Pandas Datetime

Learning Objectives

After this lesson, you will be able to:

- Handle timeseries data in Pandas
- Convert dates and times into a Timestamp object using `to_datetime`
- Specify input and output format arguments
- Extract components, such as year and day, from a `Timestamp` object
- Create `DatetimeIndex` objects, and understand their advantages
- Implement `groupby` statements for specific segmented analysis
- Use apply functions to clean data with Pandas

To the Notebook!

We will actually commence this lesson directly in the Jupyter Notebook, `pandas-datetime.ipynb`, to walk through the what, why, and how all at once.

Here we have slides reviewing the key concepts.

How Do We Handle Timeseries Data (Dates and Times)?

To handle timeseries data, we must:

- Import the data (usually as a string)
- Convert the data into a `Timestamp` object
- Handle missing values (sometimes)
- Understand how to slice and handle this `Timestamp` object

Pro tip: Timeseries information is very common in the financial industry (fintech/trading, etc).

A Note on Delivery

- This unit's lessons will occur in jupyter notebooks
  - The slides will be an introduction to the lesson (no code, just overview)
  - Then, we'll open a notebook and start coding!

Why use Timeseries Data?

Timestamp objects in pandas allow us to conduct analysis on *chronological data*.

- What's the X axis unit of this chart?
- What's the ordering of the data?

Key Pandas Function for Converting to Timestamp Objects:

```
Signature: pd.to_datetime(arg, errors='raise', dayfirst=False, yearfirst=Fal

Docstring:

Convert argument to datetime.
```

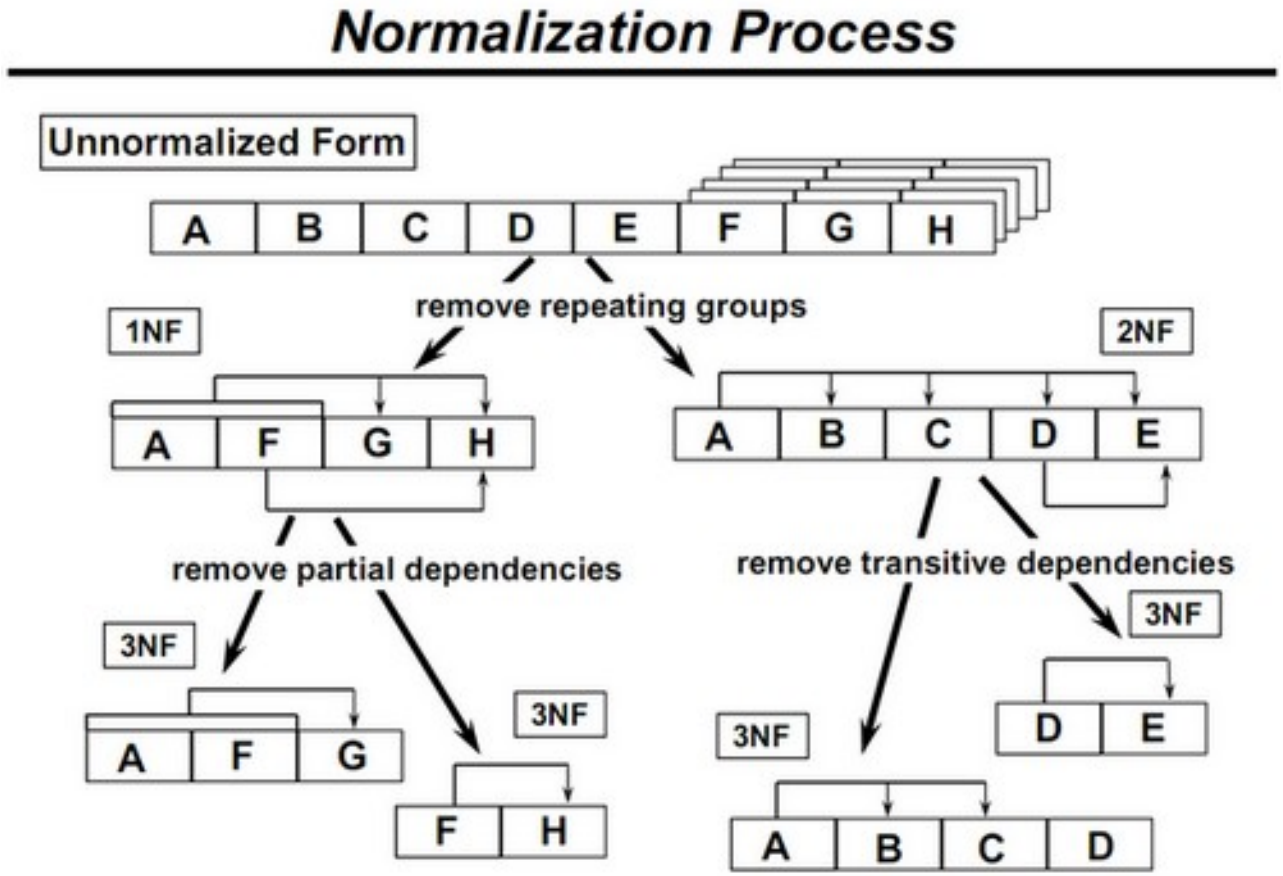
1. Read in the dataset using `pd.read_csv()`
2. Use `pd.to_datetime(df['myColumn'])`
3. The returned `pd.Series` object will be converted to a Timestamp object!

Things to Look Out For

`to_datetime` allows us to convert from string values to datetime values.

- Most of the time, it works very nicely
- At the end of the day, it's just a string parser
- Keep this in mind - always check the output column for `NaT` values
    - These are values that `pd.to_datetime` isn't able to convert
    - Make sure you have elegant, automated ways of handling/flagging these scenarios
    - One example may be a separate column flag, and a backfill/forwardfill strategy

Why Does This Matter?



- Storing datetime information in a database (dataframe) as a string:
  - is very space inefficient
  - doesn't allow us to easily *extract* information from it (see 3NF image above)
  - doesn't allow us to use linear algebra library (numpy!) advantages
    - *Note*: Timestamp (datetime) pandas objects are numpy objects!

Additional Resources

- Pandas documentation
- DataSchool 30-video series (by a former GA instructor!)