**Constraint Analyzer Project**

**Source code location:**

* **Location of all the files mentioned in this document:**
* **S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Code Files**

**Code files Description -**

**File Number – 1:**

* File Name – ConstraintContingencyUniquePairCreation.py
* Purpose – This file is created to extract unique constraint-contingency pair from historical constraint data
* Input File Used –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\Constraint Data\constraint14.xls, sheet\_name = ‘Sheet0’

(**Must read** - source of this file described in DataSource\_Documentation.doc file)

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\Constraint Data\constraint15.xls, sheet\_name = ‘Sheet0’

(**Must read** - source of this file described in DataSource\_Documentation.doc file)

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\Constraint Data\constraint16.xls, sheet\_name = ‘Sheet0’

(**Must read** - source of this file described in DataSource\_Documentation.doc file)

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\Constraint Data\constraint17.xls, sheet\_name = ‘Sheet0’

(**Must read** - source of this file described in DataSource\_Documentation.doc file)

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\Constraint Data\constraint18.xls, sheet\_name = ‘Sheet0’

(**Must read** - source of this file described in DataSource\_Documentation.doc file)

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\Constraint Data\constraint19.xls, sheet\_name = ‘Sheet0’

(**Must read** - source of this file described in DataSource\_Documentation.doc file)

* Output File Generated –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019.xlsx

(**Must read:** further changes are done in this file which are done manually and are described in DataSource\_Documentation.doc file)

**File Number – 2:**

* File name – ConstraintContingencyMapping.py
* Purpose – this file is created to format the constraint-contingency file such that ‘code’ column values are changed by removing all the special characters and similarly special characters are removed from auction mapping file’s ‘op\_eqode’ column as well to make the mapping easier i.e. the constraints can be mapped with their respective From Bus Number and To Bus Number.
* Input Files Used –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019.xlsx, sheet\_name= ‘Constraint-Contingency’ (**Must read:** pre-processing is required before giving it as input and the details of the same are given in DataSource\_Documentation.doc file)
2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019.xlsx, sheet\_name= ‘AuctionMapping2019SEP’

* Output File Generated –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019Changed.xlsx (**Must read:** further processing is done on this file which is described in the DataSource\_Documentation.doc file)

**File Number – 3:**

* File Name – ConstraintContingencySeparation.py
* Purpose – This file is created to separate the mapped constraints, mapped contingency, unmapped constraints, unmapped contingency and create a list of both mapped constraints and contingencies.
* Input File Used –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019Changed.xlsx, sheet\_name=’Constraint-Contingency’ (**Must read** -processing is required on this excel file before using it as input and the same is described in DataSource\_Documentation.doc file)

* Output File Generated –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019Separation.xlsx (**Must read:** further processing on this file which is done manually is described in DataSource\_Documentation.doc file)

**File Number – 4:**

* File name – UnmappedConstraintsApproximateStringMatching.py
* Purpose – this file is created to compare the columns of the unmapped constraints sheet which is obtained as an output by the above-mentioned code file with the mapping document of September 2019 using approximate string matching to check if constraints can be mapped.
* Input Files Used –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019Separation.xlsx, sheet\_name=’unmappedConstraints’ (**Must read:** some changes are made to this sheet and the details given in DataSource\_Documentation.doc file)
2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\Mapping Documents\2019.SEP.Monthly.Auction.MappingDocument.xlsx

* Output File Generated –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\UnmappedConstraintsApproximateStringMatching.xlsx (**Must read:** changes are made to this sheet manually and the details given in DataSource\_Documentation.doc file)

**File Number – 5:**

* File name – ConstraintContingencyFinal.py
* Purpose – this file is created to generate a final separated list of the mapped constraints, mapped contingency, unmapped constaints, unmapped contingency and also create a list of both mapped constraints and contingencies.
* Input Files Used –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019Separation.xlsx, sheet\_name = ‘mappedConstraints’
2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019Separation.xlsx, sheet\_name =’mappedBoth’
3. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019Separation.xlsx, sheet\_name = ‘mappedContingency’
4. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\uniquePairList2014-2019Separation.xlsx, sheet\_name = ‘unmappedContingency’
5. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\UnmappedConstraintsApproximateStringMatching.xlsx, sheet\_name = ‘All’

* Output File Generated –

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Constraint-Project\Data\UniqueConstraintContingencyPair\Constraint-ContingencyFinal.xlsx

**File number 1,2,3,4 and 5 should be executed in order to obtain results as output of one file is used as input of next file.**

**File Number – 3:**

* File name – TransmissionOutagesMapping.py
* Purpose – this file is created to format the transmission outages file (input file) such that all the duplicate facilities are removed and ‘to’ column values are changed by removing all special characters and similarly, special characters are removed from auction mapping file’s (another sheet of input file) ‘op\_eqcode’ column as well to make the mapping easier i.e. the transmission lines can then be mapped in PowerWorld with their respective From Bus Number and To Bus Number.
* First run: For the year 2014

Input File – 1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2014-01-01\_to\_2014-12-31.xlsx , sheet name – 2014 (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2014-01-01\_to\_2014-12-31.xlsx , sheet name – AuctionMapping2019JUL (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

Output File - S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2014.xlsx (**Must read:** further processing must be performed on this file which is explained in DataSource\_Documnetation.docx file)

* Second run: For the year 2015

Input File – 1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2015-01-01\_to\_2015-12-31.xlsx , sheet name – 2015 (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2015-01-01\_to\_2015-12-31.xlsx , sheet name – AuctionMapping2019JUL (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

Output File - S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2015.xlsx (**Must read:** further processing must be performed on this file which is explained in DataSource\_Documnetation.docx file)

* Third run: For the year 2016

Input File – 1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2016-01-01\_to\_2016-12-31.xlsx , sheet name – 2016 (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2016-01-01\_to\_2016-12-31.xlsx , sheet name – AuctionMapping2019JUL (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

Output File - S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2016.xlsx (**Must read:** further processing must be performed on this file which is explained in DataSource\_Documnetation.docx file)

* Fourth run: For the year 2017

Input File – 1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2017-01-01\_to\_2017-12-31.xlsx , sheet name – 2017 (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2017-01-01\_to\_2017-12-31.xlsx , sheet name – AuctionMapping2019JUL (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

Output File - S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2017.xlsx (**Must read:** further processing must be performed on this file which is explained in DataSource\_Documnetation.docx file)

* Fifth run: For the year 2018

Input File – 1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2018-01-01\_to\_2018-12-31.xlsx , sheet name – 2018 (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2018-01-01\_to\_2018-12-31.xlsx , sheet name – AuctionMapping2019JUL (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

Output File - S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2018.xlsx (**Must read:** further processing must be performed on this file which is explained in DataSource\_Documnetation.docx file)

* Sixth run: For the year 2019 (currently the code file reflects this run)

Input File – 1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2019-01-01\_to\_2019-12-31.xlsx , sheet name – 2019 (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\Outages + Constraint\ERCOT\_TransmissionOutage\_2019-01-01\_to\_2019-12-31.xlsx , sheet name – AuctionMapping2019JUL (**Must Read:** Preprocessing is required before giving it as input – how preprocessing is done is explained in DataSource\_Documnetation.docx file)

Output File - S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2019.xlsx (**Must read:** further processing must be performed on this file which is explained in DataSource\_Documnetation.docx file)

**File number – 4:**

* File name: UniqueTransmissionOutagesConcat.py
* Purpose: file is developed to create a super-list of transmission outages i.e. combine unique transmission outages of all years into one file which are mapped (data is only of line and transformer facilities)
* Input Files:

1. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2014.xlsx (**Must read:** final file with further processing done on it which is explained in DataSource\_Documentation.docx file)
2. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2015.xlsx (**Must read:** final file with further processing done on it which is explained in DataSource\_Documentation.docx file)
3. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2016.xlsx (**Must read:** final file with further processing done on it which is explained in DataSource\_Documentation.docx file)
4. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2017.xlsx (**Must read:** final file with further processing done on it which is explained in DataSource\_Documentation.docx file)
5. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2018.xlsx (**Must read:** final file with further processing done on it which is explained in DataSource\_Documentation.docx file)
6. S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2019.xlsx (**Must read:** final file with further processing done on it which is explained in DataSource\_Documentation.docx file)

* Output file: S:\asset ops\GO\_Group\Interns\2019\Anubha\Constraint Project\Data\UniqueTransmissionOutagesMapped2014-2019.xlsx where sheet1 consists of duplicate transmission outages which is renamed as ‘duplicate’ and sheet2 consist of unique transmission outages which is renamed as ‘unique’.

Approximate String Matching Code Files Documentation Remaining