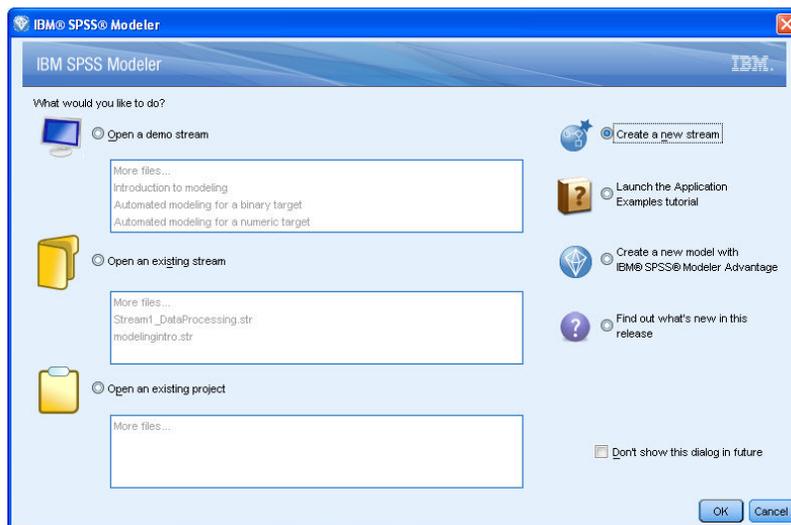


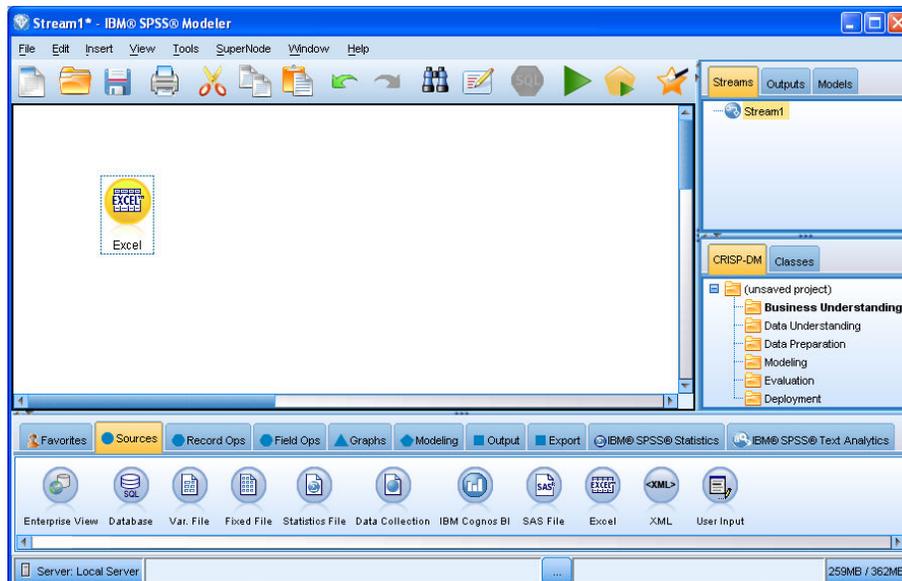
## Lab Exercise One Data Preprocessing with SPSS Modeler

### Handling Missing Data

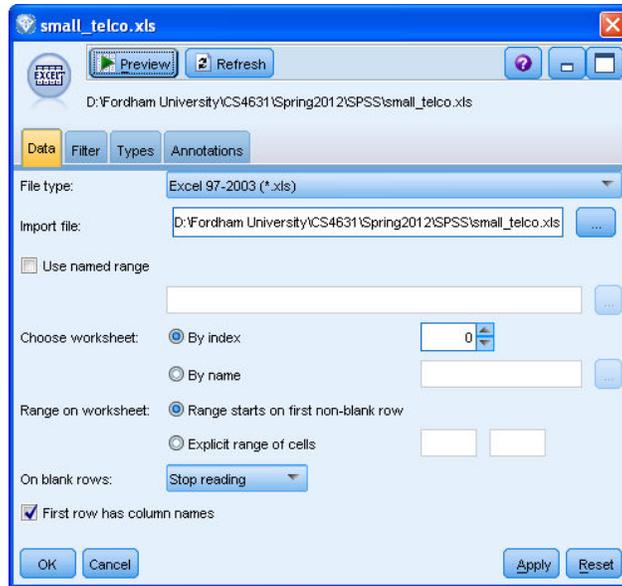
1. Download data file *small\_telco.xls* from course website, save it on desktop or a folder of your choice.
2. Open IBM SPSS Modeler, choose Create a new stream.



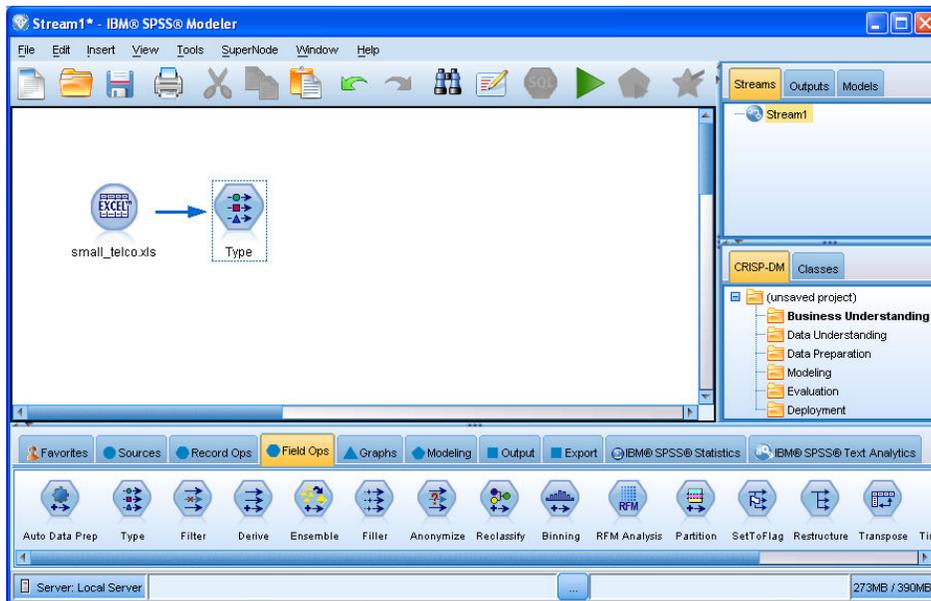
3. Put an Excel Source Node on the stream canvas.



4. Import data file into the stream, keep the default settings, and click Preview to check the data.



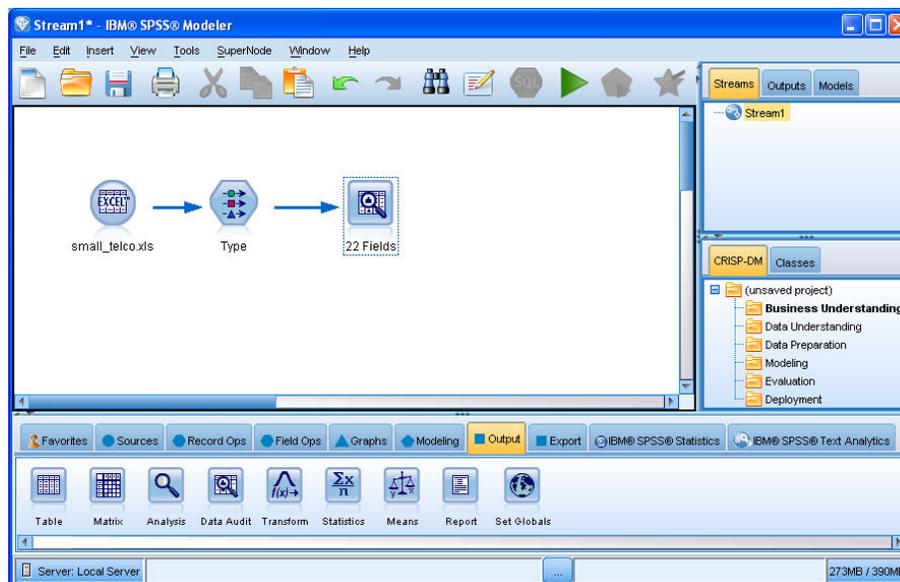
5. Add a Type Node on the stream canvas, and connect the Source Node with the Type Node.



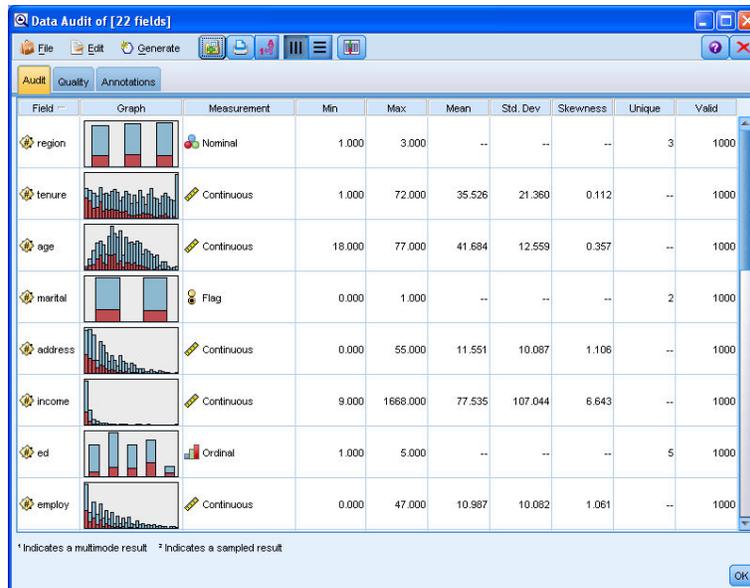
6. Double click the Type Node, set the appropriate measurement level for every field of the data. Set the role of the last field Churn as Target.



7. Add a Data Audit Node on the stream canvas, connect it with the Type Node.



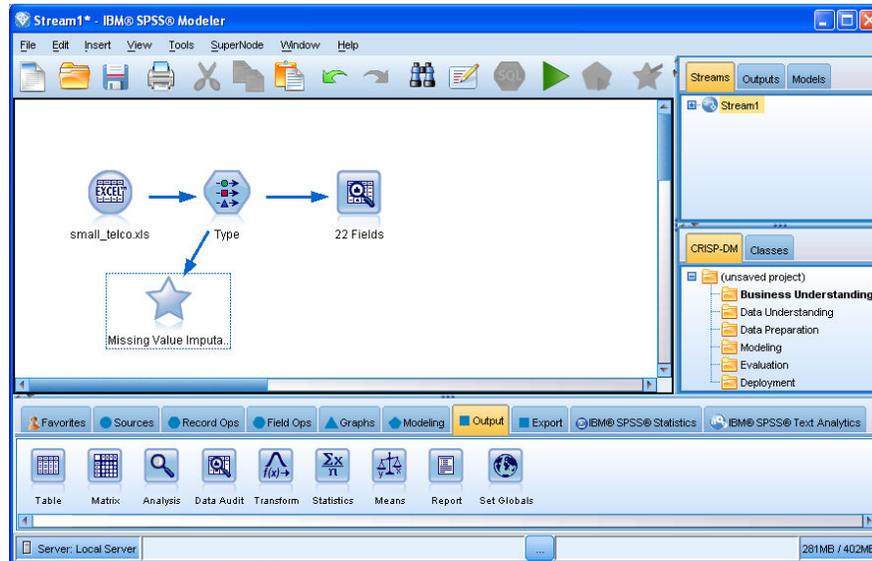
- Double click the Data Audit Node, keep the default settings, click Run button. The statistics and charts are shown below.



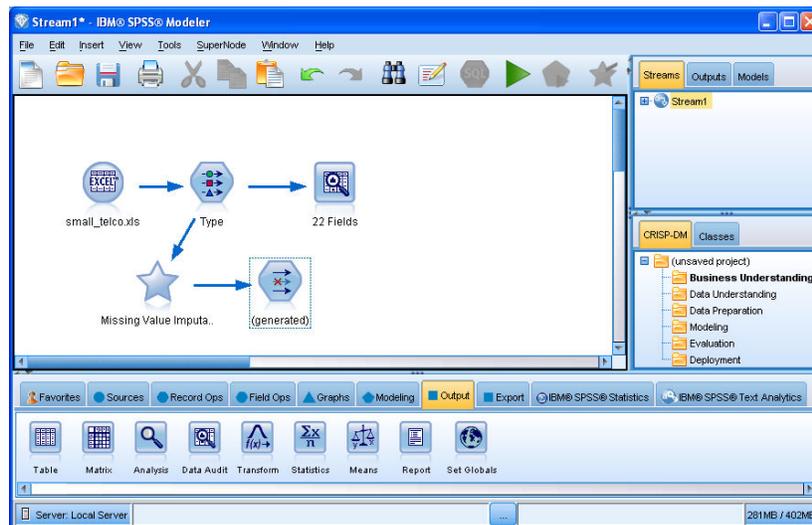
- Click Quality Tab, then specify impute method for missing values in fields *logequi*, *logcard*, *logwire*.

Field	Measurement	Outliers	Extremes	Action	Impute Missi...	Method	% Complete	Valid Records	Null Value
region	Nominal	--	--	Never	Fixed	Fixed	100	1000	0
tenure	Continuous	0	0	None	Never	Fixed	100	1000	0
age	Continuous	0	0	None	Never	Fixed	100	1000	0
marital	Flag	--	--	Never	Fixed	Fixed	100	1000	0
address	Continuous	12	0	None	Never	Fixed	100	1000	0
income	Continuous	9	6	None	Never	Fixed	100	1000	0
ed	Ordinal	--	--	Never	Fixed	Fixed	100	1000	0
employ	Continuous	8	0	None	Never	Fixed	100	1000	0
retire	Flag	--	--	Never	Fixed	Fixed	100	1000	0
gender	Nominal	--	--	Never	Fixed	Fixed	100	1000	0
reside	Nominal	--	--	Never	Fixed	Fixed	100	1000	0
longmon	Continuous	18	4	None	Never	Fixed	100	1000	0
longten	Continuous	20	4	None	Never	Fixed	100	1000	0
internet	Flag	--	--	Never	Fixed	Fixed	100	1000	0
ebill	Flag	--	--	Never	Fixed	Fixed	100	1000	0
loglong	Continuous	4	0	None	Never	Fixed	100	1000	0
logequi	Continuous	1	0	None	Blank & Null ...	Fixed	38.6	386	614
logcard	Continuous	2	0	None	Blank & Null ...	Fixed	67.8	678	322
logwire	Continuous	1	0	None	Blank & Null ...	Fixed	29.6	296	704
hinc	Continuous	9	0	None	Never	Fixed	100	1000	0
custcat	Nominal	--	--	Never	Fixed	Fixed	100	1000	0
churn	Flag	--	--	Never	Fixed	Fixed	100	1000	0

10. Generate Missing Values SuperNode with all fields, then connect it with the Type Node.

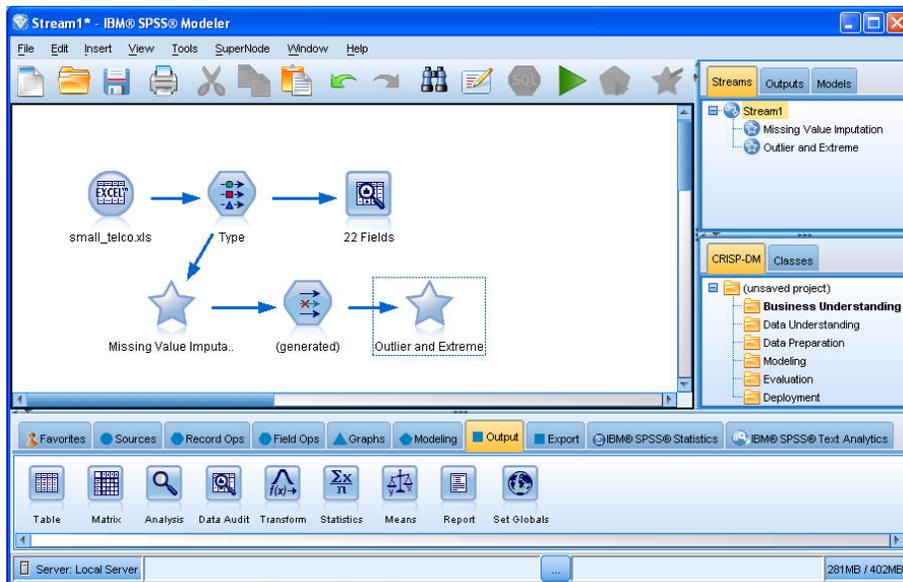


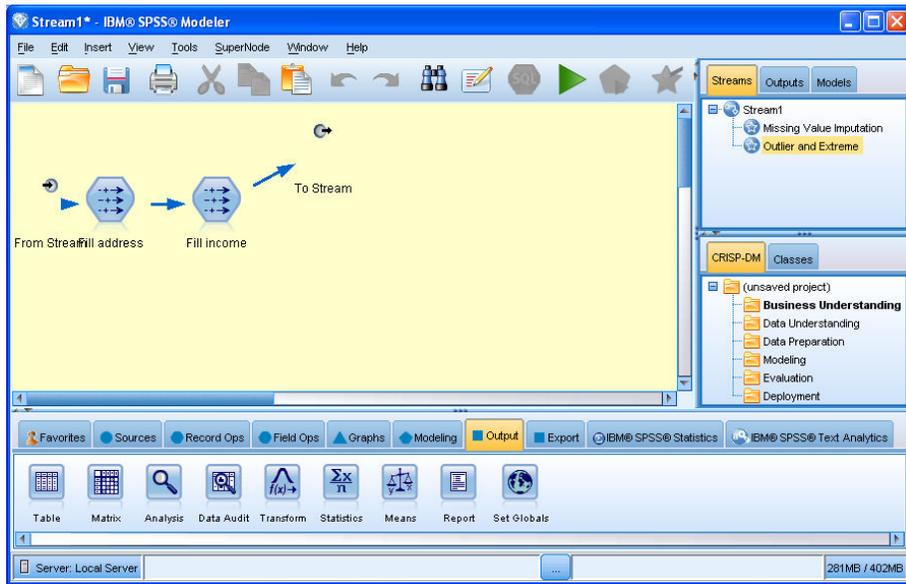
11. Generate Missing Values Filter Node with quality percentage higher than 50%, then connect the node with the Missing Value Impute SuperNode.



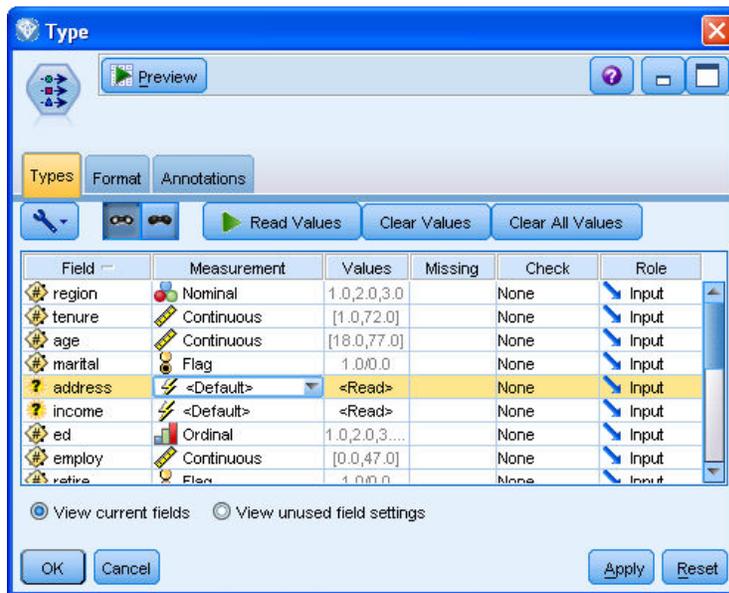
12. Select two fields with Outliers and Extreme values, choose appropriate Actions, and generate Outlier and Extreme SuperNode. Then connect it with the Filter Node just created. You could Zoom In the SuperNode to have a look at its details.

Field	Measurement	Outliers	Extremes	Action	Impute Missing	Method	% Complete	Valid Records	Null Value
region	Nominal	--	--	--	Never	Fixed	100	1000	
tenure	Continuous	0	0	None	Never	Fixed	100	1000	
age	Continuous	0	0	None	Never	Fixed	100	1000	
marital	Flag	--	--	--	Never	Fixed	100	1000	
address	Continuous	12	0	Coerce	Never	Fixed	100	1000	
income	Continuous	9	6	Coerce	Never	Fixed	100	1000	
ed	Ordinal	--	--	--	Never	Fixed	100	1000	
employ	Continuous	8	0	None	Never	Fixed	100	1000	
retire	Flag	--	--	--	Never	Fixed	100	1000	
gender	Nominal	--	--	--	Never	Fixed	100	1000	
reside	Nominal	--	--	--	Never	Fixed	100	1000	
longmon	Continuous	18	4	None	Never	Fixed	100	1000	
longten	Continuous	20	4	None	Never	Fixed	100	1000	
internet	Flag	--	--	--	Never	Fixed	100	1000	
ebill	Flag	--	--	--	Never	Fixed	100	1000	
loglong	Continuous	4	0	None	Never	Fixed	100	1000	
loggequl	Continuous	1	0	None	Blank & Null Val...	Fixed	38.6	386	
logcard	Continuous	2	0	None	Blank & Null Val...	Fixed	67.8	678	
logwire	Continuous	1	0	None	Blank & Null Val...	Fixed	29.6	296	
linc	Continuous	9	0	None	Never	Fixed	100	1000	
custcat	Nominal	--	--	--	Never	Fixed	100	1000	
churn	Flag	--	--	--	Never	Fixed	100	1000	

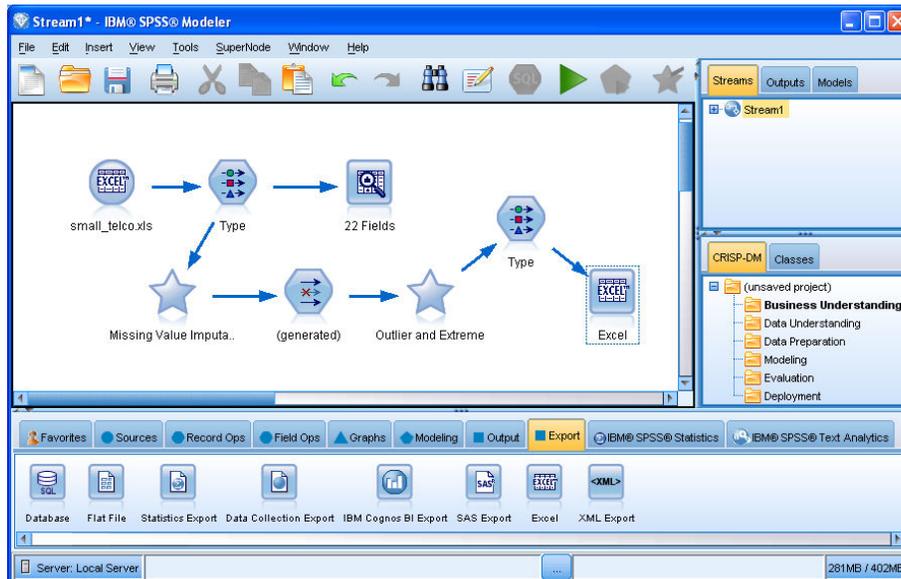




13. Add another Type Node on the stream canvas, connect it with the SuperNode. Then reset the measurement levels of these two fields you just processed.



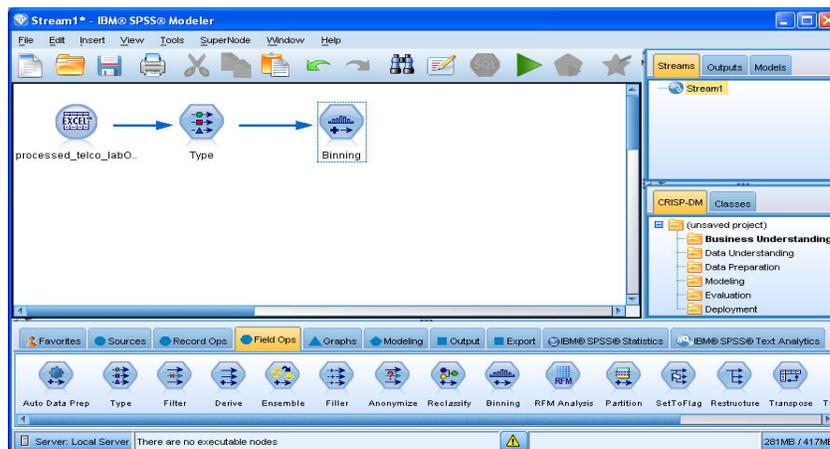
14. Then you could save the preprocessed data into an Excel file by adding an Excel Export Node on the stream canvas, then connect it with the Type Node. Double click the Excel Export Node to choose a location for the export data file. Save it as *processed\_telco.xls*.



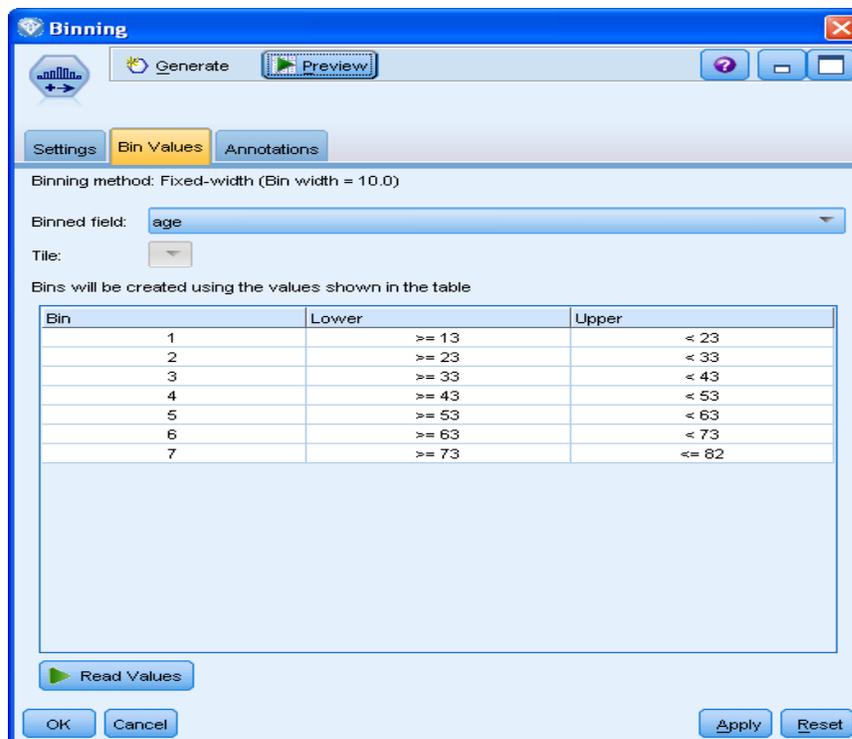
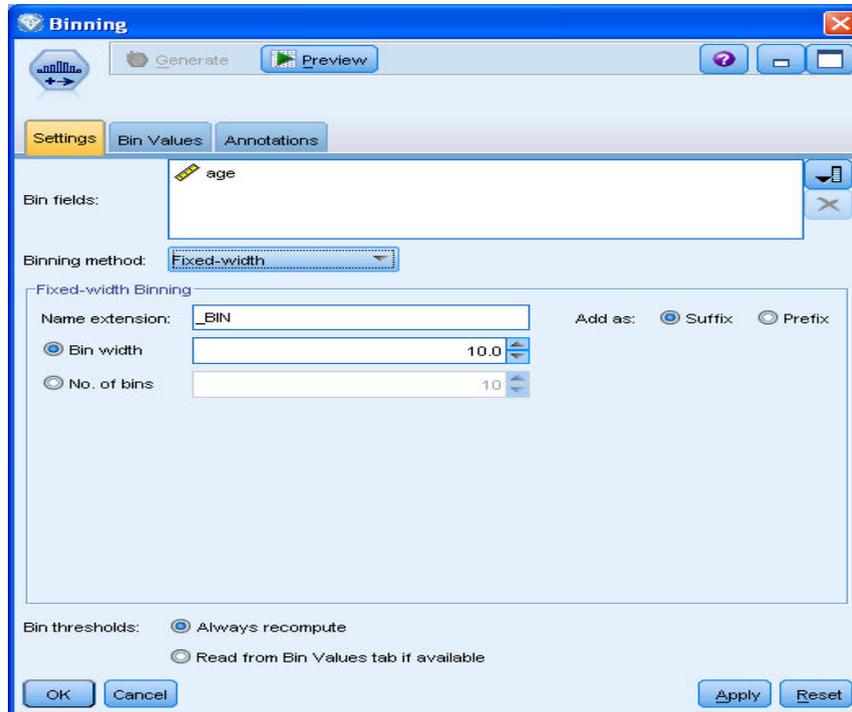
15. Open *processed\_telco.xls*, compare it with the original *small\_telco.xls*, what are the differences?

### Binning

16. Create a new stream and load *processed\_telco.xls* into SPSS Modeler, connect it with a Type node, defining the measurement levels for fields.
17. Create a Binning node and add it on the stream.



18. Choose age field to performing binning.

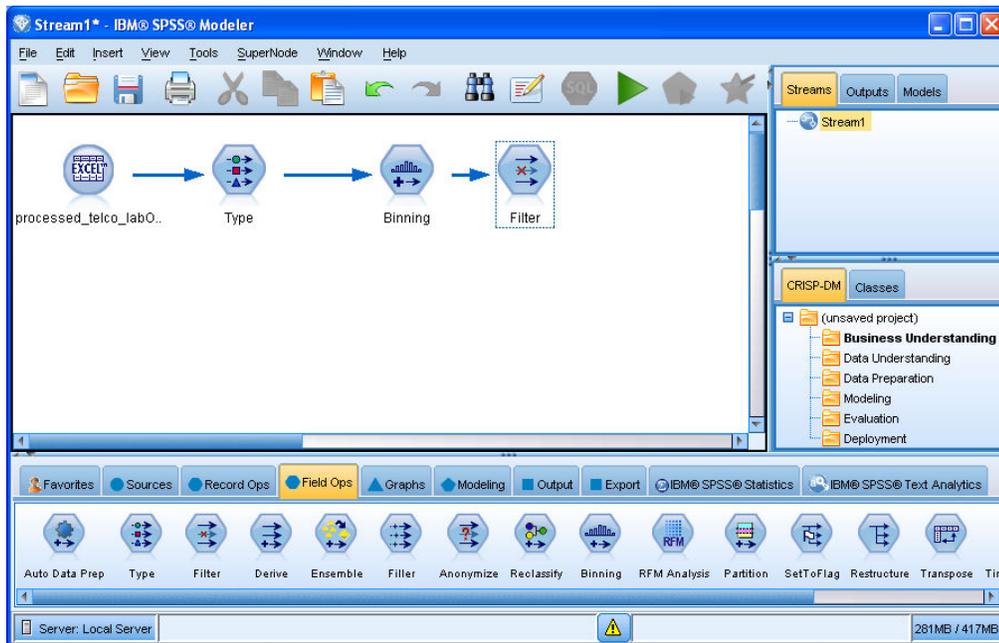


19. Click preview button to see the result.

	long	logcard	lninc	custcat	churn	age_BIN	
1	1.308	2.015	4.159	1.000	1.000	4	
2	1.482	2.725	4.913	4.000	1.000	3	
3	2.899	3.409	4.754	3.000	0.000	4	
4	2.246	0.000	3.497	1.000	1.000	3	
5	1.841	0.000	3.401	3.000	0.000	2	
6	2.468	2.603	4.357	3.000	0.000	3	
7	2.389	2.169	2.944	2.000	1.000	1	
8	1.800	3.146	4.331	4.000	0.000	3	
9	2.277	2.485	5.112	3.000	0.000	5	
10	3.184	2.803	4.277	2.000	0.000	3	

20. Export the modified data file with the new field added.

21. Could you remove the age field with the age\_BIN field only? Which node should you add? Adding a Filter Node.



22. Discard the old age field, save the new age\_BIN field.

