

Project Card Creation Quickstart

In this notebook we will run through:

1. creating a highway project card from a cube log file
2. creating a transit project card from two cube line files

```
In [1]: import os
import sys

from lasso import Project
from lasso import CubeTransit
from network_wrangler import WranglerLogger
```

```
In [2]: %load_ext autoreload
%autoreload 2
```

```
In [3]: import logging
logger = logging.getLogger("WranglerLogger")
logger.handlers[0].stream = sys.stdout
# if you don't want to see so much detail, set to logging.INFO or DEBUG
logger.setLevel(logging.DEBUG)
```

```
In [4]: #set examples directory
EX_DIR = os.path.join(os.path.dirname(os.getcwd()), "examples")
EX_DIR
```

```
Out[4]: 'C:\\Users\\farmerdv\\Lasso\\examples'
```

Roadway Project Card

Roadway project cards are built by reading in a base network in the standard network format and then processing cube log files.

The log file information is stored in a dataframe called `roadway_changes`

The project card data is created when comparing log file to the base network and is stored in the variable `card_data`

```
In [5]: test_roadway_project = Project.create_project(  
        base_roadway_dir=os.path.join(EX_DIR, "Full Network Test"),  
        roadway_log_file=os.path.join(EX_DIR, "cube", "Test1_Bridge.log"),  
        )
```

```

2020-06-03 17:27:34, INFO: No base transit network.
2020-06-03 17:27:34, INFO: No transit changes given or processed.
2020-06-03 17:27:34, INFO: Reading logfile: C:\Users\farmerdv\Lasso\examples
\cube\Test1_Bridge.log
2020-06-03 17:27:34, INFO: Processed 6 Node lines and 1 Link lines
2020-06-03 17:27:34, INFO: Reading from following files:
-C:\Users\farmerdv\Lasso\examples\Full Network Test\link.json
-C:\Users\farmerdv\Lasso\examples\Full Network Test\node.geojson
-C:\Users\farmerdv\Lasso\examples\Full Network Test\shape.geojson.
2020-06-03 17:31:11, INFO: Read 34022220 links from C:\Users\farmerdv\Lasso\ex
amples\Full Network Test\link.json
2020-06-03 17:31:11, INFO: Read 4606498 nodes from C:\Users\farmerdv\Lasso\ex
amples\Full Network Test\node.geojson
2020-06-03 17:31:11, INFO: Read 5670370 shapes from C:\Users\farmerdv\Lasso\ex
amples\Full Network Test\shape.geojson
2020-06-03 17:41:46, INFO: Lasso base directory set as: C:\Users\farmerdv\Las
so
2020-06-03 17:41:46, INFO: Creating calculated roadway variables.
2020-06-03 17:41:46, INFO: Calculating Area Type from Spatial Data and adding
as roadway network variable: area_type
2020-06-03 17:41:56, DEBUG: Reading Area Type Shapefile C:\Users\farmerdv\Las
so\metcouncil_data\area_type\ThriveMSP2040CommunityDesignation.shp

c:\users\farmerdv\appdata\local\continuum\anaconda3\envs\lassoenv\lib\site-pa
ckages\geopandas\tools\sjoin.py:61: UserWarning: CRS of frames being joined d
oes not match!(+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs +type=crs !=
epsg:4326)
  "(%s != %s)" % (left_df.crs, right_df.crs)

2020-06-03 17:43:31, DEBUG: Area Type Codes Used: {23: 4, 24: 3, 25: 2, 35:
2, 36: 1, 41: 1, 51: 1, 52: 1, 53: 1, 60: 1}
2020-06-03 17:43:31, INFO: Finished Calculating Area Type from Spatial Data i
nto variable: area_type
2020-06-03 17:43:33, INFO: Adding roadway network variable for county using a
spatial join with: C:\Users\farmerdv\Lasso\metcouncil_data\county\cb_2017_us_
county_5m.shp

c:\users\farmerdv\appdata\local\continuum\anaconda3\envs\lassoenv\lib\site-pa
ckages\geopandas\tools\sjoin.py:61: UserWarning: CRS of frames being joined d
oes not match!(+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs +type=crs !=
epsg:4326)
  "(%s != %s)" % (left_df.crs, right_df.crs)

```

```

2020-06-03 17:44:48, INFO: Finished Calculating county variable: county
2020-06-03 17:44:50, INFO: Calculating Centroid Connector and adding as roadway network variable: centroidconnect
2020-06-03 17:44:50, DEBUG: Calculating Centroid Connectors using highest TAZ number: 3100
2020-06-03 17:44:50, INFO: Finished calculating centroid connector variable: centroidconnect
2020-06-03 17:44:50, INFO: Calculating MPO as roadway network variable: mpo
2020-06-03 17:44:50, DEBUG: MPO Counties: [,1,, ,3,, ,4,, ,5,, ,6,, ,7,, ,2,]
2020-06-03 17:44:50, INFO: Finished calculating MPO variable: mpo
2020-06-03 17:44:50, INFO: Calculating Assignment Group as network variable: assign_group
2020-06-03 17:44:50, DEBUG: Calculating Centroid Connectors
2020-06-03 17:44:50, INFO: Centroid Connector Variable 'centroidconnect' already in network. Returning without overwriting.
2020-06-03 17:44:50, DEBUG: Reading MRCC / Shared Streets Match CSV
2020-06-03 17:44:50, DEBUG: Reading MRCC Shapefile: C:\Users\farmerdv\Lasso\metcouncil_data\mrcc\trans_mrcc_centerlines.shp
2020-06-03 17:44:56, DEBUG: MRCC GDF Columns
Index(['LINK_ID', 'ROUTE_SYS', 'ST_CONCAT', 'geometry'], dtype='object')
2020-06-03 17:44:57, DEBUG: mrcc shst ref df columns
Index(['shstReferenceId', 'shstGeometryId', 'pp_link_id', 'score'], dtype='object')
2020-06-03 17:45:03, DEBUG: WiDOT GDF Columns
Index(['OBJECTID', 'WISLR_OVLY', 'SURF_TYCD', 'TRLNS_SURF', 'TRLNS_SU_1', 'LSHD_SURF_', 'LEFT_SHLD_', 'RSHD_SURF_', 'RGHT_SHLD_', 'RDWY_OWRST', 'RW_INDC', 'RW_WD', 'MEDN_TYCD', 'LEFT_CURB_', 'RGHT_CURB_', 'PRKG_TYCD', 'TRLNS_NB', 'WISLR_SFRT', 'SDWK_TYCD', 'HARST_TYCD', 'VARST_TYCD', 'RDWY_MAGMT', 'RDWY_MAG_1', 'LOC_WISLR_', 'RWCRT_MILG', 'RDWY_CTGY_', 'RDWY_SBCTG', 'AVG_DLY_TR', 'AVG_DLY_1', 'AVG_DLY_2', 'RDWY_ACS_T', 'FED_URLC_T', 'FEDUA_TYCD', 'FED_CLSN_T', 'FNCT_CLS_T', 'NHS_CLS_TY', 'NHS_RTE_NB', 'HPMS_SMPL_', 'HOV_LANE_T', 'PVMT_IRI_N', 'PVMT_IRI_Y', 'ST_LABL_NM', 'ST_PRMY_SY', 'RDWY_LINK_', 'SHC_NTWK_N', 'WISLR_PTY_', 'WISLR_PTY1', 'WISLR_CMTY', 'WISLR_CERT', 'DOT_CNTY_C', 'LOC_FLKOS_', 'LOC_TLKOS_', 'LINK_OVLY_', 'DIR_INDC', 'OPOS_RDWY_', 'INV_YR', 'LOC_WI_CMT', 'MEDN_WD_MS', 'RDWY_SBML_', 'RDWY_GTRST', 'RDWY_HTRST', 'RDWY_MNTNR', 'RDWY_OWNR_', 'RDWY_SLRST', 'RDWY_WDRST', 'RDWY_WTRST', 'RWCRT_PTY_', 'RDWY_CERT_', 'RWSR_SYS_T', 'RDWY_SURF_', 'CSTMS_SFRT', 'RDWY_RTG_D', 'CNTY_PRMY_', 'DSGND_TRK_', 'DSGND_TRK1', 'CTFR_INDC', 'FNCT_CLS_C', 'FNCT_CLS_G', 'HPMS_SMPL1', 'WISLR_PT_1', 'SEG_WISLR_', 'RWCRT_RTE_', 'ASGD_RTE_I', 'ASGD_RTE_S', 'SFRTG_TYCD', 'RTG_SURF_T', 'TRADS_ID', 'PA_WISLR_P', 'WISLR_PT_2', 'PMRC_TYCD', 'DOT_RGN_NB', 'FED_SFGRP_', 'TRMT_TYID', 'MNTC_TRMT_', 'MNTC_TRMT1', 'MNTC_TRM_1', 'SHAPE_Leng', 'geometry', 'LINK_ID'], dtype='object')
2020-06-03 17:45:15, DEBUG: widot shst ref df columns
2020-06-03 17:45:15, DEBUG: source ShSt rename_variables_for_dbf columns
Index(['shstReferenceId', 'shstGeometryId', 'pp_link_id', 'score'], dtype='object')
2020-06-03 17:45:15, DEBUG: source gdf columns
Index(['LINK_ID', 'ROUTE_SYS', 'ST_CONCAT', 'geometry'], dtype='object')
2020-06-03 17:45:27, DEBUG: source ShSt rename_variables_for_dbf columns
Index(['shstReferenceId', 'shstGeometryId', 'shstFromIntersectionId', 'shstToIntersectionId', 'gisReferenceId', 'gisGeometryId', 'gisTotalSegments', 'gisSegmentIndex', 'gisFromIntersectionId', 'gisToIntersectionId', 'startSideOfStreet', 'endSideOfStreet'],

```

```

    'sideOfStreet', 'score', 'matchType', 'pp_link_id', 'geometry'],
    dtype='object')
2020-06-03 17:45:27, DEBUG: source gdf columns
Index(['OBJECTID', 'WISLR_OVLY', 'SURF_TYCD', 'TRLNS_SURF', 'TRLNS_SU_1',
      'LSHD_SURF_', 'LEFT_SHLD_', 'RSHD_SURF_', 'RGHT_SHLD_', 'RDWY_OWRST',
      'RW_INDC', 'RW_WD', 'MEDN_TYCD', 'LEFT_CURB_', 'RGHT_CURB_',
      'PRKG_TYCD', 'TRLNS_NB', 'WISLR_SFRT', 'SDWK_TYCD', 'HARST_TYCD',
      'VARST_TYCD', 'RDWY_MAGMT', 'RDWY_MAG_1', 'LOC_WISLR_', 'RWCRT_MILG',
      'RDWY_CTGY_', 'RDWY_SBCTG', 'AVG_DLY_TR', 'AVG_DLY__1', 'AVG_DLY__2',
      'RDWY_ACS_T', 'FED_URLC_T', 'FEDUA_TYCD', 'FED_CLSN_T', 'FNCT_CLS_T',
      'NHS_CLS_TY', 'NHS_RTE_NB', 'HPMS_SMPL_', 'HOV_LANE_T', 'PVMT_IRI_N',
      'PVMT_IRI_Y', 'ST_LABL_NM', 'ST_PRMY_SY', 'RDWY_LINK_', 'SHC_NTWK_N',
      'WISLR_PTY_', 'WISLR_PTY1', 'WISLR_CMTY', 'WISLR_CERT', 'DOT_CNTY_C',
      'LOC_FLKOS_', 'LOC_TLKOS_', 'LINK_OVLY_', 'DIR_INDC', 'OPOS_RDWY_',
      'INV_YR', 'LOC_WI_CMT', 'MEDN_WD_MS', 'RDWY_SBML_', 'RDWY_GTRST',
      'RDWY_HTRST', 'RDWY_MNTNR', 'RDWY_OWNR_', 'RDWY_SLRST', 'RDWY_WDRST',
      'RDWY_WTRST', 'RWCRT_PTY_', 'RDWY_CERT_', 'RWSR_SYS_T', 'RDWY_SURF_',
      'CSTMS_SFRT', 'RDWY_RTG_D', 'CNTY_PRMY_', 'DSGND_TRK_', 'DSGND_TRK1',
      'CTFR_INDC', 'FNCT_CLS_C', 'FNCT_CLS_G', 'HPMS_SMPL1', 'WISLR_PT_1',
      'SEG_WISLR_', 'RWCRT_RTE_', 'ASGD_RTE_I', 'ASGD_RTE_S', 'SFRTG_TYCD',
      'RTG_SURF_T', 'TRADS_ID', 'PA_WISLR_P', 'WISLR_PT_2', 'PMRC_TYCD',
      'DOT_RGN_NB', 'FED_SFGRP_', 'TRMT_TYID', 'MNTC_TRMT_', 'MNTC_TRMT1',
      'MNTC_TRM_1', 'SHAPE_Leng', 'geometry', 'LINK_ID'],
      dtype='object')
2020-06-03 17:46:47, INFO: Finished calculating assignment group variable: as
sign_group
2020-06-03 17:46:48, INFO: Calculating Roadway Class
2020-06-03 17:46:51, INFO: Finished calculating roadway class variable: roadw
ay_class
2020-06-03 17:46:51, INFO: Adding Counts
2020-06-03 17:46:51, DEBUG: Adding MNDOT Counts using
- shst file: C:\Users\farmerdv\Lasso\metcouncil_data\count_mn\mn_count_ShSt_A
PI_match.csv
- shp file: AADT_mn
- as network variable: AADT
2020-06-03 17:46:51, INFO: Adding Variable AADT using Shared Streets Referenc
e from C:\Users\farmerdv\Lasso\metcouncil_data\count_mn\mn_count_ShSt_API_mat
ch.csv
2020-06-03 17:46:53, INFO: Added variable: AADT using Shared Streets Referenc
e
2020-06-03 17:46:54, DEBUG: Adding WiDot Counts using
- shst file: C:\Users\farmerdv\Lasso\metcouncil_data\Wisconsin_Lanes_Counts_M
edian\wi_count_ShSt_API_match.csv
- shp file: AADT_wi
- as network variable: AADT
2020-06-03 17:46:54, INFO: Adding Variable AADT using Shared Streets Referenc
e from C:\Users\farmerdv\Lasso\metcouncil_data\Wisconsin_Lanes_Counts_Median
\wi_count_ShSt_API_match.csv
2020-06-03 17:46:57, INFO: Added variable: AADT using Shared Streets Referenc
e

```

```
c:\users\farmerdv\lasso\lasso\roadway.py:933: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame.  
Try using .loc[row_indexer,col_indexer] = value instead
```

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
].astype(network_var_type)

```
2020-06-03 17:46:57, INFO: Finished adding counts variable: AADT  
2020-06-03 17:46:57, INFO: Finished creating ML lanes variable: ML_lanes  
2020-06-03 17:46:57, INFO: Finished creating hov corridor variable: segment_i  
d  
2020-06-03 17:46:57, INFO: Overwriting existing distance Variable 'distance'  
already in network  
2020-06-03 17:47:32, INFO: Calculating distance for centroid connectors  
2020-06-03 17:47:36, INFO: Filling nan for network from network wrangler  
2020-06-03 17:47:58, INFO: Converting variable type to MetCouncil standard  
2020-06-03 17:48:26, INFO: Lasso base directory set as: C:\Users\farmerdv\Las  
so  
2020-06-03 17:48:26, INFO: Evaluating compatibility between roadway network c  
hanges and base network. Not evaluating deletions.  
2020-06-03 17:48:29, INFO: Evaluating project changes.  
2020-06-03 17:48:29, DEBUG: Processing link deletions
```

```

-----
KeyError                                Traceback (most recent call last)
c:\users\farmerdv\appdata\local\continuum\anaconda3\envs\lassoenv\lib\site-pa
ckages\pandas\core\indexes\base.py in get_loc(self, key, method, tolerance)
    2896             try:
-> 2897                 return self._engine.get_loc(key)
    2898             except KeyError:

pandas/_libs/index.pyx in pandas._libs.index.IndexEngine.get_loc()

pandas/_libs/index.pyx in pandas._libs.index.IndexEngine.get_loc()

pandas/_libs/hashtable_class_helper.pxi in pandas._libs.hashtable.PyObjectHas
htable.get_item()

pandas/_libs/hashtable_class_helper.pxi in pandas._libs.hashtable.PyObjectHas
htable.get_item()

```

KeyError: 'model_link_id'

During handling of the above exception, another exception occurred:

```

KeyError                                Traceback (most recent call last)
<ipython-input-5-5835dd80c02d> in <module>
      1 test_roadway_project = Project.create_project(
      2     base_roadway_dir=os.path.join(EX_DIR, "Full Network Test"),
----> 3     roadway_log_file=os.path.join(EX_DIR, "cube", "Test1_Bridge.lo
      4     g"),
      5 )

c:\users\farmerdv\lasso\lasso\project.py in create_project(roadway_log_file,
roadway_shp_file, roadway_csv_file, base_roadway_dir, base_transit_source, b
uild_transit_source, roadway_changes, transit_changes, base_roadway_network,
base_transit_network, build_transit_network, project_name, parameters)
    247     evaluate=True,
    248     project_name=project_name,
--> 249     parameters=parameters,
    250 )
    251

c:\users\farmerdv\lasso\lasso\project.py in __init__(self, roadway_changes, t
ransit_changes, base_roadway_network, base_transit_network, build_transit_net
work, project_name, evaluate, parameters)
     90
     91     if evaluate:
----> 92         self.evaluate_changes()
     93
     94     def write_project_card(self, filename):

c:\users\farmerdv\lasso\lasso\project.py in evaluate_changes(self)
    365
    366     if not self.roadway_changes.empty:
--> 367         highway_change_list = self.add_highway_changes()
    368
    369     if (self.transit_changes is not None) or (

```

```

c:\users\farmerdv\lasso\lasso\project.py in add_highway_changes(self, limit_v

```

```

variables_to_existing_network)
    472         cube_delete_df = link_changes_df[link_changes_df.OPERATION_fi
nal == "D"]
    473         if cube_delete_df.shape[1] > 0:
--> 474             links_to_delete = cube_delete_df["model_link_id"].tolist(
)
    475             delete_link_dict = {
    476                 "category": "Roadway Deletion",

c:\users\farmerdv\appdata\local\continuum\anaconda3\envs\lassoenv\lib\site-pa
ckages\pandas\core\frame.py in __getitem__(self, key)
    2993         if self.columns.nlevels > 1:
    2994             return self._getitem_multilevel(key)
-> 2995         indexer = self.columns.get_loc(key)
    2996         if is_integer(indexer):
    2997             indexer = [indexer]

c:\users\farmerdv\appdata\local\continuum\anaconda3\envs\lassoenv\lib\site-pa
ckages\pandas\core\indexes\base.py in get_loc(self, key, method, tolerance)
    2897         return self._engine.get_loc(key)
    2898         except KeyError:
-> 2899             return self._engine.get_loc(self._maybe_cast_indexer(
key))
    2900         indexer = self.get_indexer([key], method=method, tolerance=to
lerance)
    2901         if indexer.ndim > 1 or indexer.size > 1:

pandas/_libs/index.pyx in pandas._libs.index.IndexEngine.get_loc()

pandas/_libs/index.pyx in pandas._libs.index.IndexEngine.get_loc()

pandas/_libs/hashtable_class_helper.pxi in pandas._libs.hashtable.PyObjectHas
htable.get_item()

pandas/_libs/hashtable_class_helper.pxi in pandas._libs.hashtable.PyObjectHas
htable.get_item()

KeyError: 'model_link_id'

```