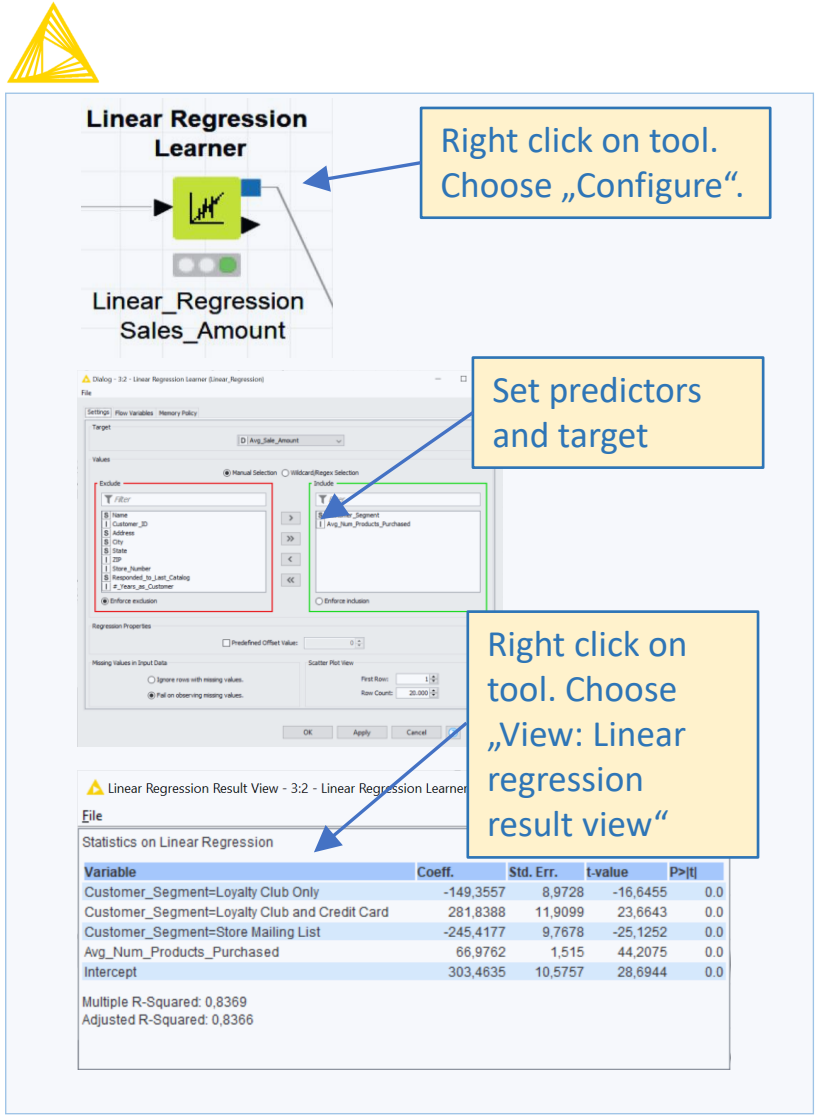


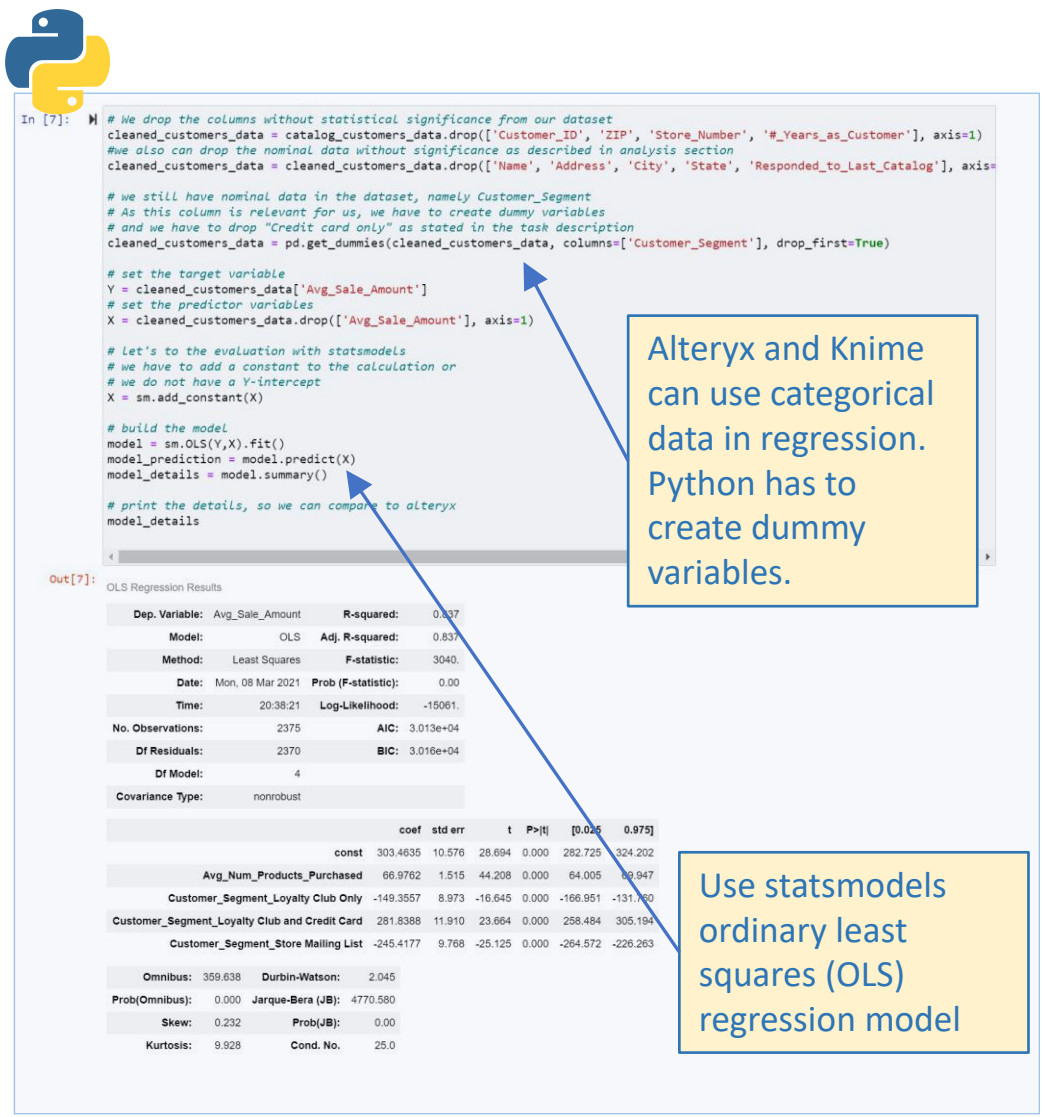



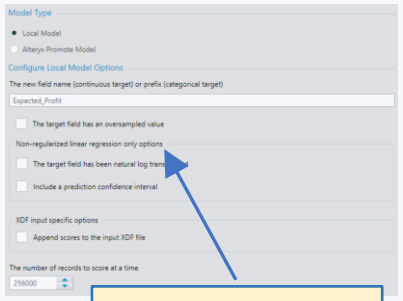
# The linear regression tools



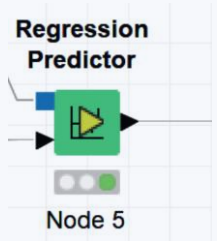



# The score tools

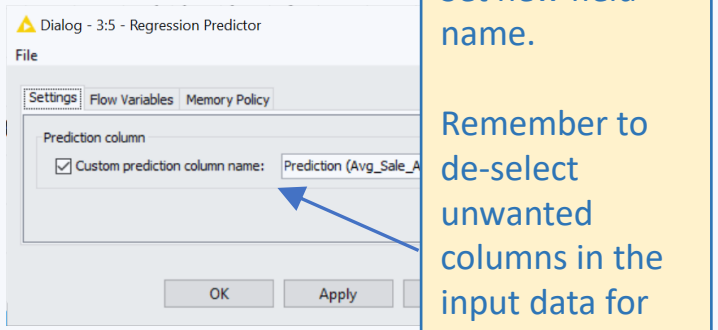


Set new field name.

Remember to de-select unwanted columns in the input data for the score tool.

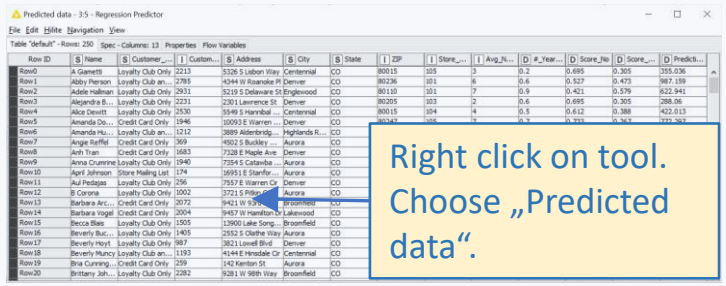



Right click on tool. Choose „Configure“.




Set new field name.

Remember to de-select unwanted columns in the input data for the score tool.



Right click on tool. Choose „Predicted data“.

```
In [85]: # Now we have a working model, we can use the data from
         # p1-mailinglist.xlsx to test the model and to make a prediction
         catalog_test_file = "p1-mailinglist.xlsx"
         catalog_test_data = pd.read_excel(catalog_test_file)

         # see above
         cleaned_test_data = pd.get_dummies(catalog_test_data, columns=['Customer_Segment'], drop_first=True)
         cleaned_test_data = cleaned_test_data.drop(['Customer_ID', 'ZIP', 'Store_Number', '#_Years_as_Customer'], axis=1)
         cleaned_test_data = cleaned_test_data.drop(['Name', 'Address', 'City', 'State'], axis=1)

         # even if we know we need Score_Yes amd Score_No. these columns are not present in the customer dataset
         # so a correlation between the model data and the test data will not work
         # alteryx can do this automatically, we have to get our hands dirty
         cleaned_test_data1 = cleaned_test_data.drop(['Score_Yes', 'Score_No'], axis=1)

         # set the predictor variables
         X_test = cleaned_test_data1

         # let's to the evaluation with statsmodels
         # we have to add a constant to the calculation or
         # we do not have a Y-intercept
         X_test = sm.add_constant(X_test)


         # and make a prediction with the test data
         model_prediction_test = model.predict(X_test)

         # we have to make a prediction according to the value of Score_Yes
         # so let's read the score values again and add them to the model
         score = pd.read_excel('p1-mailinglist.xlsx', usecols=['Score_Yes'])

         # add the model to the data frame
         score['Predicted_Sales'] = model_prediction_test

         # show the results
         score
```

Out[85]:

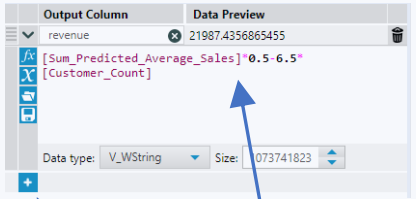
| | Score_Yes | Predicted_Sales |
|---|---|---|
| 0 | 0.305036 | 355.036364 |
| 1 | 0.472725 | 987.159466 |
| 2 | 0.578882 | 622.941184 |
| 3 | 0.305138 | 288.060159 |
| 4 | 0.387706 | 422.012569 |
| ... | ... | ... |

Do the same to mailinglist what you did to customer data.

Then use the trained model with the mailinglist data

And build a new table with score_yes and predicted_sales

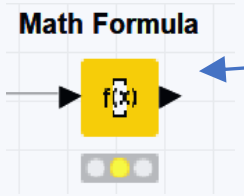
# The formula tools



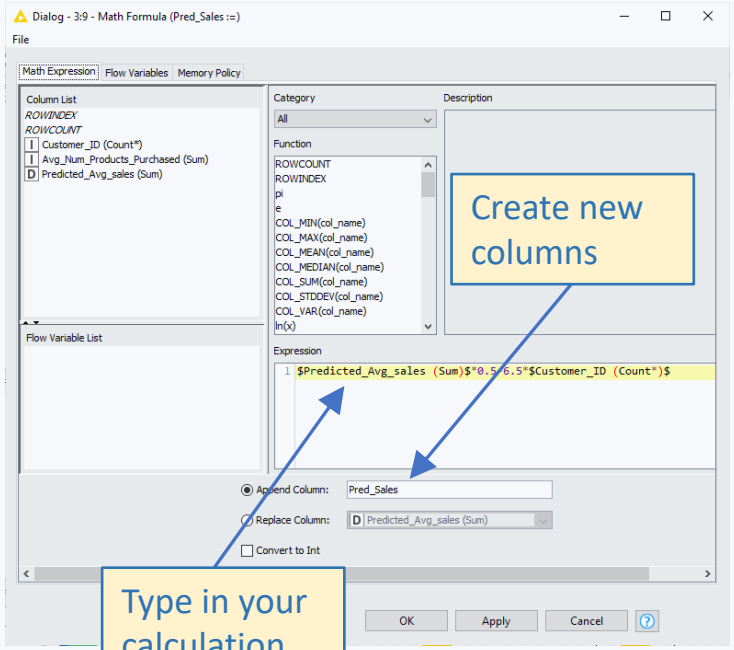

Type in your calculation

Create new columns






Right click on tool. Choose „Configure“.



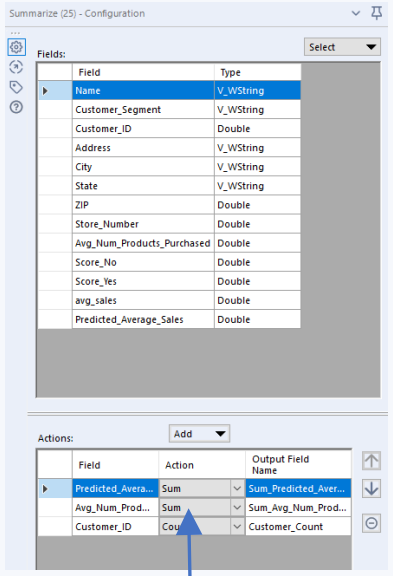

Create new columns

Type in your calculation

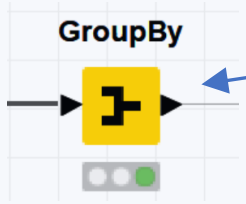
```
In [108]: # now we do the evaluation

print("Catalog marketing campaign results")
print("----------------------------------\n")

total_revenue = sum(score['Predicted_Sales']*score['Score_Yes'])
print("Total expected revenue from the marketing campaign: ", '${:,.2f}'.format(total_revenue))

adjusted_revenue = total_revenue * 0.5
print("Applying gross margin of 50%: ", '${:,.2f}'.format(adjusted_revenue))

number_customers = score.shape[0]
print_costs = 6.5
catalog_costs = print_costs * number_customers
print("Print costs are $6.5 x", number_customers, "customer(s):", '${:,.2f}'.format(catalog_costs))

print("")
expected_profit = adjusted_revenue - catalog_costs
print("The expected profit from the marketing campaign is:", '${:,.2f}'.format(expected_profit))

if (expected_profit > 10000):
    print("Recommendation: GO! We should do the campaign.")
else:
    print("Recommendation: NO GO! We should not do the campaign.")

Catalog marketing campaign results
----------------------------------

Total expected revenue from the marketing campaign:  $47,224.87
Applying gross margin of 50%:  $23,612.44
Print costs are $6.5 x 250 customer(s): $1,625.00

The expected profit from the marketing campaign is: $21,987.44
Recommendation: GO! We should do the campaign.
```

Simple python calculations.

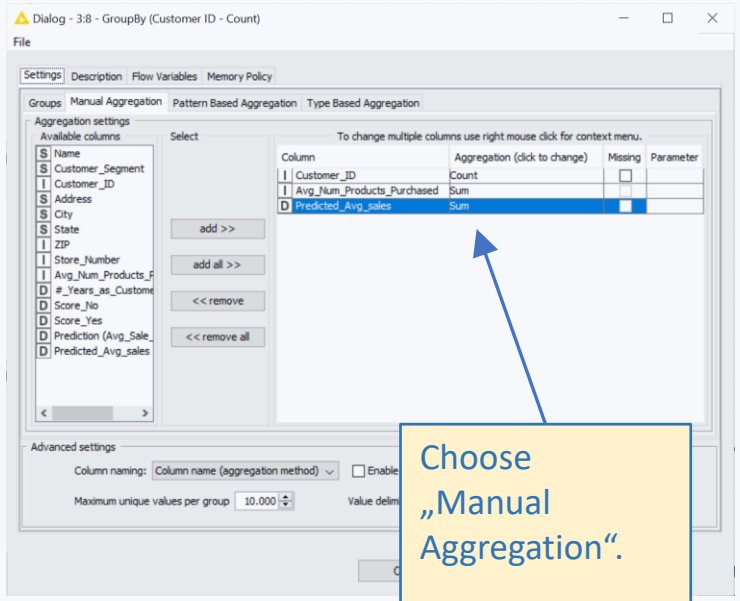
# The summarize / aggregation tools




Set aggregation functions for columns




Right click on tool. Choose „Configure“.




Choose „Manual Aggregation“.

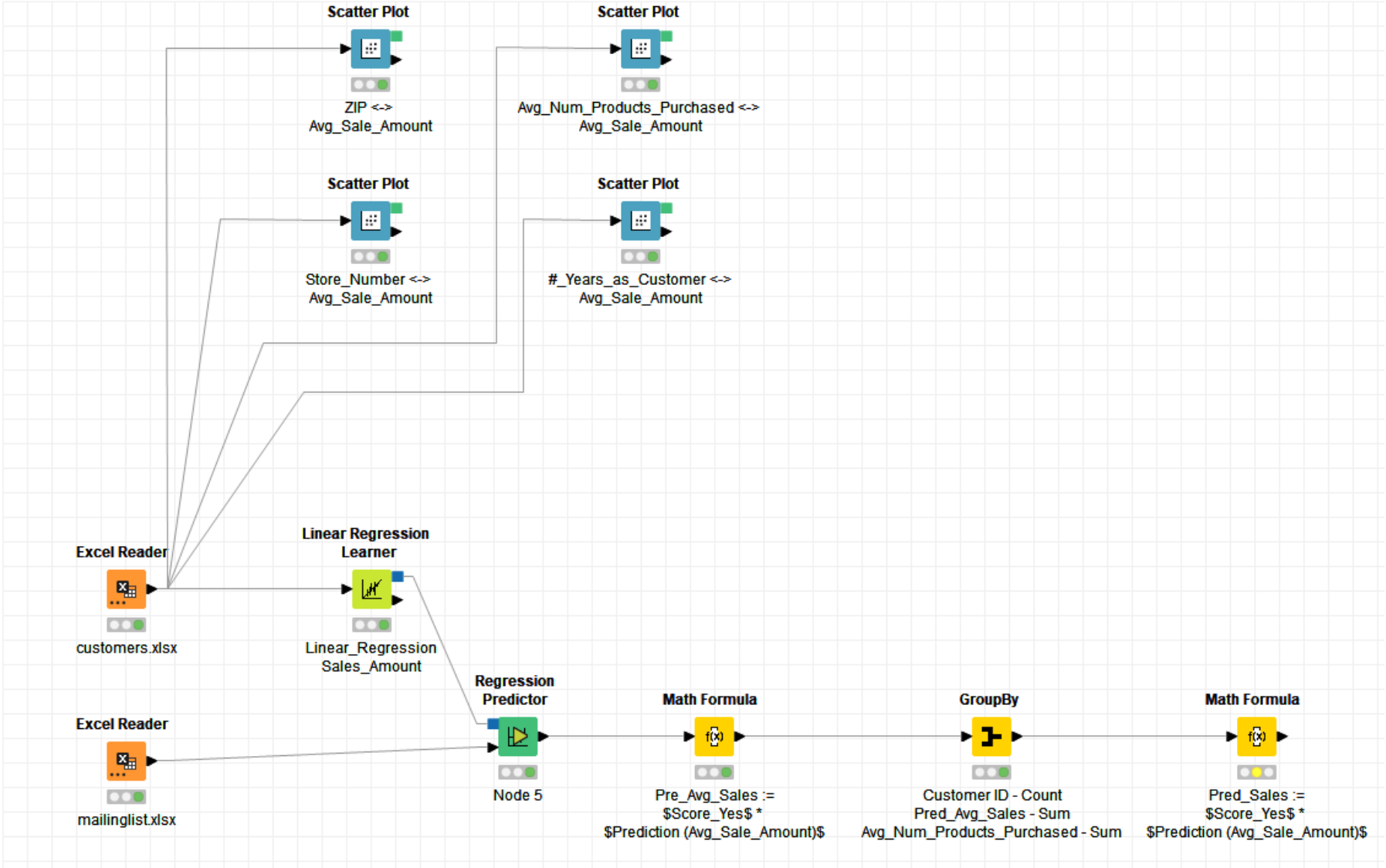
Set desired aggregation function.

```
In [108]: # now we do the evaluation

print("Catalog marketing campaign results")
print("----------------------------------\n")

total_revenue = sum(score['Predicted_Sales']*score['Score_Yes'])
print("Total expected revenue from the marketing campaign: ", '${:,.2f}'.format(total_revenue))

adjusted_revenue = total_revenue * 0.5
print("Applying gross margin of 50%: ", '${:,.2f}'.format(adjusted_revenue))

number_customers = score.shape[0]
print_costs = 6.5
catalog_costs = print_costs * number_customers
print("Print costs are $6.5 x", number_customers, "customer(s):", '${:,.2f}'.format(catalog_costs))

print("")
expected_profit = adjusted_revenue - catalog_costs
print("The expected profit from the marketing campaign is:", '${:,.2f}'.format(expected_profit))

if (expected_profit > 10000):
    print("Recommendation: GO! We should do the campaign.")
else:
    print("Recommendation: NO GO! We should not do the campaign.")
```

```
Catalog marketing campaign results
----------------------------------

Total expected revenue from the marketing campaign:  $47,224.87
Applying gross margin of 50%:  $23,612.44
Print costs are $6.5 x 250 customer(s): $1,625.00

The expected profit from the marketing campaign is: $21,987.44
Recommendation: GO! We should do the campaign.
```

Simple python calculations.

# The Knime Workflow of Lesson 5



# The Python Code of Lesson 5 - I

```
# a reference to the pandas library
import pandas as pd

# To visualize the data we need mytplotlib
# and seaborn for nice pairplots
import matplotlib.pyplot as plt
import seaborn as sns

# statsmodel will do the linear regression for us
import statsmodels.api as sm

# second library we can use for linear regression
from sklearn import linear_model
from sklearn.linear_model import LinearRegression

# the excel file must be in the same directory as this notebook
# be sure to use the right excel data file.
# This one is the customer excel file for building the model
catalog_customers_file= 'p1-customers.xlsx'

# via pandas, the contents ae read into a variable or data frame named catalog_customers_data
# pandas is able not to only read excel, but does a great job on csv, too.
catalog_customers_data = pd.read_excel(catalog_customers_file)

# now I know I can show the data by typing the variable name
catalog_customers_data
```

# The Python Code of Lesson 5 - II

```
# with a seaborn pairplot, we can check for linear relationship
# in each and every combination of the data columns.
# as we can see, the only relationship seems to be between
# Avg_Sales_Amount and Avg_Num_Products_Purchased

sns.pairplot(catalog_customers_data)
plt.show()

# We drop the columns without statistical significance from our dataset
cleaned_customers_data = catalog_customers_data.drop(['Customer_ID', 'ZIP', 'Store_Number', '#_Years_as_Customer'], axis=1)
#we also can drop the nominal data without significance as described in analysis section
cleaned_customers_data = cleaned_customers_data.drop(['Name', 'Address', 'City', 'State', 'Responded_to_Last_Catalog'], axis=1
)

# we still have nominal data in the dataset, namely Customer_Segment
# As this column is relevant for us, we have to create dummy variables
# and we have to drop "Credit card only" as stated in the task description
cleaned_customers_data = pd.get_dummies(cleaned_customers_data, columns=['Customer_Segment'], drop_first=True)

# set the target variable
Y = cleaned_customers_data['Avg_Sale_Amount']
# set the predictor variables
X = cleaned_customers_data.drop(['Avg_Sale_Amount'], axis=1)
```

# The Python Code of Lesson 5 - III

```
# let's to the evaluation with statsmodels
# we have to add a constant to the calculation or
# we do not have a Y-intercept
X = sm.add_constant(X)

# build the model
model = sm.OLS(Y,X).fit()
model_prediction = model.predict(X)
model_details = model.summary()

# print the details, so we can compare to alteryx
model_details

# Now we have a working model, we can use the data from
# p1-mailinglist.xlsx to test the model and to make a prediction
catalog_test_file = "p1-mailinglist.xlsx"
catalog_test_data = pd.read_excel(catalog_test_file)

# see above
cleaned_test_data = pd.get_dummies(catalog_test_data, columns=['Customer_Segment'], drop_first=True)
cleaned_test_data = cleaned_test_data.drop(['Customer_ID', 'ZIP', 'Store_Number', '#_Years_as_Customer'], axis=1)
cleaned_test_data = cleaned_test_data.drop(['Name', 'Address', 'City', 'State'], axis=1)

# even if we know we need Score_Yes amd Score_No. these columns are not present in the customer dataset
# so a correlation between the model data and the test data will not work
# alteryx can do this automatically, we have to get our hands dirty
cleaned_test_data1 = cleaned_test_data.drop(['Score_Yes', 'Score_No'], axis=1)
```

# The Python Code of Lesson 5 - IV

```
# set the predictor variables
X_test = cleaned_test_data1

# let's to the evaluation with statsmodels
# we have to add a constant to the calculation or
# we do not have a Y-intercept
X_test = sm.add_constant(X_test)


# and make a prediction with the test data
model_prediction_test = model.predict(X_test)

# we have to make a prediction according to the value of Score_Yes
# so let's read the score values again and add them to the model
score = pd.read_excel('p1-mailinglist.xlsx', usecols=['Score_Yes'])

# add the model to the data frame
score['Predicted_Sales'] = model_prediction_test

# show the results
score
```

# The Python Code of Lesson 5 - V

```
# now we do the evaluation

print("Catalog marketing campaign results")
print("----------------------------------\n")

total_revenue = sum(score['Predicted_Sales']*score['Score_Yes'])
print("Total expected revenue from the marketing campaign: ", '${:,.2f}'.format(total_revenue))

adjusted_revenue = total_revenue * 0.5
print("Applying gross margin of 50%: ", '${:,.2f}'.format(adjusted_revenue))

number_customers = score.shape[0]
print_costs = 6.5
catalog_costs = print_costs * number_customers
print("Print costs are $6.5 x", number_customers, "customer(s):", '${:,.2f}'.format(catalog_costs))

print("")
expected_profit = adjusted_revenue - catalog_costs
print("The expected profit from the marketing campaign is:", '${:,.2f}'.format(expected_profit))

if (expected_profit > 10000):
    print("Recommendation: GO! We should do the campaign.")
else:
    print("Recommendation: NO GO! We should not do the campaign.")
```