**Workflow of Constraint Analyzer Project**

Transmission outages hourly data pulled **from Yes Energy (2014-2019)**

**Code file - Get\_Historical\_Trans\_Outage\_v1.py**

Constraint-Contingency Summary data pulled **from Yes Energy (2014-2019)**

**Manual process of pulling data from Yes Energy Portal**

Column values of outage data (all files) and mapping document are changed in order to make mapping easier

**Code file – TransmissionOutagesMapping.py**

Constraint-contingency unique pair extraction

**Code file – ConstraintContingencyUniquePairCreation.py**

Column values of constraint data and mapping document are changed in order to make mapping easier

**Code file – ConstraintContingencyMapping.py**

With the obtained excel sheet, vlookup is performed to map constraints to the respective from bus and to bus number

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All the files are combined in such a way that only unique outages which are mapped are stored in one sheet and unmapped outages are stored in another of resultant file

**Code file – UniqueTransmissionOutagesConcat.py**

Separation of mapped constraints, mapped contingency, unmapped constraints, unmapped contingency and mapped both

**Code file – ConstraintContingencySeparation.py**

Mapped outages are verified using approximate string matching and a histogram is created to show verification results

**Code file – MappedOutagesVerification.py**

**Code file – MappedOutagesVerificationHistogram.py**

Above obtained sheet containing unmapped constraint data is used to perform approximate string matching between unmapped constraints and mapping document

**Code file – UnmappedConstraintsApproximateStringMatching.py**

Unmapped outage data is used to perform approximate string matching between unmapped outages and mapping document

**Code file – ApproximatematchingUnmappedTransmissionOutages.py**

Mapping of unmapped constraints is performed using approximate string-matching results

**Manual Process**

Mapping of unmapped constraints is performed using approximate string-matching results

**Manual Process**

A final file is created containing unique constraint-contingency pair which are mapped

**Code file – ConstraintContingencyFinal.py**

After the manual process unmapped and mapped outages are separated into different sheets of an excel file

**Code file – SeparationOfUnmappedTransmissionOutages.py**

Hourly constraint-contingency data is pulled from **Yes Energy (2014-2019)**

**Code file - Get\_Historical\_ConstraintData.py**

A final file (combining already mapped and newly mapped outages) consisting unique transmission outages data is created where mapped and unmapped outages are separated into different sheets

**Code file – TransmissionOutagesFinal.py**

A final file consisting of hourly constraint-contingency data is created which is mapped using the above mapping file.

Only mapped constraint-contingency pairs are stored in an excel sheet

**Code file – ConstraintContingencyList.py**

A super list consisting of hourly outage data (subset = outage and start date unique) is created which contains mapped outages of all years

**Code file – TransmissionOutagesList.py**

Above obtained excel file data is extracted and formed such a way that it matches the powerworld case file format

**Code file – ConstraintContingencyInterfaceCreation.py**

Result obtained from above step is used to define interface elements in powerworld case file which is stored after making changes to it.

**Code file – ConstraintContingencyInterfaceDefinitionPowerworld.py**

**Note – detailed description of all code files can be found in CodeFiles\_Documentation.docx**

Result of above step is used to create the training dataset

**Code file – TraningDatasetNewMethod.py**

Only mapped constraint-contingency pairs are stored in an excel sheet

**Code file – ConstraintContingencyList.py**

A super list consisting of hourly outage data (subset = outage and start date unique) is created which contains mapped outages of all years

**Code file – TransmissionOutagesList.py**

Dependent LODF calculation is performed taking constraint-contingency and transmission outage files.

**Code file – CalculationNewMethod.py**

Independent LODF calculation is performed taking constraint-contingency and transmission outage files.

**Code file – CalculationTrial.py**

Result of above step is used to create the training dataset

**Code file – TraningDatasetTrial.py**

Only mapped constraint-contingency pairs are stored in an excel sheet

**Code file – ConstraintContingencyList.py**

A super list consisting of hourly outage data (subset = outage and start date unique) is created which contains mapped outages of all years

**Code file – TransmissionOutagesList.py**