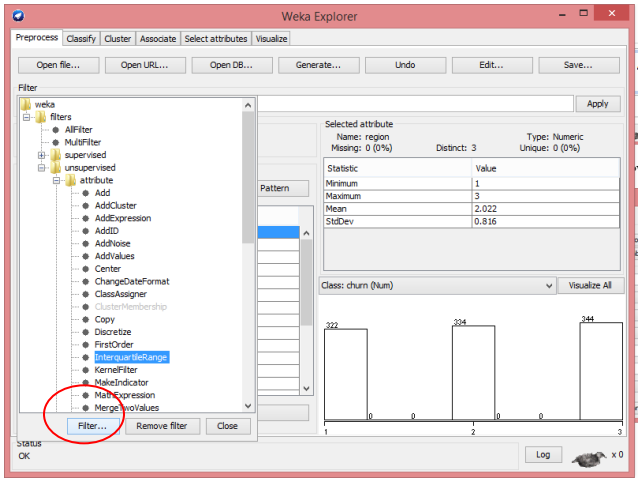
Lab Exercise One
Data Preprocessing with WEKA Explorer

Using Filters to handle outliers and extreme values

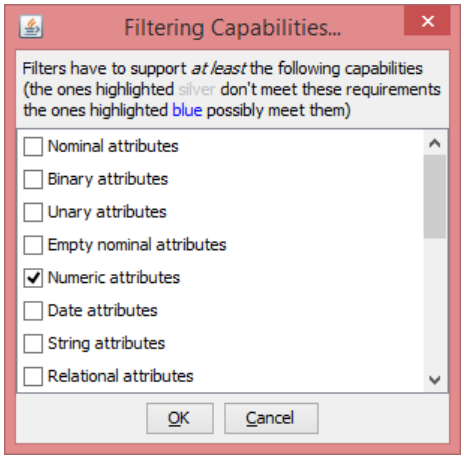
Unsupervised Attribute Filter – InterquartileRange: This filter adds new attributes that indicate whether the values of instances can be considered **outliers or extreme** values.

1. Open the dataset – **small_telco_labOne**. Perform the replacing missing values step with the filter – **ReplaceMissingValues**. Please pay attention that there are total **22 attributes** in the dataset.

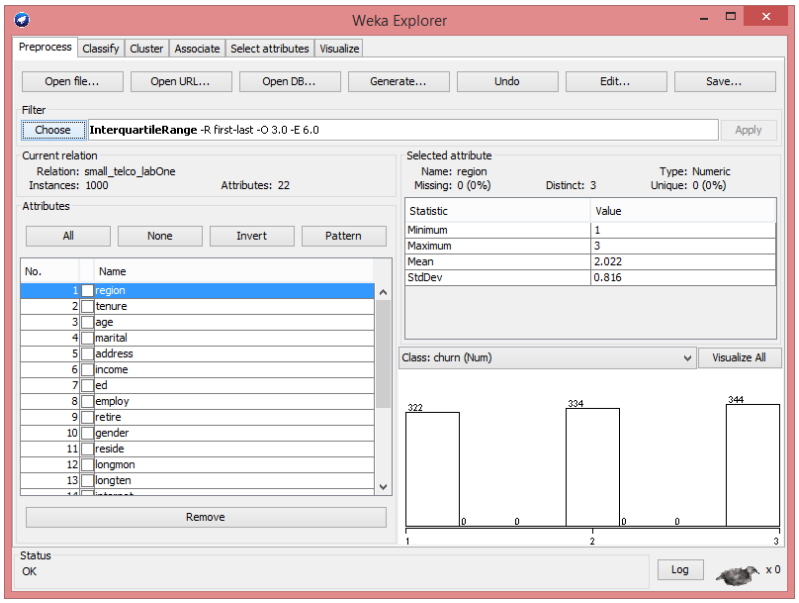
2. Then Click **Choose** button under **Filter**. Click **Filter** button at the bottom of the drop-down window.



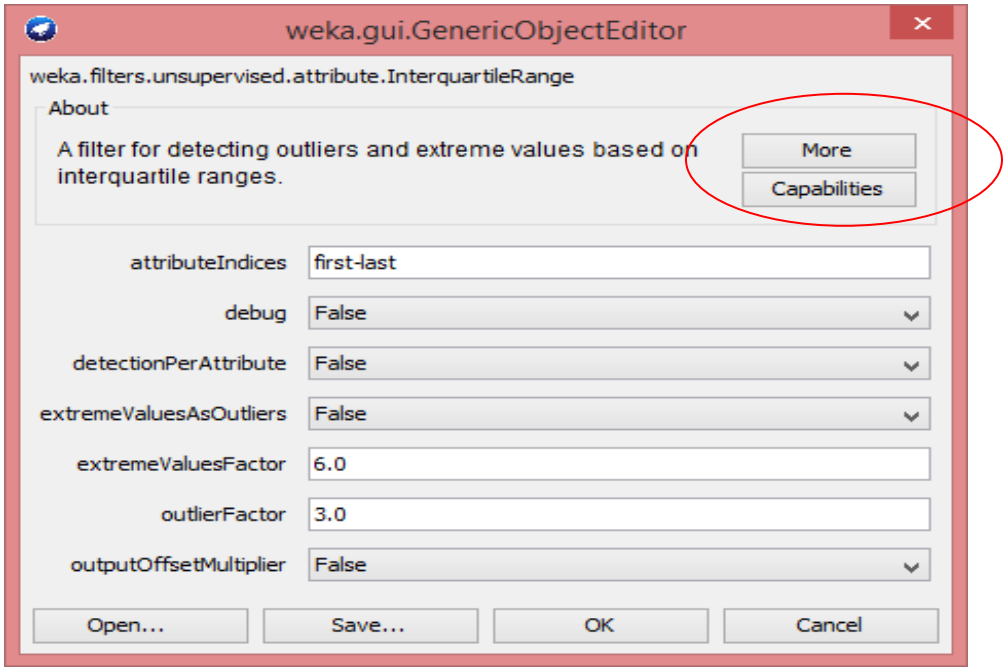
3. A window called Filtering Capabilities opens. This window shows what kind of attributes that filters support. Make sure that only **Numeric Attributes** and **Numeric Class** are checked. Click **OK**.

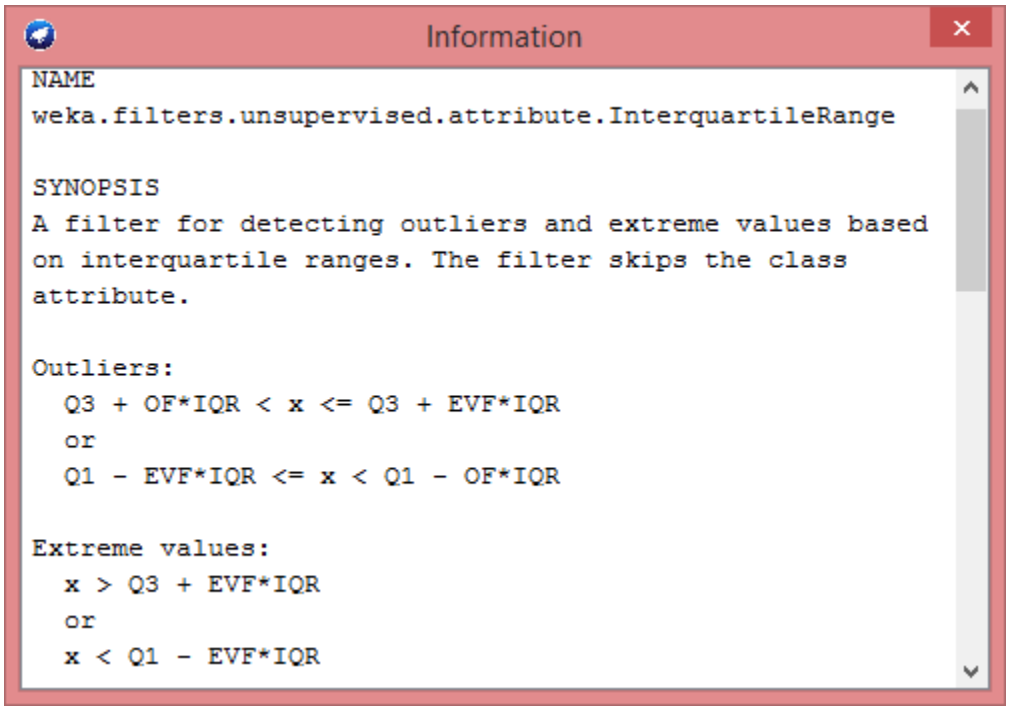


4. Choose **InterquartileRange** filter from the drop down list of **unsupervised attribute** filter list.

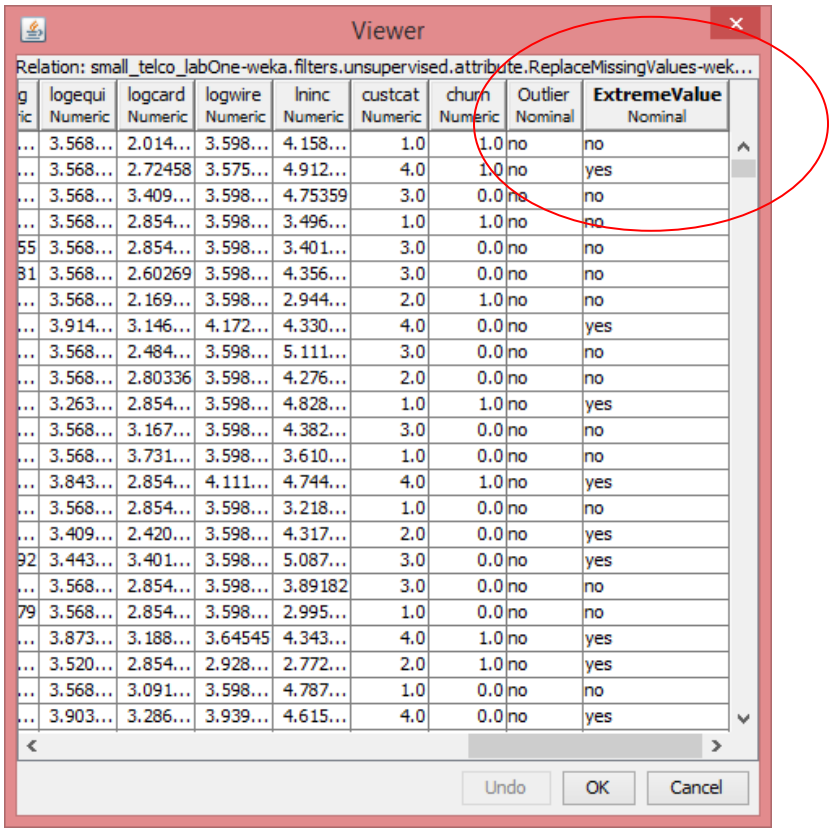


5. Left-click the box of the filter, the properties window shows. Click **More** button to show more information about this filter. The factors are used to define extreme values and outlier.



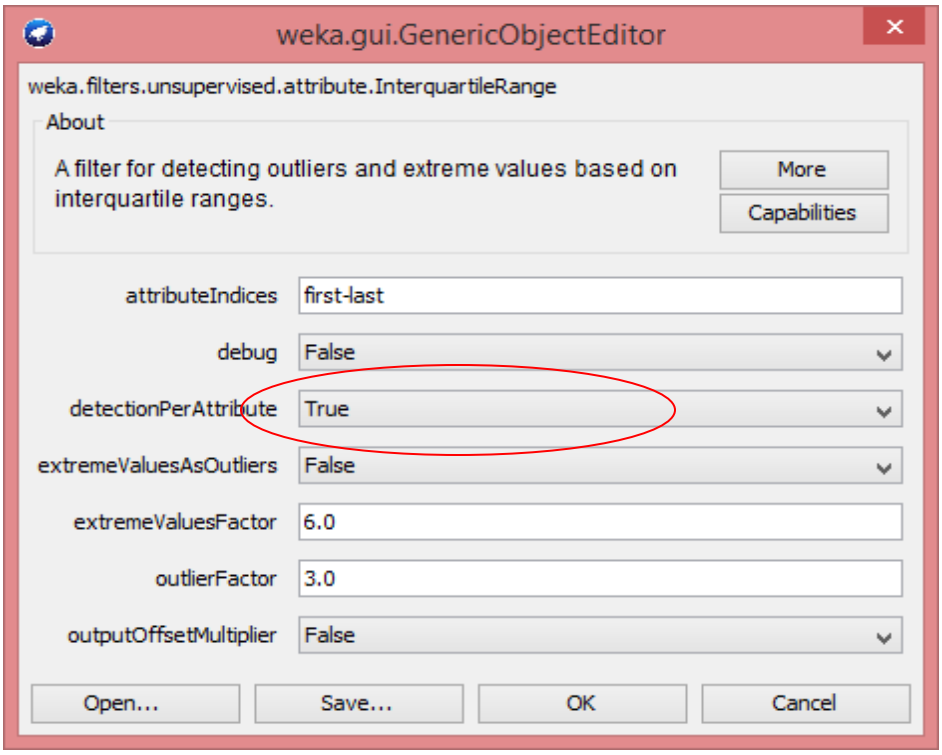


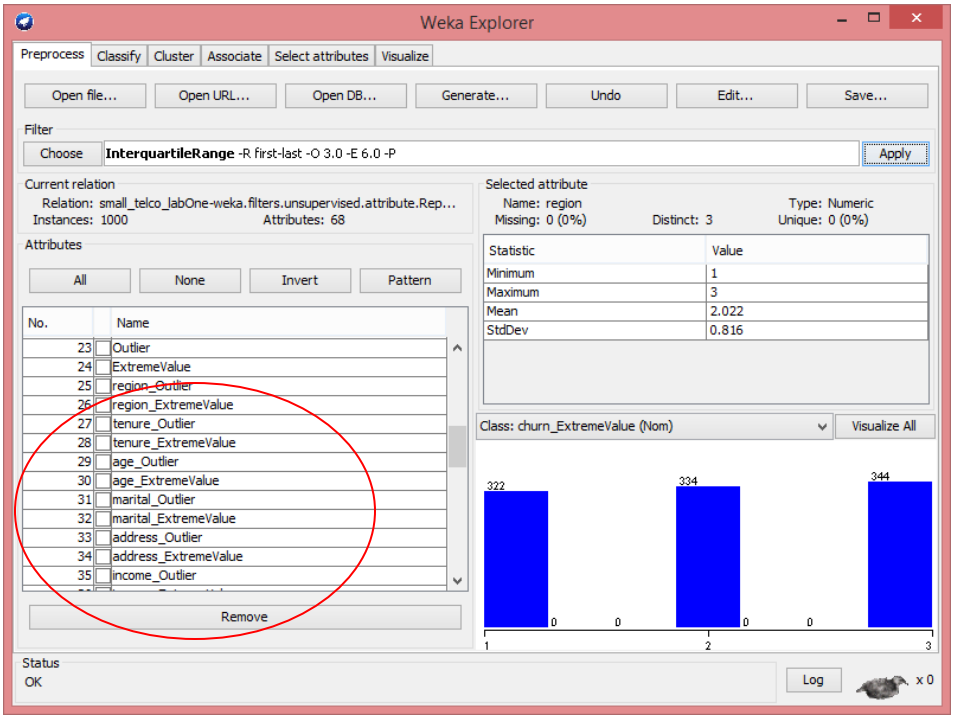
6. Click **Apply** button at the end of the filter box. You will find two extra attributes are generated. These two attributes flag an instance as an outlier or extreme if any of its attribute values are deemed outliers or extreme.



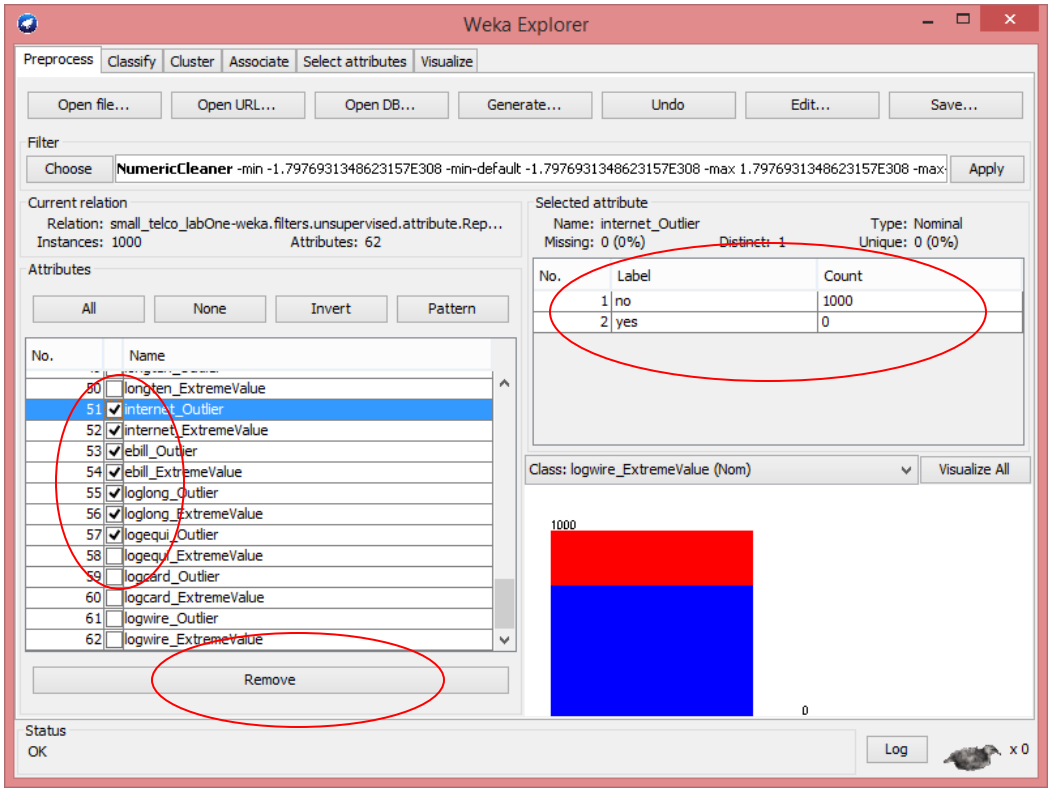
g ic	logequi Numeric	logcard Numeric	logwire Numeric	lninc Numeric	custcat Numeric	churn Numeric	Outlier Nominal	**ExtremeValue** Nominal
...	3.568...	2.014...	3.598...	4.158...	1.0	1.0	no	no
...	3.568...	2.72458	3.575...	4.912...	4.0	1.0	no	yes
...	3.568...	3.409...	3.598...	4.75359	3.0	0.0	no	no
...	3.568...	2.854...	3.598...	3.496...	1.0	1.0	no	no
55	3.568...	2.854...	3.598...	3.401...	3.0	0.0	no	no
31	3.568...	2.60269	3.598...	4.356...	3.0	0.0	no	no
...	3.568...	2.169...	3.598...	2.944...	2.0	1.0	no	no
...	3.914...	3.146...	4.172...	4.330...	4.0	0.0	no	yes
...	3.568...	2.484...	3.598...	5.111...	3.0	0.0	no	no
...	3.568...	2.80336	3.598...	4.276...	2.0	0.0	no	no
...	3.263...	2.854...	3.598...	4.828...	1.0	1.0	no	yes
...	3.568...	3.167...	3.598...	4.382...	3.0	0.0	no	no
...	3.568...	3.731...	3.598...	3.610...	1.0	0.0	no	no
...	3.843...	2.854...	4.111...	4.744...	4.0	1.0	no	yes
...	3.568...	2.854...	3.598...	3.218...	1.0	0.0	no	no
...	3.409...	2.420...	3.598...	4.317...	2.0	0.0	no	yes
92	3.443...	3.401...	3.598...	5.087...	3.0	0.0	no	yes
...	3.568...	2.854...	3.598...	3.89182	3.0	0.0	no	no
79	3.568...	2.854...	3.598...	2.995...	1.0	0.0	no	no
...	3.873...	3.188...	3.64545	4.343...	4.0	1.0	no	yes
...	3.520...	2.854...	2.928...	2.772...	2.0	1.0	no	yes
...	3.568...	3.091...	3.598...	4.787...	1.0	0.0	no	no
...	3.903...	3.286...	3.939...	4.615...	4.0	0.0	no	yes

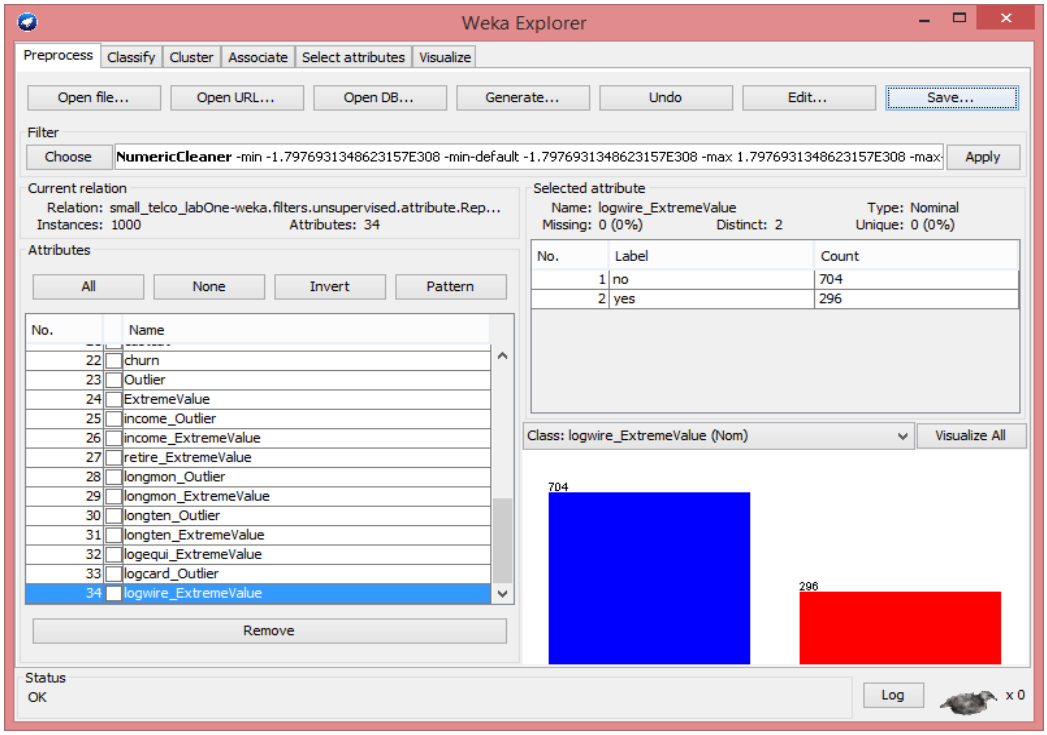
7. If we change the option for **InterquartileRange** filter, detectionPerAttribute from False to True, an outlier-extreme indicator pair for each attribute is generated.





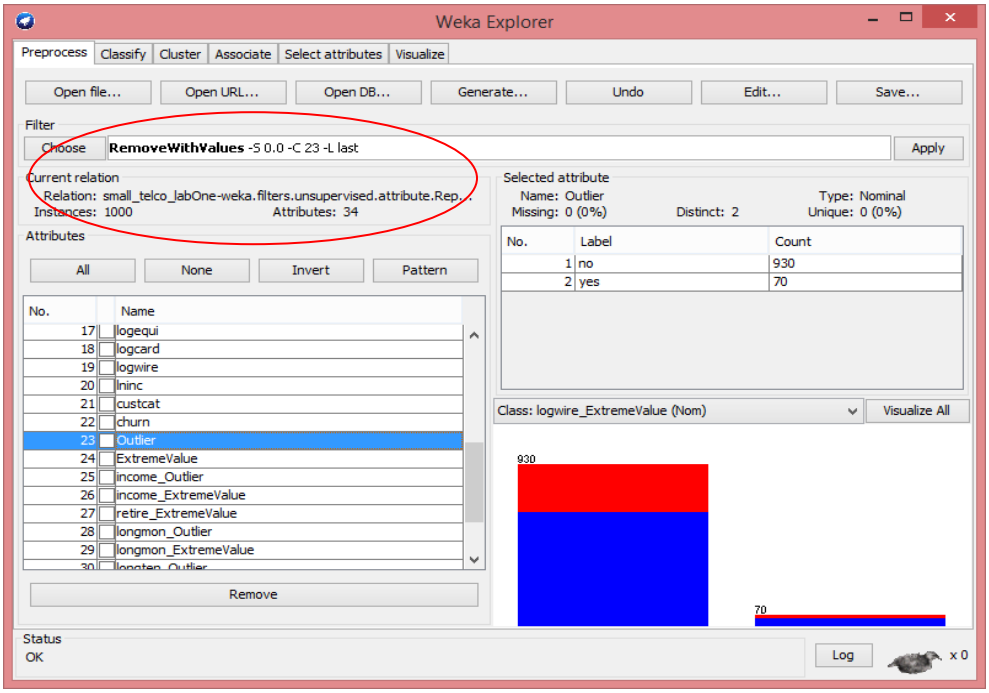
8. You could click each generated attribute to check the outlier and extreme values for original attribute. Remove those attribute indicator without outlier or extreme values with **Remove** button.

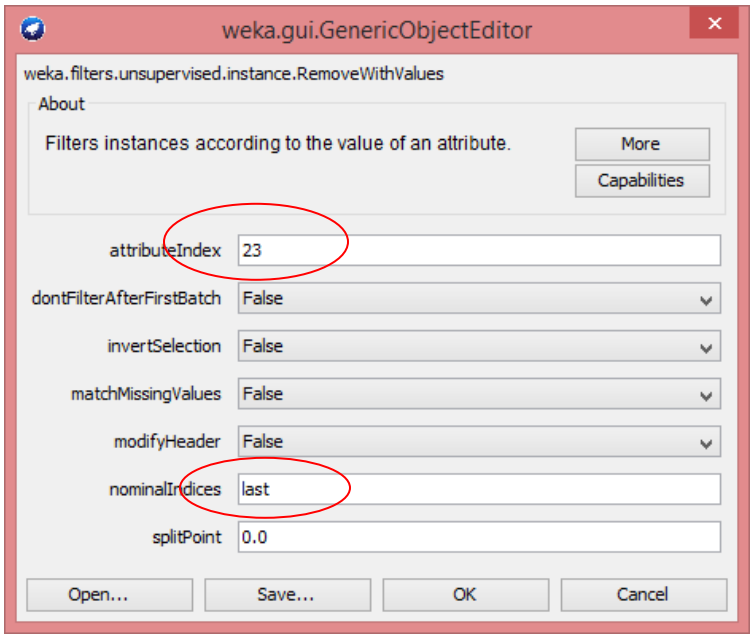




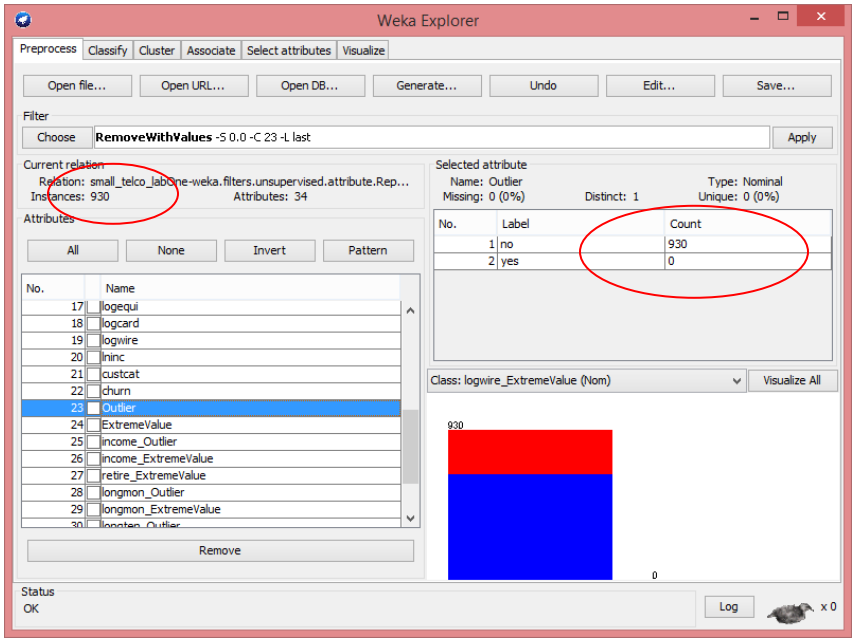
Unsupervised Instance Filter – RemoveWithValues: This filter removes instances according to the values of an attribute.

1. After we find out which instances having outliers or extreme values, we could remove those instances with outliers completely from the dataset. Choose **RemoveWithValues** from the drop-down list of **unsupervised instance** Filter. Then left-click the box of the filter. Since **outlier attribute** is indexed as 23 and "**yes**" value is the **last** nominal value of this attribute, change the options of the filter accordingly.





2. Then click **Apply** after confirming the changes. 70 instances are removed from the dataset and Outlier attribute has no Yes values.



3. You could also remove instances according to the outlier-attribute-pair indicators in the same way.