

# Transform

Opens and combines [annual H2A visa disclosure data files](https://www.foreignlaborcert.doleta.gov/performance/data.cfm) (<https://www.foreignlaborcert.doleta.gov/performance/data.cfm>) from the Office of Foreign Labor Certification at the United States Department of Labor.

```
In [1]: import os
import pandas as pd
```

```
In [2]: import warnings
warnings.filterwarnings("ignore")
```

```
In [53]: input_dir = os.path.join(os.getcwd(), 'input')
output_dir = os.path.join(os.getcwd(), 'output')
```

```
In [54]: %%capture
os.path.exists(input_dir) or os.makedirs(input_dir)
os.path.exists(output_dir) or os.makedirs(output_dir)
```

A crosswalk that standardizes the headers from each year's file to a common schema

```
In [55]: schema = {
    2008: dict(
        case_number="CASE_NO",
        case_status="CASE_STATUS",
        workers_certified="NBR_WORKERS_CERTIFIED",
        employer="EMPLOYER_NAME",
        city="ALIEN_WORK_CITY",
        state="ALIEN_WORK_STATE",
        job_title="JOB_TITLE",
        certification_start_date="CERTIFICATION_BEGIN_DATE",
    ),
    2009: dict(
        case_number="CASE_NO",
        case_status="CASE_STATUS",
        workers_certified="NBR_WORKERS_CERTIFIED",
        employer="EMPLOYER_NAME",
        city="ALIEN_WORK_CITY",
        state="ALIEN_WORK_STATE",
        job_title="JOB_TITLE",
        certification_start_date="CERTIFICATION_BEGIN_DATE",
    ),
    2010: dict(
        case_number="CASE_NO",
        case_status="CASE_STATUS",
        workers_certified="NBR_WORKERS_CERTIFIED",
        employer="EMPLOYER_NAME",
        city="ALIEN_WORK_CITY",
        state="ALIEN_WORK_STATE",
        job_title="JOB_TITLE",
        certification_start_date="CERTIFICATION_BEGIN_DATE",
    ),
    2011: dict(
        case_number="CASE_NO",
        case_status="CASE_STATUS",
        workers_certified="NBR_WORKERS_CERTIFIED",
        employer="EMPLOYER_NAME",
        city="ALIEN_WORK_CITY",
        state="ALIEN_WORK_STATE",
        crop="PRIMARY_CROP",
        job_title="JOB_TITLE",
        certification_start_date="CERTIFICATION_BEGIN_DATE",
    ),
    2012: dict(
        case_number="CASE_NO",
        case_status="CASE_STATUS",
        workers_certified="NBR_WORKERS_CERTIFIED",
        employer="EMPLOYER_NAME",
        city="ALIEN_WORK_CITY",
        state="ALIEN_WORK_STATE",
        crop="PRIMARY_CROP",
        job_title="JOB_TITLE",
        certification_start_date="CERTIFICATION_BEGIN_DATE",
    ),
    2013: dict(
        case_number="CASE_NO",
```

```
case_status="CASE_STATUS",
workers_certified="NBR_WORKERS_CERTIFIED",
employer="EMPLOYER_NAME",
city="ALIEN_WORK_CITY",
state="ALIEN_WORK_STATE",
job_title="JOB_TITLE",
certification_start_date="CERTIFICATION_BEGIN_DATE",
),
2014: dict(
    case_number="CASE_NO",
    case_status="CASE_STATUS",
    workers_certified="NBR_WORKERS_CERTIFIED",
    employer="EMPLOYER_NAME",
    city="WORKSITE_LOCATION_CITY",
    state="WORKSITE_LOCATION_STATE",
    job_title="JOB_TITLE",
    certification_start_date="CERTIFICATION_BEGIN_DATE",
),
2015: dict(
    case_number="CASE_NUMBER",
    case_status="CASE_STATUS",
    workers_certified="NBR_WORKERS_CERTIFIED",
    employer="EMPLOYER_NAME",
    city="WORKSITE_CITY",
    state="WORKSITE_STATE",
    crop="PRIMARY_CROP",
    job_title="JOB_TITLE",
    certification_start_date="CERTIFICATION_BEGIN_DATE",
),
2016: dict(
    case_number="CASE_NUMBER",
    case_status="CASE_STATUS",
    workers_certified="NBR_WORKERS_CERTIFIED",
    employer="EMPLOYER_NAME",
    city="WORKSITE_CITY",
    state="WORKSITE_STATE",
    crop="PRIMARY_CROP",
    job_title="JOB_TITLE",
    certification_start_date="CERTIFICATION_BEGIN_DATE",
),
2017: dict(
    case_number="CASE_NUMBER",
    case_status="CASE_STATUS",
    workers_certified="NBR_WORKERS_CERTIFIED",
    employer="EMPLOYER_NAME",
    city="WORKSITE_CITY",
    state="WORKSITE_STATE",
    crop="PRIMARY_CROP",
    job_title="JOB_TITLE",
    certification_start_date="CERTIFICATION_BEGIN_DATE",
),
}
```

```

In [56]: def transform_xls(year):
        """
        Transforms the H2A visa data from the provided year.

        Returns it cleaned up, deduped and standardized for consolidation with other years.
        """
        print("Transforming {} data".format(year))

        # Open the raw file
        input_path = os.path.join(
            input_dir,
            "{}.xlsx".format(year)
        )
        df = pd.read_excel(input_path)

        # Pull the schema for this year
        s = schema[year]

        # Reverse the schema and standardize the column names
        i = {v: k for k, v in s.iteritems()}
        df = df.rename(columns=i)

        # Trim down to just the columns we want to keep
        trimmed = df[s.keys()]

        # Add the fiscal year from the file name
        trimmed['fiscal_year'] = year

        # Add a column with the calendar year where the jobs were certified
        trimmed.certification_start_date = pd.to_datetime(trimmed.certification_start_date)
        trimmed['certification_start_year'] = trimmed.apply(lambda x: x.certification_start_date.year, axis=1)

        # Trim applications from outside the time range we want to analyze
        trimmed = trimmed[
            (trimmed.certification_start_year > 2007) &
            (trimmed.certification_start_year < 2018)
        ]

        # Add incremental id
        trimmed['row_number'] = range(len(trimmed))

        # Combine that with the fiscal year into a unique id
        trimmed['latimes_id'] = trimmed.apply(lambda x: "{}-{}".format(x.fiscal_year, x.row_number), axis=1)

        # A little clean up on numbers
        trimmed.workers_certified.fillna(0, inplace=True)
        trimmed.workers_certified = trimmed.workers_certified.astype(int)

        # Drop duplicate case records, as prescribed by the DOL.
        ## They say, "When analyzing H-2A program use, it is recommended to
        ## use the total number of workers certified (NBR_WORKERS_CERTIFIED)
        ## listed on the "master" record (i.e., the first employer record

```

```

## listed in the series of duplicate case numbers), which
## represents the total unique number of workers certified for
## the entire H-2A application, including all of the "sub" employer record
s.

# HOWEVER! Close examination of the data shows that we cannot depend on the
master
# master record coming first in the spreadsheets.

# On the advice of the DOL, we will resort the data so that the record
# with the maximum workers certified comes first and will then infer
# that it must be the parent record.
dupes = trimmed.groupby("case_number").filter(lambda x: len(x) > 1).sort_values(
    ["case_number", "workers_certified"],
    ascending=[True, False]
)
master_cases = dupes.drop_duplicates("case_number", keep="first")
master_cases['master_case'] = True
sub_cases = dupes[~dupes['latimes_id'].isin(master_cases.latimes_id)]
deduped = trimmed[~trimmed.case_number.isin(dupes.case_number)]
deduped['master_case'] = False
deduped = deduped.append(master_cases)

# Filter it down to only those applications that were approved
approved_status_list = [
    'DETERMINATION ISSUED - CERTIFICATION',
    'DETERMINATION ISSUED - PARTIAL CERTIFICATION',
    'Certified - Full',
    'Certified - Partial',
    # According to interview with a DOL official,
    # the expired certifications should be included.
    # They are only marked that way due to a bookkeeping error
    # when the records are pulled for public disclosure.
    'DETERMINATION ISSUED - CERTIFICATION EXPIRED',
    'DETERMINATION ISSUED - PARTIAL CERTIFICATION EXPIRED',
]
certified = deduped[deduped.case_status.isin(approved_status_list)]
sub_cases = sub_cases[sub_cases.case_status.isin(approved_status_list)]

# Pass the DataFrames back
return certified, sub_cases

```

Process all the annual files

```
In [57]: master_list, sub_list = zip(*[transform_xls(y) for y in sorted(schema.keys())])
```

```
Transforming 2008 data  
Transforming 2009 data  
Transforming 2010 data  
Transforming 2011 data  
Transforming 2012 data  
Transforming 2013 data  
Transforming 2014 data  
Transforming 2015 data  
Transforming 2016 data  
Transforming 2017 data
```

Merge all the dataframes into big ones

```
In [58]: master_df = pd.concat(master_list)
```

```
In [59]: sub_df = pd.concat(sub_list)
```

Filter out any case number that appear in multiple years

```
In [60]: master_df.sort_values(  
    ["case_number", "fiscal_year"],  
    ascending=[True, False]  
).drop_duplicates("case_number", keep="first", inplace=True)
```

Standardize common variations on crop names

```

In [61]: clean_dict = {
    'Ag Eq Operator': 'Agricultural Equipment Operators',
    'Ag Eqp Operator;': 'Agricultural Equipment Operators',
    'Ag Equip Oper': 'Agricultural Equipment Operators',
    'Ag Equipment Operator': 'Agricultural Equipment Operators',
    'Ag equip operator': 'Agricultural Equipment Operators',
    'Agricultural Equipment Operator': 'Agricultural Equipment Operators',
    'Air Cured': 'Tobacco',
    'Apple Drops': 'Apples',
    'Asian Pears': 'Pears',
    'Bartlett Pears': 'Pears',
    'Bell Peppers': 'Peppers',
    'Dwarf Apples': 'Apples',
    'Romaine': 'Lettuce',
    'Spinich': 'Lettuce',
    'Spinach': 'Lettuce',
    'Onion': 'Onions',
    'Romaine Lettuce': 'Lettuce',
    'Iceburg Lettuce': 'Lettuce',
    'sheep': 'Sheep',
    'Vineyards': 'Grapes',
    'Iceburg Lettuce': 'Lettuce',
    'Harvest Strawberries': 'Strawberries',
    'Vidalia Onions': 'Onion',
    'Nursery': 'Nursery or greenhouse',
    'Nursery Work': 'Nursery or greenhouse',
    'Greenhouses': 'Nursery or greenhouse',
    'Nurseries & Greenhouses': 'Nursery or greenhouse',
    'Nursery and Greenhouse Worker': 'Nursery or greenhouse',
    'Nursery and Greenhouse Workers': 'Nursery or greenhouse',
    'Purple Hull Peas': 'Other crops',
    'Sugercane': 'Sugarcane',
    'Sugar Cane': 'Sugarcane',
    'Sugarcane': 'Sugarcane',
    'Sugar Beets': 'Beets',
    'Sweet Onions': 'Onions',
    'Sweet Peppers': 'Peppers',
    'Valencia Oranges': 'Oranges',
    'Watermelon': 'Watermelons',
    'Yellow Cherries': 'Cherries',
    'Jalapeno Peppers': 'Peppers',
    'Chile Peppers': 'Peppers',
    'Kale': 'Lettuce',
    'Construction of Livestock buildings': 'Construction of Livestock Building
s',
    'Construction of Livestock Buildings': 'Construction of Livestock Building
s',
    'Construction, Livestock Building': 'Construction of Livestock Buildings',
    'Construction of Livestock Buildings': 'Construction of Livestock Buildin
gs',
    'Construction of livestock buildings.': 'Construction of Livestock Buildin
gs',
    'Construction of livestocks buildings': 'Construction of Livestock Buildin
gs',
    'Constructionof Livestock Buildings': 'Construction of Livestock Building
s',

```

```

'Consturcition of Livestock Buildings': 'Construction of Livestock Buildin
gs',
'Construction Livestock Buildings': 'Construction of Livestock Buildings',
'Custom Combine ': 'Custom Combine',
'Chili Peppers': "Peppers",
'Flue Cured': "Tobacco",
'HARVEST, GATHER, COUNT AND PACKAGE;WATERMELON': "Watermelosn",
'Hand harvest peaches': "Peaches",
'Harvest Corn': "Corn",
'Harvesting Citrus and other fruits': "Citrus",
'Harvesting Watermelons': "Watermelons",
'Hay And Straw': "Hay",
'Hay/Straw': "Hay",
'Open range cattle': "Cattle",
'ALL PRODUCITON OF HANDLING SMALL BLAES OF HAY': "Hay",
'Grapes Harvest': "Grapes",
'Veneyards': "Grapes",
'Grass Hay': "Hay",
'Hay & Straw': "Hay",
'Straw': "Hay",
'Straw/Hay': "Hay",
'Straw': "Hay",
'Straw': "Hay",
'Custom Harvester Wheat, corn, small grain': "Wheat",
'OPEN RANGE CATTLE': "Cattle",
'Wathermelon Unloaders and Watermelon Packing': "Watermelons",
'Apple': "Apples",
'Apple Harvest': "Apples",
'Detassel Corn': "Corn",
'Detasseling Corn': "Corn",
'Calves': "Cattle",
'Calving': "Cattle",
'Cattle Herder': "Cattle",
'Cattle Worker': "Cattle",
'TOBACCO': "Tobacco",
'Tobacco - Topping & Oiling': "Tobacco",
'Tobacco -Setting': "Tobacco",
'Tobbaco': "Tobacco",
'Sweet Corn': "Corn",
'Sweet corn, harvest': "Corn",
'Watermelosn': "Watermelons",
'Stripping Tobacco': "Tobacco",
'Farm worker': "Other",
'General Farmworker': "Other",
'Grain': "Grains",
'Nursery Stock': "Nursery or greenhouse",
'Shepherdher': "Sheep",
'Farm Worker': "Other",
'Sheep Shearer': "Sheep",
}

```

```

In [62]: master_df['latimes_crop'] = master_df.apply(lambda x: clean_dict.get(x.crop, x
.crop), axis=1)

```



```
In [63]: sub_df['latimes_crop'] = sub_df.apply(lambda x: clean_dict.get(x.crop, x.crop), axis=1)
```

Create a combined file that merges master and sub cases.

First, sum up the total number of workers certified for subcases of each case number

```
In [64]: subcase_workers = sub_df.groupby("case_number").agg(dict(workers_certified="sum")).reset_index()
```

```
In [65]: subcase_workers.columns = ['case_number', 'workers_subcases']
```

Merge that number to the master list for comparison

```
In [66]: combined_df = pd.merge(
    master_df,
    subcase_workers,
    how="left",
    on="case_number"
)
```

Append all subcases with case numbers that appear in the master list to the combined list

```
In [67]: linked_subcases = sub_df[sub_df.case_number.isin(combined_df.case_number)]
```

```
In [68]: linked_subcases['sub_case'] = True
```

```
In [69]: combined_df = combined_df.append(linked_subcases)
```

Zero out the subcases worker count where it is empty

```
In [70]: combined_df.workers_subcases.fillna(0, inplace=True)
```

Calculate a net worker count by subtracting the subcase count from the total. This prevents double counting subcase positions included in master cases.

```
In [71]: combined_df['net_workers'] = combined_df.apply(
    lambda x: x.workers_certified - x.workers_subcases,
    axis=1
)
```

Drop master cases with zero workers after subtracting their subcases

```
In [72]: net_df = combined_df[combined_df.net_workers > 0]
```

Write out the transformed files for analysis

```
In [73]: master_df.to_csv(  
    os.path.join(output_dir, "transformed_master_cases.csv"),  
    index=False,  
    encoding="utf-8"  
)
```

```
In [74]: sub_df.to_csv(  
    os.path.join(output_dir, "transformed_sub_cases.csv"),  
    index=False,  
    encoding="utf-8"  
)
```

```
In [75]: net_df.to_csv(  
    os.path.join(output_dir, "transformed_all_cases.csv"),  
    index=False,  
    encoding="utf-8"  
)
```