# Data Visualization

## Course Outline

## Course Information

- **Lectures:**
  - Offline
- **Lecturer**: Behnam Bahrak
  - Email: bahrak@gmail.com
  - Office: 4th floor, Daneshvar building
  - Office Hours: By appointment
- **Prerequisites:**
  - Basic knowledge of statistics
  - Some Python programming experience

# What is data visualization?

- Visualization is the process that **transform**s (abstract) **data** into **interactive graphical representations** for the purpose of **exploration, confirmation, or presentation**.

- The use of computer-supported, interactive, visual representations of abstract data to amplify cognition.

  -Stuart Card

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# Why visualize?

- To inform humans: Communication/Explanation
  - *Who is ahead in the election polls?*

- When questions are not well defined: Exploration
  - *What is the structure of a terrorist network?*
  - *Which drug can help patient X?*

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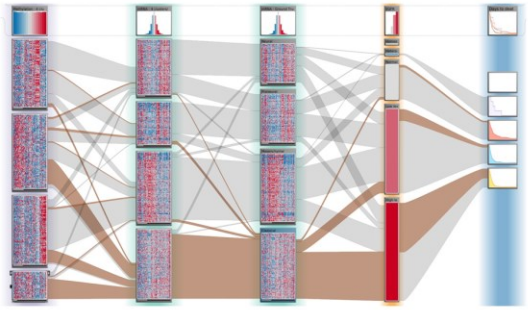
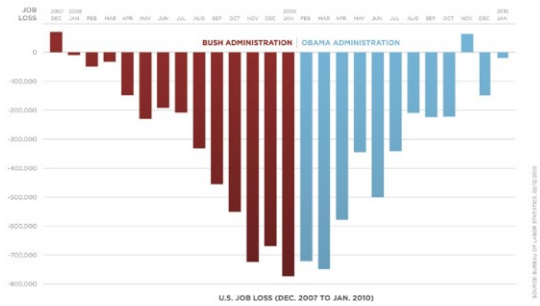
# Purpose of Visualization

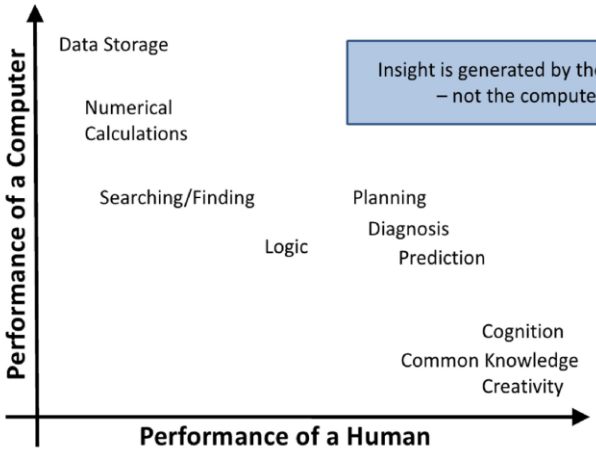





Exploration ⟷ Explanation



# The Ability Matrix



# Human Data Interaction

- **Visualization as a Human-in-the-Loop Analytics Tool**
- Leveraging human capabilities
  - **Pattern Discovery**: clusters, outliers, trends
  - **Contextual Knowledge**: expectations for dataset, explanations for patterns
  - **Action**: humans learn and take action
- But: we also have to **design for Humans and their limitations**

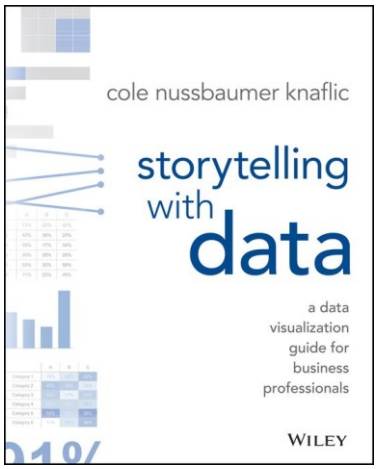


# Goals

- Understanding the principles of data visualization.
- Learning data visualization tools and software.
- Becoming familiar with effective data storytelling.
- Critique and evaluate visualization designs.
- Increase your data visualization literacy.

# Textbook

- Knaflic, Cole Nussbaumer. ***Storytelling with data: A data visualization guide for business professionals***. John Wiley & Sons, 2015.

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# Assessment

- Weekly assignments: 50%
- Midterm project: 20%
- Final project: 30%
- Class participation and activity: 5%

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# Syllabus

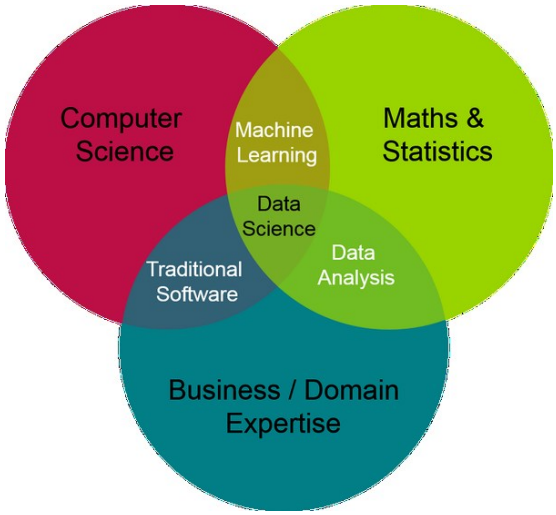
- Visualization in Data Science Lifecycle
- Statistical Charts
- Visualization Tools
- Gestalt Principles
- Preattentive Attributes
- Designer Mindset
- Creating Dashboards



# Syllabus

- Network Visualization
- Spatial Data Visualization
- Temporal Data Visualization
- High Dimensional Data Visualization

# What is Data Science?

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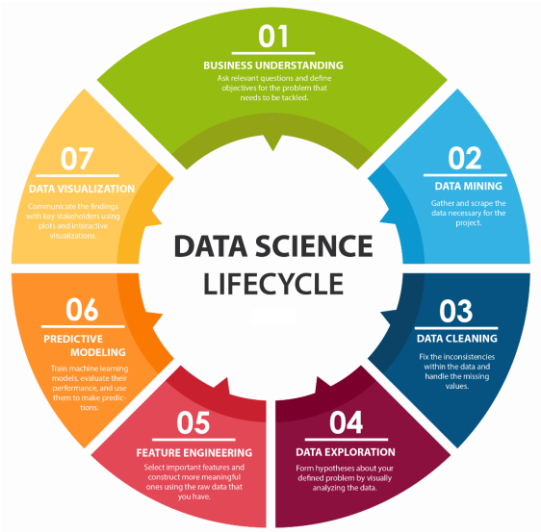
# Data Science Lifecycle

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