Numpy, Pandas, and Scikit-Learn

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LearnQuest

Why Use Pandas and Numpy?

1. Already written code for data science (Python libraries)
2. Faster data wrangling and analysis! (Written mostly in C)

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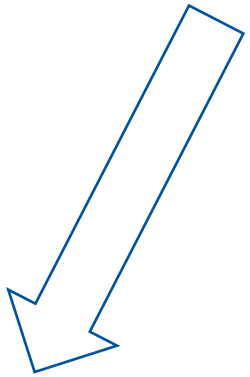

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```
pd.read_csv('orders.csv').groupby('Order Date').sum().to_csv('grouped_orders.csv')
```

A Tale of Two Matrices

Numpy

- **Type:** Mathematical Matrices (only numbers)
- **Main structure:** Arrays – similar to Excel with just numbers
- **Use Cases:** Matrix to a 5^{th} power, random numbers, number ranges, missing values, list conversions, linear algebraic calculations
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Pandas

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```
array([[0.8249888 , 0.24979155, 0.79719817, 0.0035682 , 0.00815663],
       [0.59428351, 0.5941183 , 0.63903329, 0.68025011, 0.69124751],
       [0.97160135, 0.75746315, 0.81417836, 0.2592979 , 0.51379441],
       [0.45281654, 0.49509363, 0.40326315, 0.11308091, 0.78175295],
       [0.61679325, 0.35484431, 0.34741814, 0.66497307, 0.06190098],
       [0.80918979, 0.19280099, 0.79689589, 0.36151733, 0.67275732],
       [0.22898206, 0.96506853, 0.9395566 , 0.83567071, 0.90740995],
       [0.5153297 , 0.73086199, 0.62606757, 0.20651277, 0.3589751 ],
       [0.83653033, 0.758272  , 0.35327387, 0.26504777, 0.37401509],
       [0.20079886, 0.25584164, 0.20877105, 0.37039681, 0.29956502],
       [0.37167533, 0.93510168, 0.77947436, 0.71571247, 0.40358436],
       [0.10809994, 0.54756469, 0.7417065 , 0.25672907, 0.0192784 ],
       [0.88182689, 0.66561254, 0.99875671, 0.42072552, 0.38811864],
       [0.12863145, 0.11459206, 0.20615946, 0.04105515, 0.03424916],
       [0.77313463, 0.59808671, 0.2568987 , 0.45116242, 0.75258347],
       [0.5283624 , 0.37202166, 0.83716868, 0.15319497, 0.13126105],
       [0.98516634, 0.28416098, 0.98175643, 0.98217529, 0.34898673],
       [0.15650063, 0.40911476, 0.63216031, 0.4845381 , 0.34404839],
       [0.25099388, 0.84347889, 0.95057475, 0.26486295, 0.22221181],
       [0.59412643, 0.58056145, 0.3299675 , 0.46726547, 0.35558934]])
```

20 x 5 Numpy array

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	Order ID	Order Date	Product ID	Destination Port	Unit quantity	Weight
0	1.447296e+09	2019-12-31	1700106	PORT09	808	14.30
1	1.447158e+09	2019-12-31	1700106	PORT09	3188	87.94
2	1.447139e+09	2019-12-31	1700106	PORT09	2331	61.20
3	1.447364e+09	2019-12-31	1700106	PORT09	847	16.16
4	1.447364e+09	2019-12-31	1700106	PORT09	2163	52.34

Pandas Dataframe

Introduction to Scikit-learn

Scikit-learn

- Machine learning library Built on top of NumPy library (and others)
- Data Preprocessing: Feature Extraction, Normalization
- Supervised Learning: Regression, Classification, Neural Networks
- Unsupervised Learning: Clustering, Dimensionality Reduction

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Typical Workflow

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2) Transform Data

3) Apply Model

4) Analyze results

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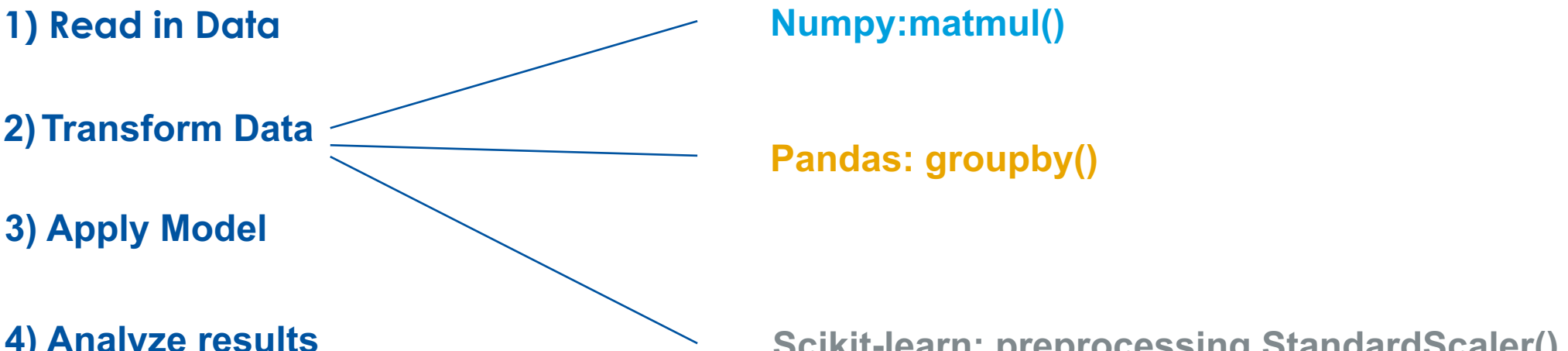

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