Foundations of Data Science Lecture 2, Module 1

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CS6053

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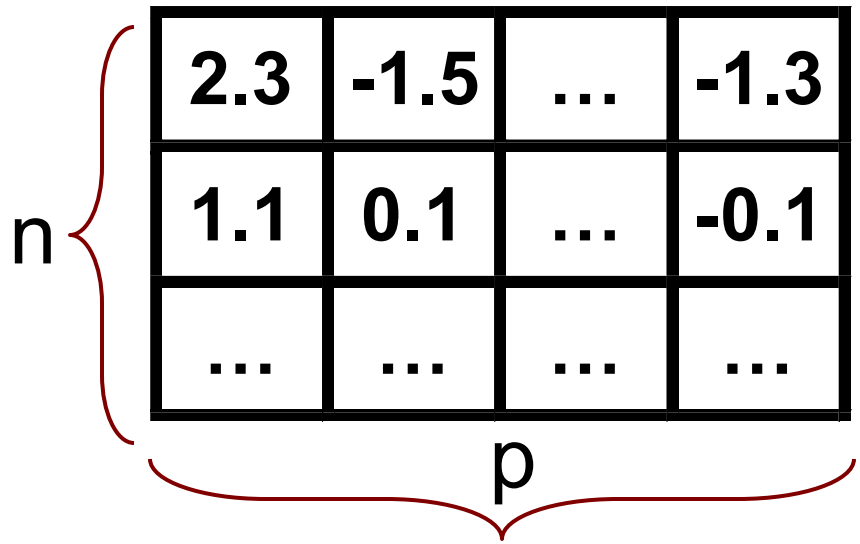
Last Time

- What is Data Science?
- Data Handling
- Doing Data Science
- Statistics Review
- Polling YOU
- About the course
- Assignment 1

Today

- Types of Data
- Data cleaning, sampling, processing
- Python: Pandas
- Assignment 2 out

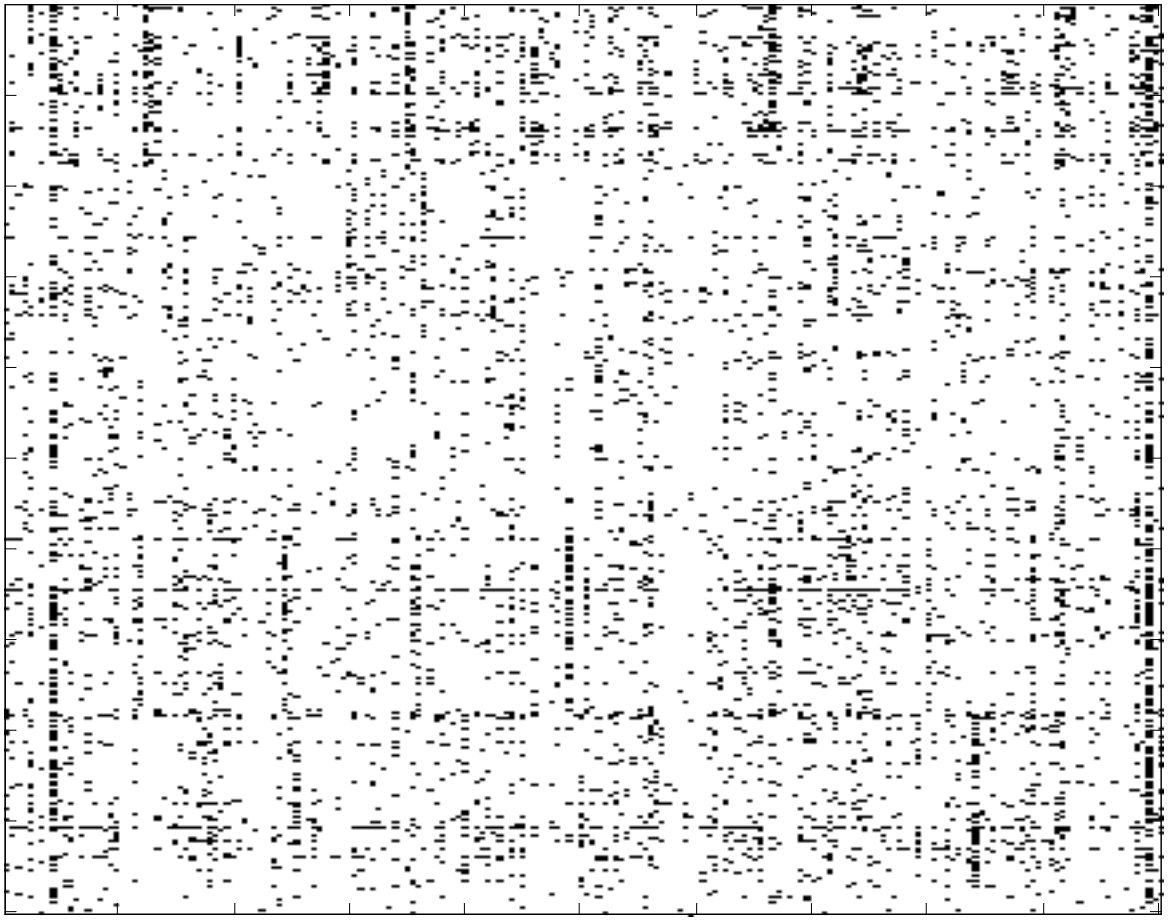
Types of Data: Flat File Data



- Rows = objects/observations
- Columns = measurements on objects (variables)
- Both n and p can be very large in data mining (also p>>n)
- Matrix can be quite sparse

Types of Data: Text Data

Can be represented as a sparse matrix



Text Documents

Word ID

Types of Data: Transactional Data

Date stamped events (logs, phone calls):

128.195.36.195, -, 3/22/00, 10:35:11, W3SVC, SRVR1, 128.200.39.181, 781, 363, 875, 200, 0, GET, /top.html, -,
128.195.36.195, -, 3/22/00, 10:35:16, W3SVC, SRVR1, 128.200.39.181, 5288, 524, 414, 200, 0, POST, /spt/main.html, -,
128.195.36.195, -, 3/22/00, 10:35:17, W3SVC, SRVR1, 128.200.39.181, 30, 280, 111, 404, 3, GET, /spt/images/bk1.jpg, -,
128.195.36.101, -, 3/22/00, 16:18:50, W3SVC, SRVR1, 128.200.39.181, 60, 425, 72, 304, 0, GET, /top.html, -,
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128.200.39.17, -, 3/22/00, 20:54:55, W3SVC, SRVR1, 128.200.39.181, 17766, 365, 414, 200, 0, POST, /spt/main.html, -,
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128.200.39.17, -, 3/22/00, 20:55:07, W3SVC, SRVR1, 128.200.39.181, 0, 258, 111, 404, 3, GET, /spt/images/bk1.jpg, -,
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128.200.39.17, -, 3/22/00, 20:55:36, W3SVC, SRVR1, 128.200.39.181, 0, 258, 111, 404, 3, GET, /spt/images/bk1.jpg, -,
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128.200.39.17, -, 3/22/00, 20:56:33, W3SVC, SRVR1, 128.200.39.181, 0, 262, 72, 304, 0, GET, /top.html, -,
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Can be represented as a time series:

User 1	2	3	2	2	3	3	3	1	1	1	3	1	3	3	3	3
User 2	3	3	3	1	1	1										
User 3	7	7	7	7	7	7	7	7								
User 4	1	5	1	1	1	5	1	5	1	1	1	1	1	1		
User 5	5	1	1	5												
…	…															

Types of Data: Relational Data

128.200.39.17, -, 3/22/00, 20:55:07, W3SVC, SRVR1, 128.200.39.181, 0, 258, 111, 404, 3, GET, /spt/images/bk1.jpg, -,
128.200.39.17, -, 3/22/00, 20:55:36, W3SVC, SRVR1, 128.200.39.181, 1061, 382, 414, 200, 0, POST, /spt/main.html, -,
128.200.39.17, -, 3/22/00, 20:55:36, W3SVC, SRVR1, 128.200.39.181, 0, 258, 111, 404, 3, GET, /spt/images/bk1.jpg, -,
128.195.36.195, -, 3/22/00, 10:35:11, W3SVC, SRVR1, 128.200.39.181, 781, 363, 875, 200, 0, GET, /top.html, -,
128.195.36.195, -, 3/22/00, 10:35:16, W3SVC, SRVR1, 128.200.39.181, 5288, 524, 414, 200, 0, POST, /spt/main.html, -,
128.195.36.195, -, 3/22/00, 10:35:17, W3SVC, SRVR1, 128.200.39.181, 30, 280, 111, 404, 3, GET, /spt/images/bk1.jpg, -,
…,

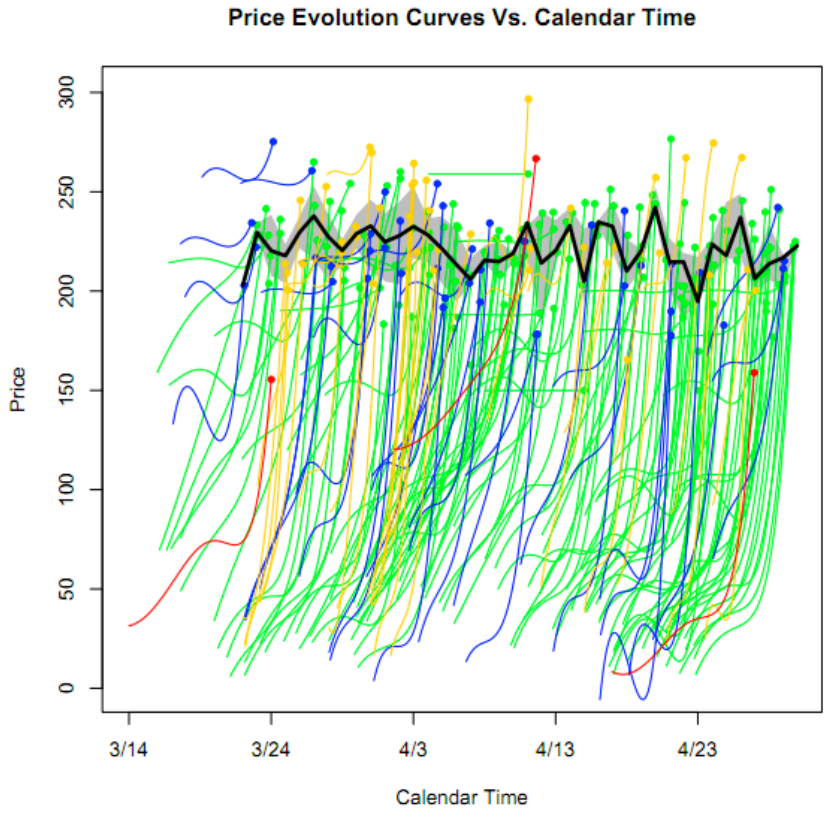
128.195.36.195, Doe, John, 12 Main St, 973-462-3421, Madison, NJ, **07932**
114.12.12.25,Trank, Jill, 11 Elm St, 998-555-5675, Chester, NJ, 07911
…

07911, Chester, NJ, 07954, 34000, , 40.65, -74.12
07932, Madison, NJ, 56000, 40.642, -74.132
…

- Most large data sets are stored in relational data sets
- Data query via SQL

Types of Data: Time Series Data

Types of Data: Time Series Data



Jank, Shmueli, et al (2005)

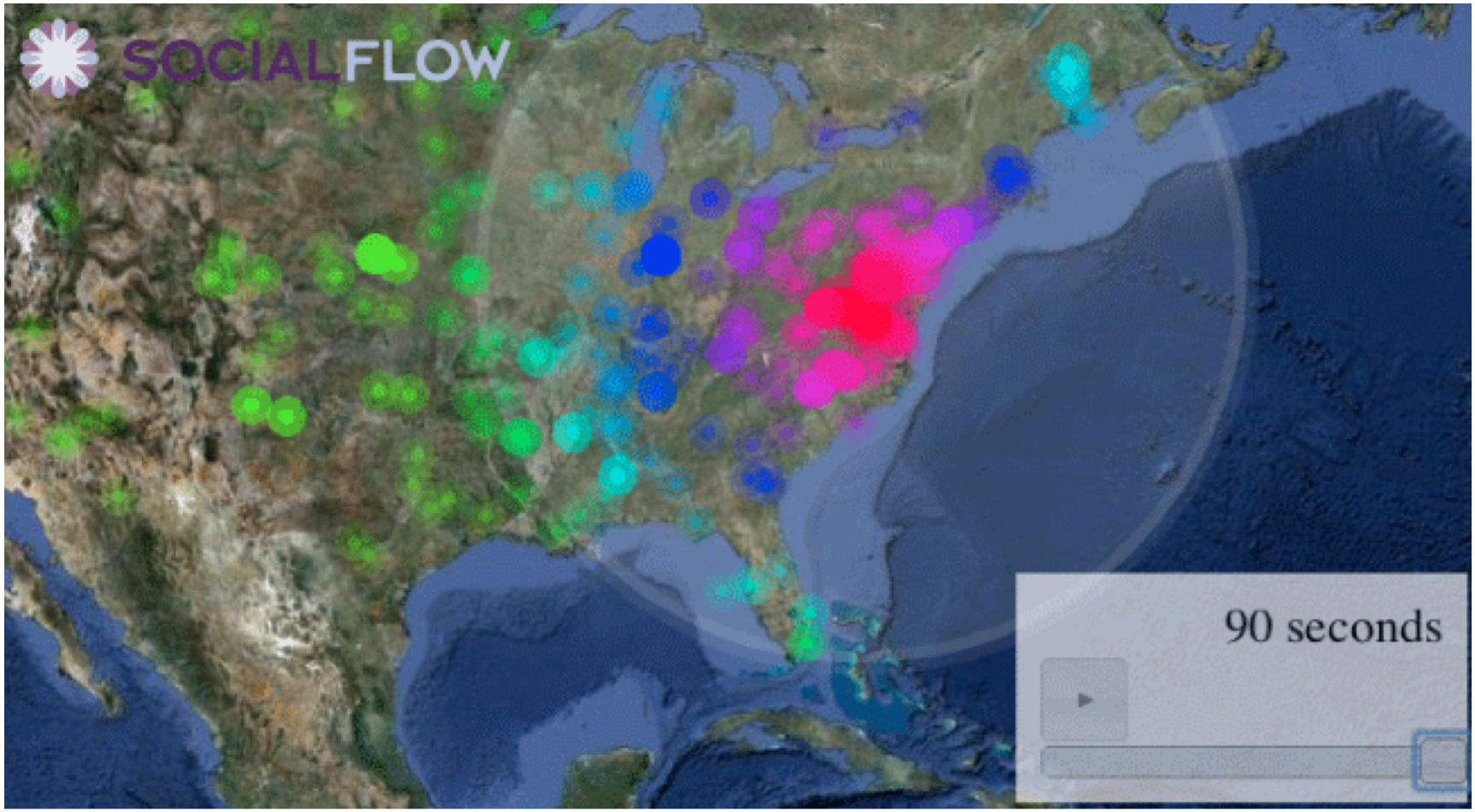
Fig. 10. Rug Plot displaying the price evolution (y-axis) of 217 online auctions over calendar time (x-axis) during a 3-month period. The colored lines show the price path of each auction with color indicating auction length (yellow = 3-day; blue=5-day; green = 7-day; red = 10-day). The dot at the end of each line indicates the final price of the auction. The black line represents the average of the daily closing price , and the gray band is the inter-quartile range.

Types of Data: Image Data

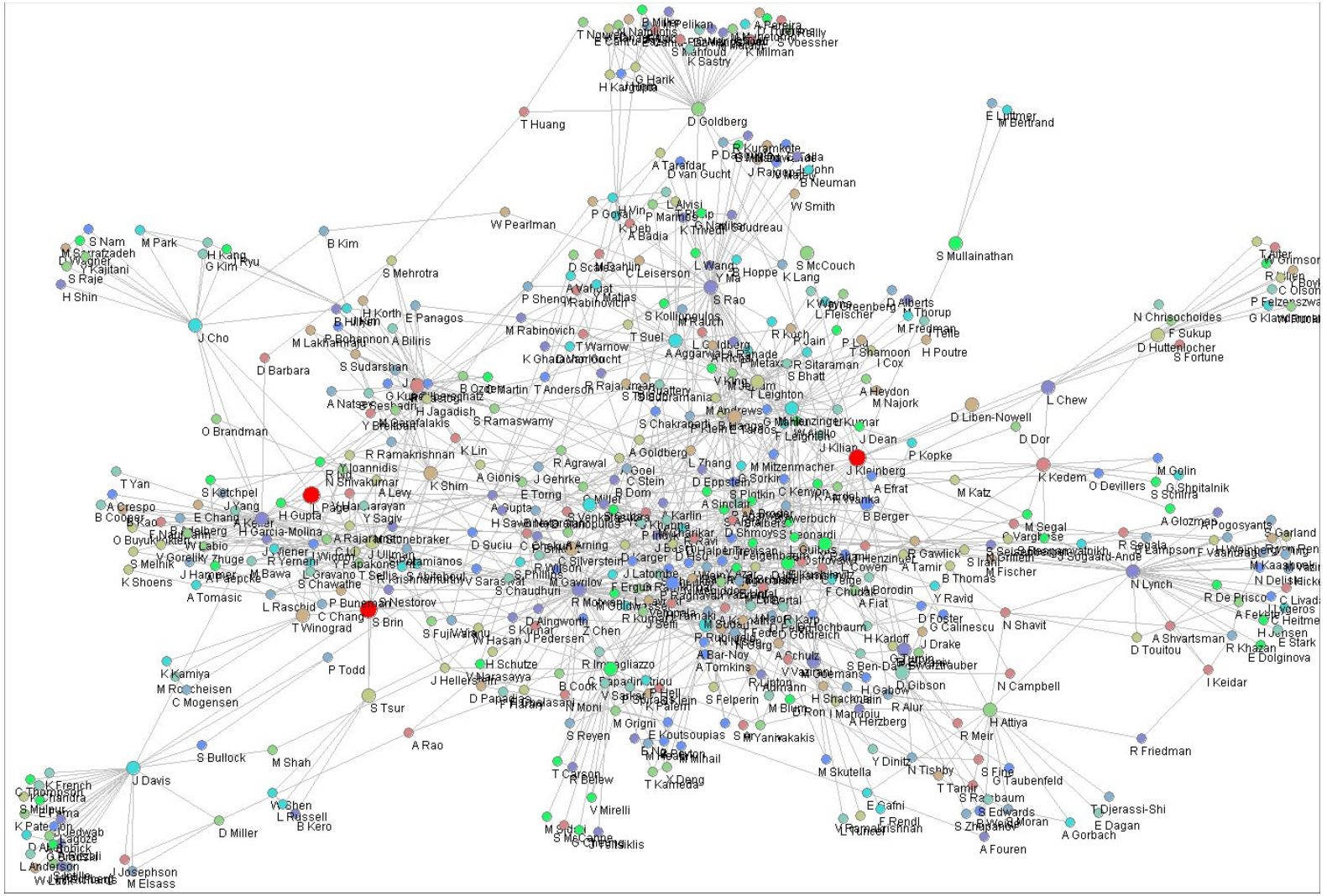
Types of Data: Spatio-Temporal Data

@b_mc817
Glendaaaaa

Omg earthquake!!!



Types of Data: Network Data



Algorithms for estimating relative importance in networks
S. White and P. Smyth, *ACM SIGKDD,* 2003.