

IBM Software

Clustering Course

Lab 3: Calculating risk-return characteristics of a portfolio

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Calculating risk-return characteristics of a portfolio

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Summary

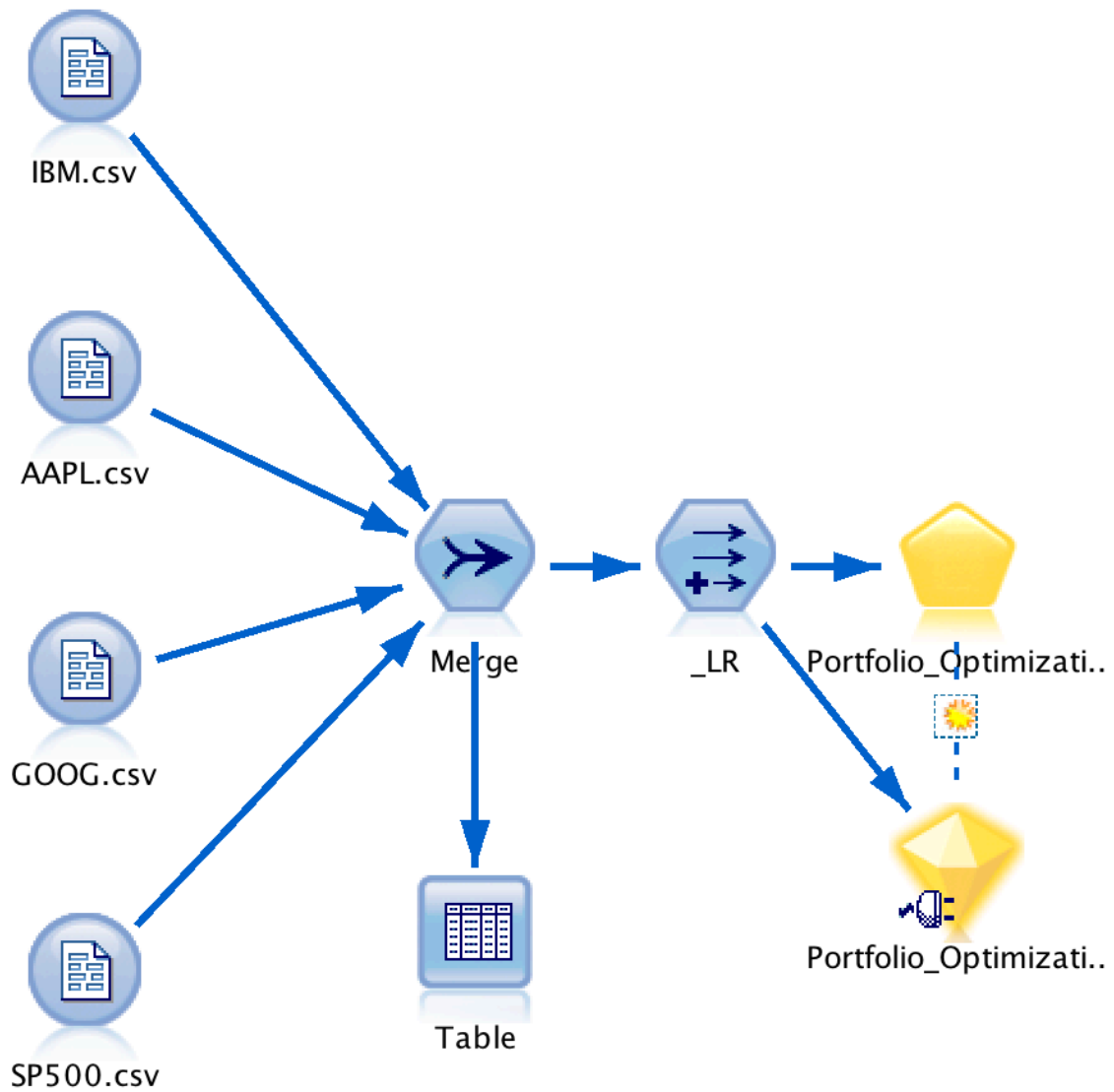
Hello, welcome to second lab. Let's have a brief overview of what we are going to practice in this lab.

We will be working with a apart of stream that we prepared in Lab 2.

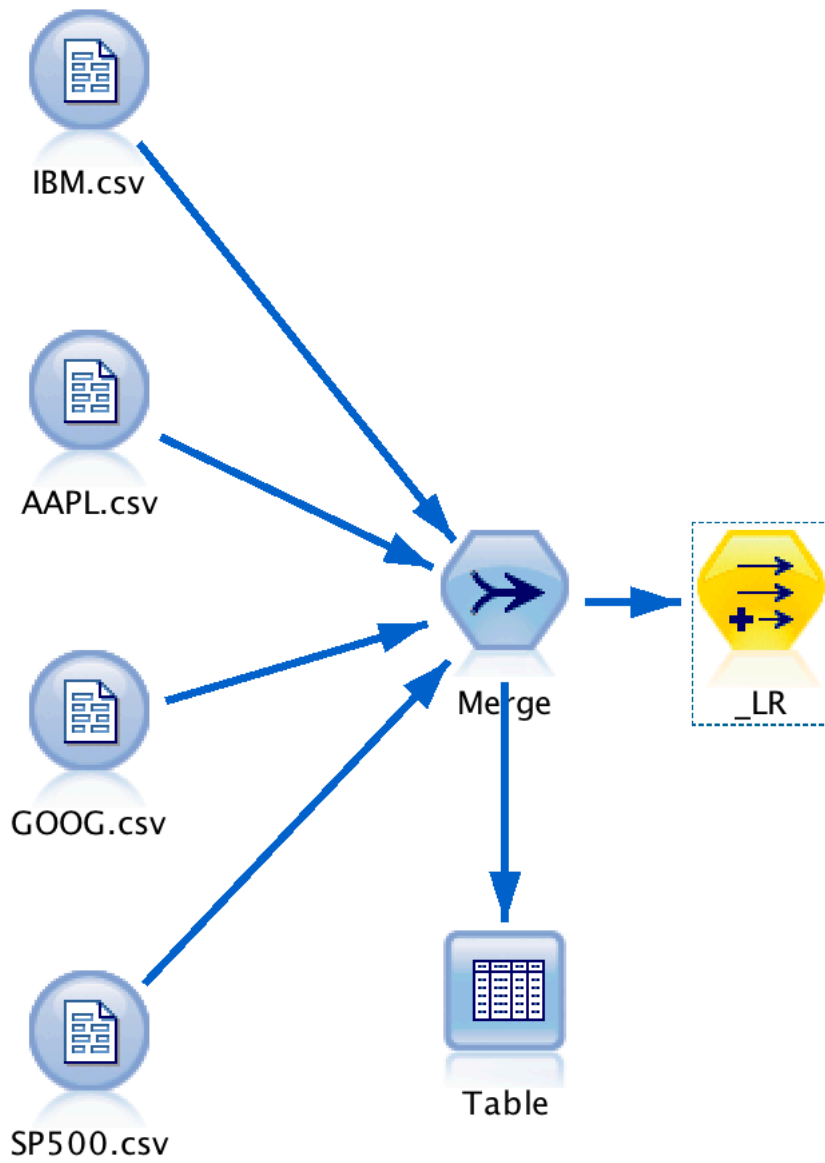
We will calculate expected return of stocks using CAPM theory.

Additionally in this lab, you will see how you can utilize "Regression" modeling node to calculate market beta of a given stock and calculate expected return using CAPM.

First, we should open the stream we have from second lab.



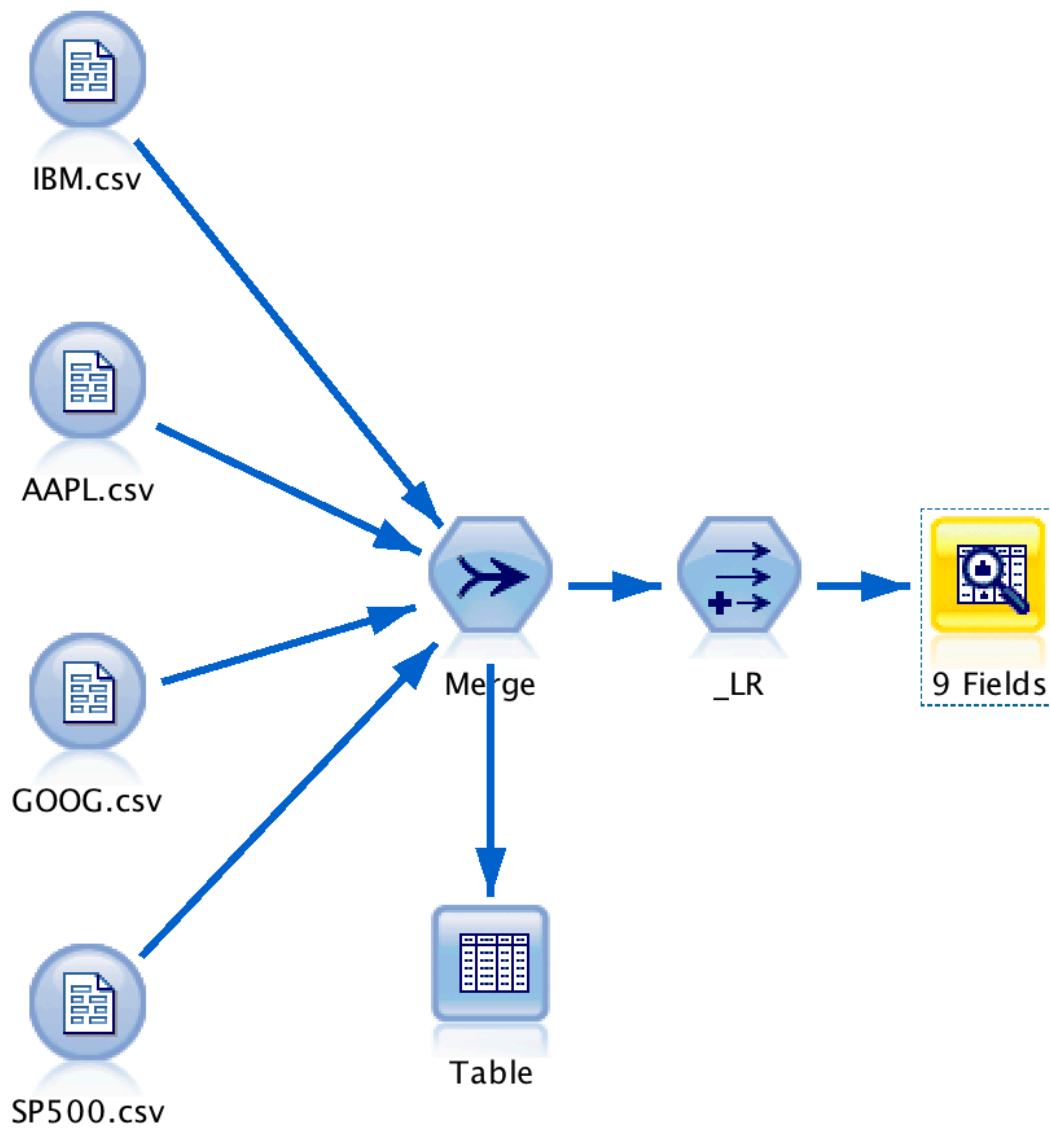
Delete yellow highlighted nodes as we don't need them, your final stream should look like following



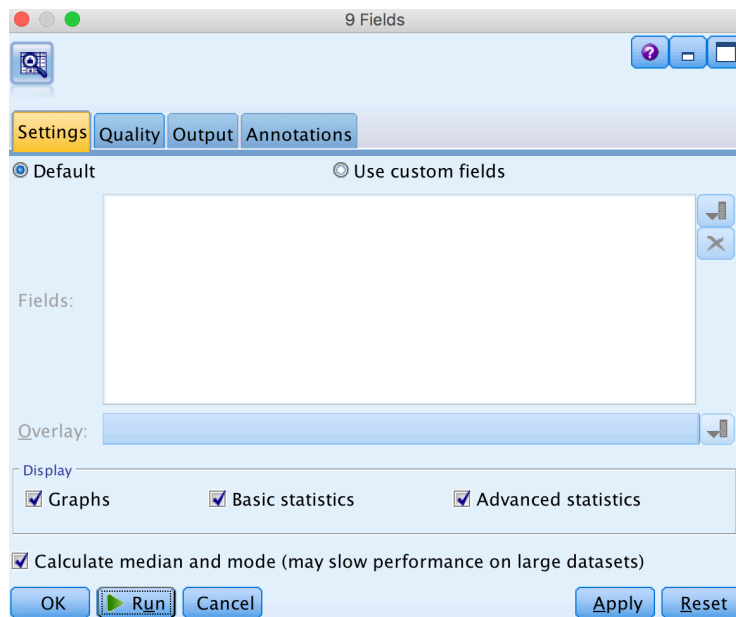
1. Calculating Risk

Risk is standard deviation of historical data.

We can add “Data Audit” node from “Output” palette.



We can check additional options



We can see statistics such as min, max, mean, standard deviation, variance and also other distributional properties of log return series.

FileEditGenerate

Data Audit of [9 fields]

AuditQualityAnnotations

Field	Sample Graph	Measurement	Min	Max	Sum	Range	Mean	Mean Std. Err.	Std. Dev	Variance	Skewness	Skewness Std. Err.	Kurtosis	Kurtosis
Date	<div><div>Field</div></div>	Continuous	2004-0...	2016-09...	--	380764800...	--	--	--	--	--	--	--	--
SP500_AC		Continuous	676.530	2190.150	4391255...	1513.620	1445.443	6.490	357.736	127974...	0.532	0.044	-0.693	
GOOG_AC		Continuous	49.955	784.850	1026608...	734.895	337.922	3.211	176.989	31325.0...	0.837	0.044	-0.234	
AAPL_AC		Continuous	2.008	129.181	142570.0...	127.172	46.929	0.673	37.104	1376.709	0.585	0.044	-0.971	
IBM_AC		Continuous	57.329	195.360	369335.2...	138.031	121.572	0.759	41.842	1750.722	0.042	0.044	-1.490	
SP500_AC_LR		Continuous	-0.095	0.110	0.682	0.204	0.000	0.000	0.012	0.000	-0.342	0.044	11.226	
GOOG_AC_LR		Continuous	-0.123	0.182	2.731	0.306	0.001	0.000	0.020	0.000	0.634	0.044	9.442	
AAPL_AC_LR		Continuous	-0.197	0.130	3.961	0.328	0.001	0.000	0.022	0.000	-0.166	0.044	5.660	

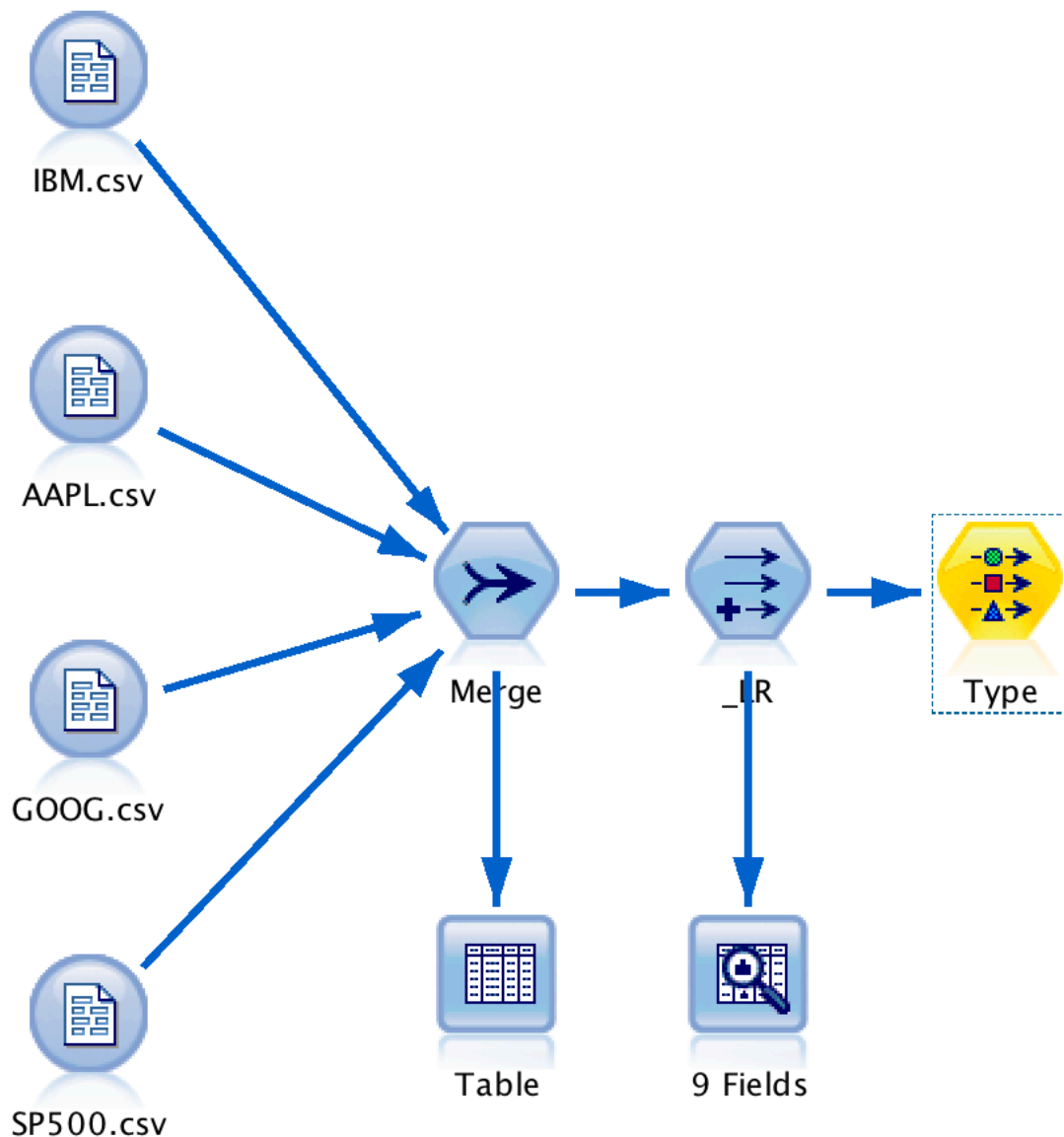
¹ Indicates a multimode result

² Indicates a sampled result

2. Using CAPM to calculate expected return of stocks

In order to calculate Beta of a stock, we can use linear regression. In order to use “Regression” node from “Modeling” palette, we need to identify which fields will be used as inputs and targets.

In order to do that, we will add “Type” node from “Field Ops” palette.



We will identify input variables and target variable next

Type

Preview

Types

Format

Annotations

Read Values

Clear Values

Clear All Values

Field	Measurement	Values	Missing	Check	Role
Date	Continuous	<Read>		None	None
SP500 AC	Continuous	<Read>		None	None
GOOG AC	Continuous	<Read>		None	None
AAPL AC	Continuous	<Read>		None	None
IBM AC	Continuous	<Read>		None	None
SP500 AC LR	Continuous	<Read>		None	Input
GOOG AC LR	Continuous	<Read>		None	Target
AAPL AC LR	Continuous	<Read>		None	Target
IBM AC LR	Continuous	<Read>		None	Target

☒ View current fields
 ☐ View unused field settings

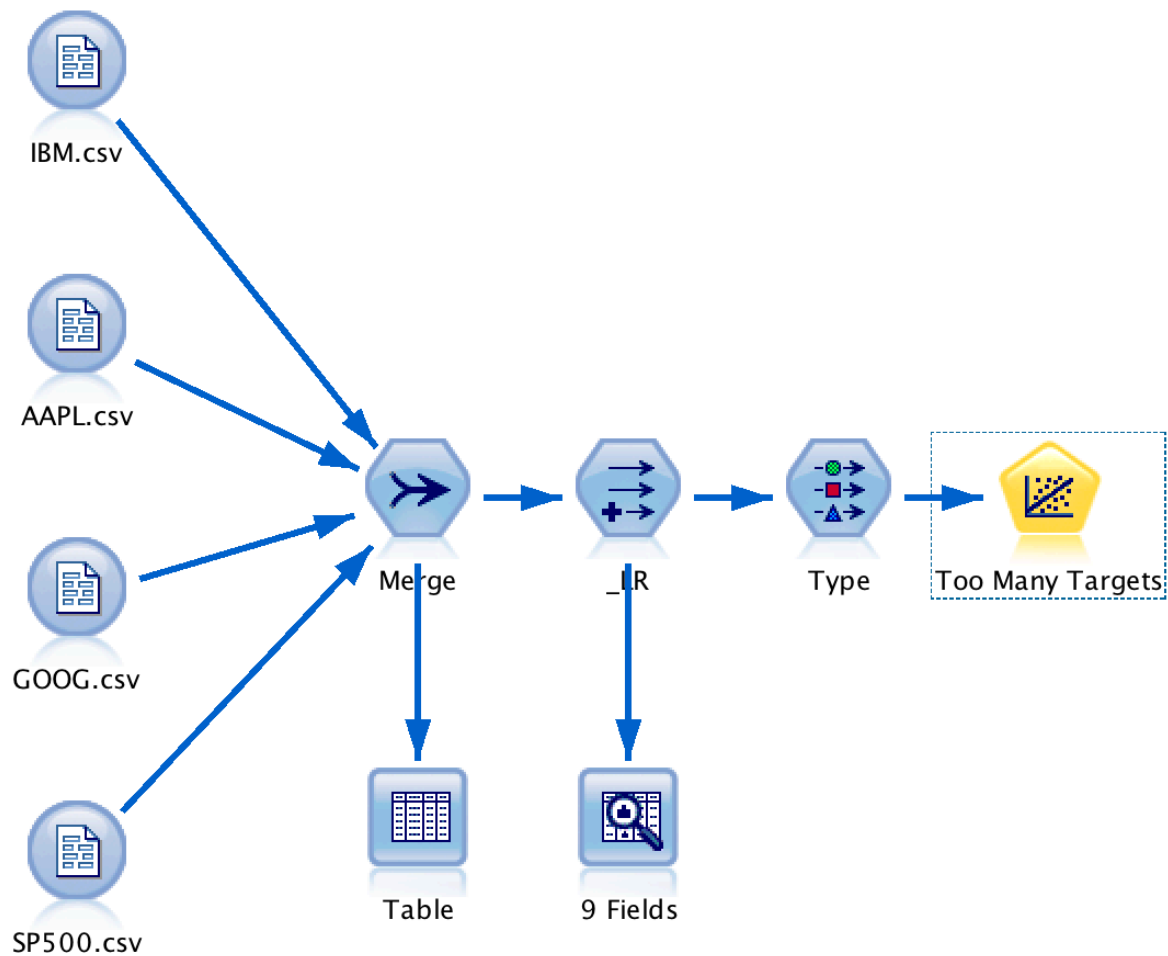
OK

Cancel

Apply

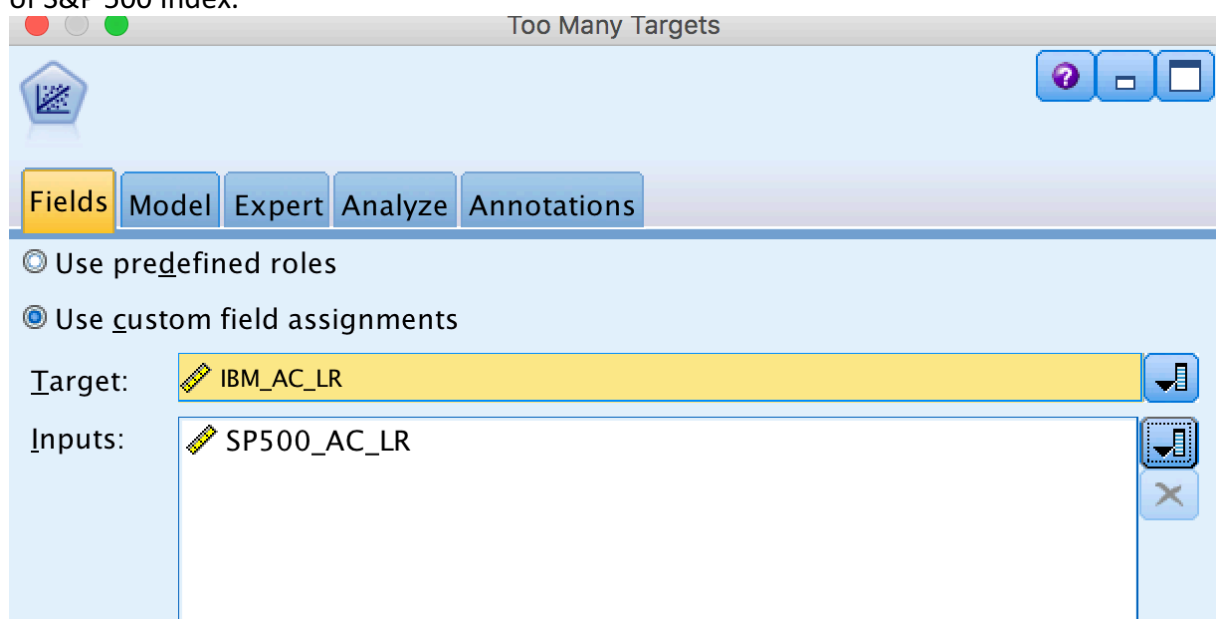
Reset

Once we are done with “Type” node, we can add “Regression” node from modeling palette to calculate beta.

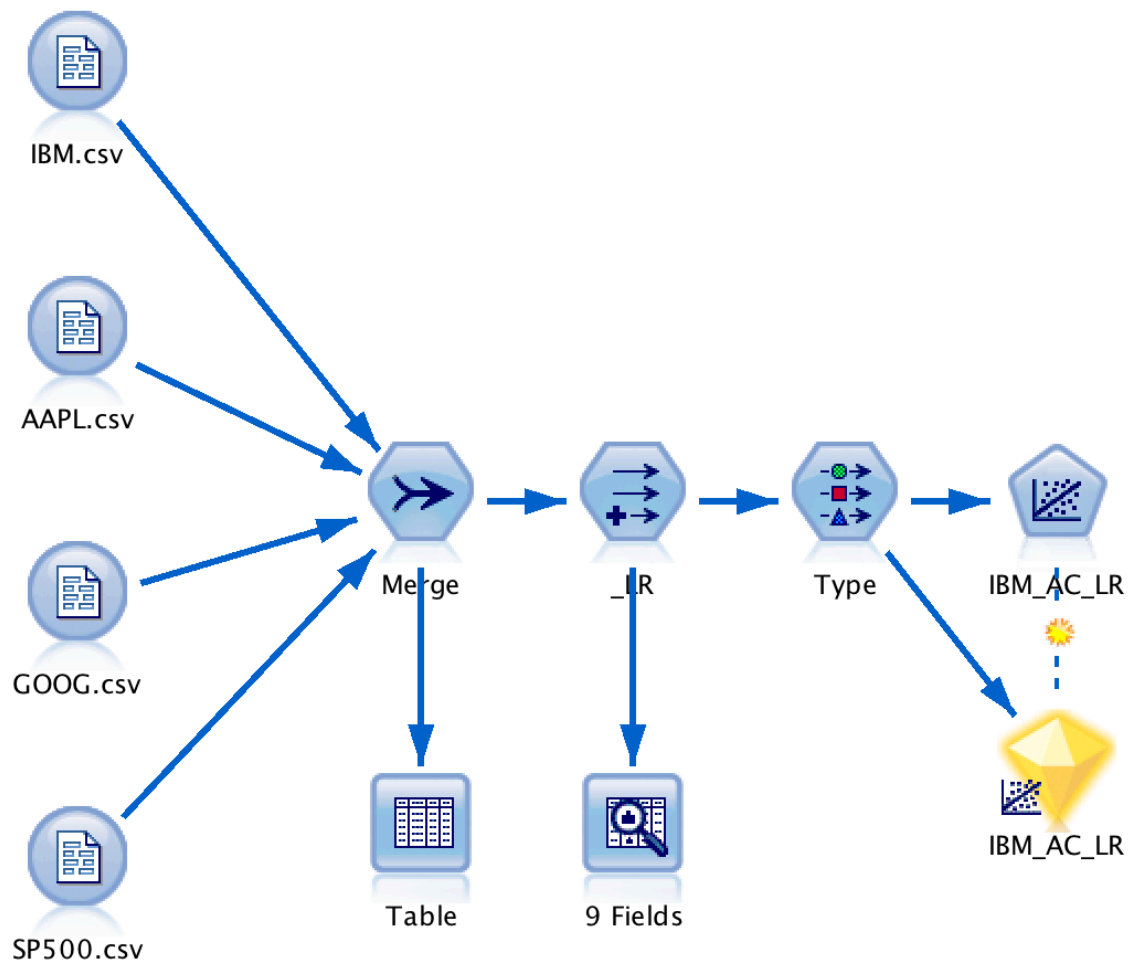


Double click to open the node and here we have to define response variable and explanatory variable.

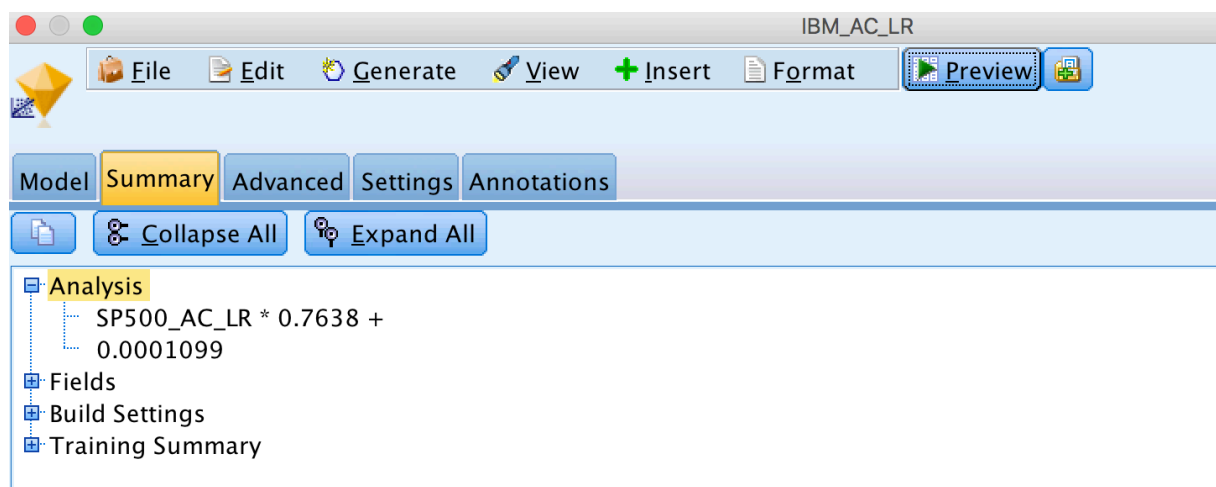
Our response variable will be log returns of IBM and explanatory variable will be log returns of S&P 500 Index.



If you click run with default settings, you will get the model output



In “Summary” tab you will see the coefficient of “SP500_AC_LR” and this value will be our beta value, which is 0.76 in this case.



If you remember from CAPM formula, expected return of stock is calculated with following formula;

$$E(r_i) = r_f + \beta(E(r_m) - r_f)$$

Let's assume, we are given expected market return of 10% and risk-free rate of 3%.
In this case, expected return of IBM will be

$$E(r_i) = 0.03 + 0.76(0.10 - 0.03)$$

$$E(r_i) = 0.083 = 8.3\%$$

You can follow same steps to calculate expected return for other stocks which I highly encourage you to do so on your own for practice.

Summary

In this lab, you have learned how to calculate market beta for a given stock by using "Regression" modeling node.

Thank you for your time and see you in another lab.