

# The Use of Data Visualization in E-commerce: a Review

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CPSC 547 PROJECT



# Motivation

- Clickstream data has significant potential in improving online businesses
- Clickstream data consists of millions of ordered clicks for thousands of users carrying out hundreds of tasks in e-commerce websites
- Due to the complexity and size of Clickstream data the process of analyzing and visualizing Clickstream data is challenging

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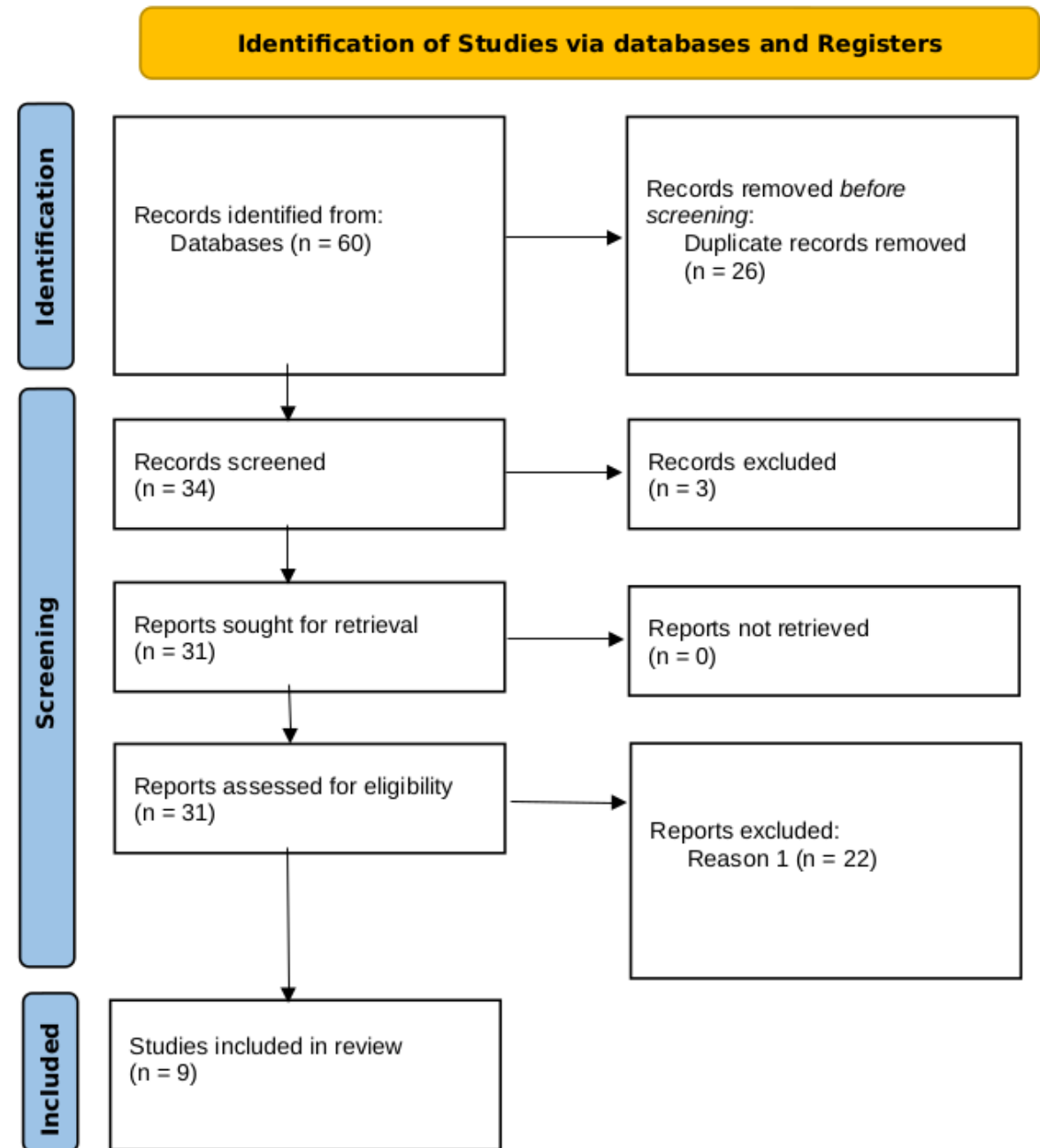
# Project

- The goal of this project is to survey the work concerned with visualizing Clickstream data in e-commerce websites.
- To conduct the survey, PRISMA method was used to add a systematic approach to search and select papers.

categorized selected papers into main topics, summarized the visualization methods used in papers, discussed findings, and provided recommendations to design visualizations for Clickstream data.

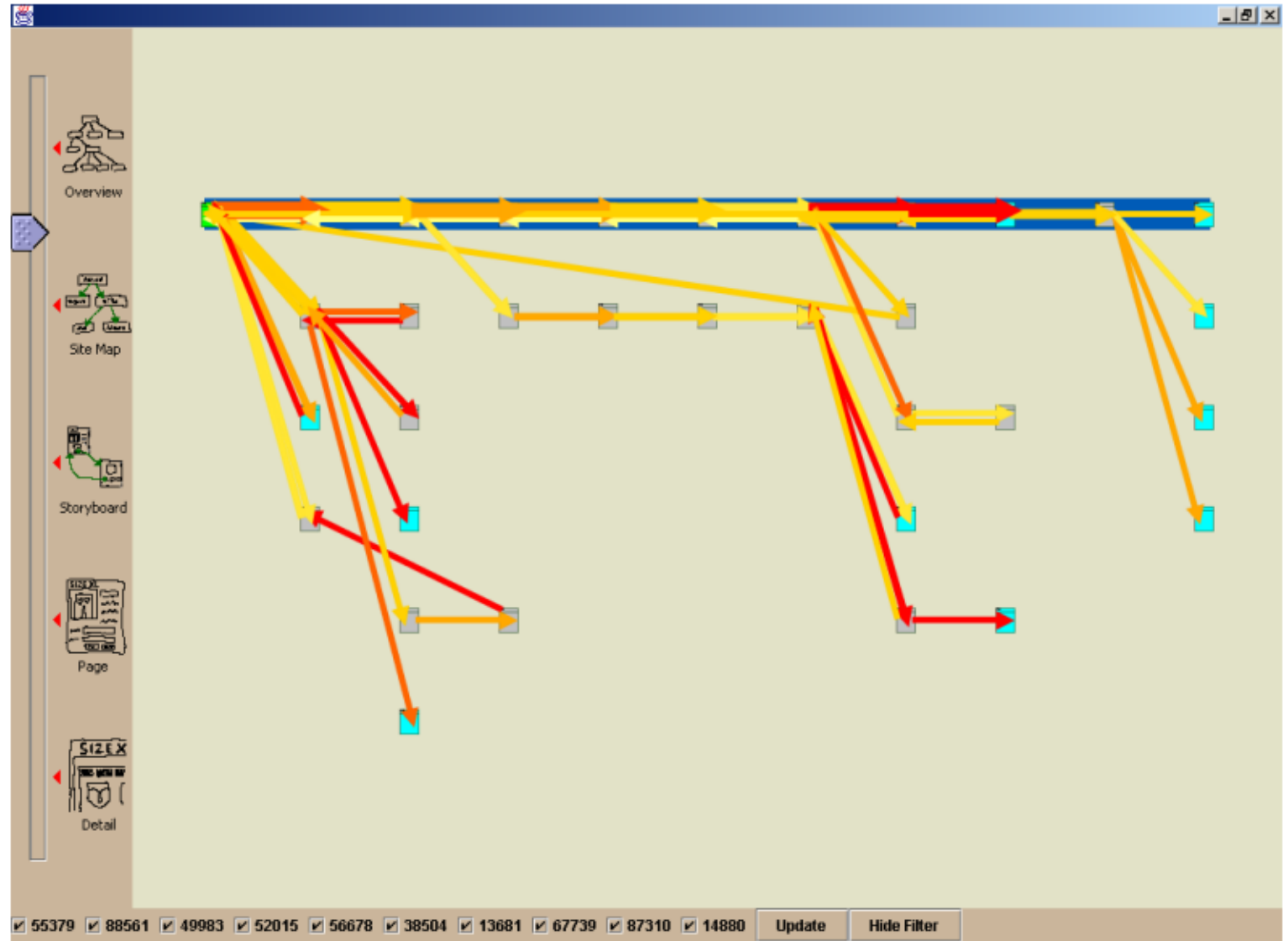
# Method

- 9 seed papers identified following PRISMA
- From identified seed papers backward citation search done to select 3 more papers
- Out of 78 search results, the total number of papers selected is 12



# Categorization

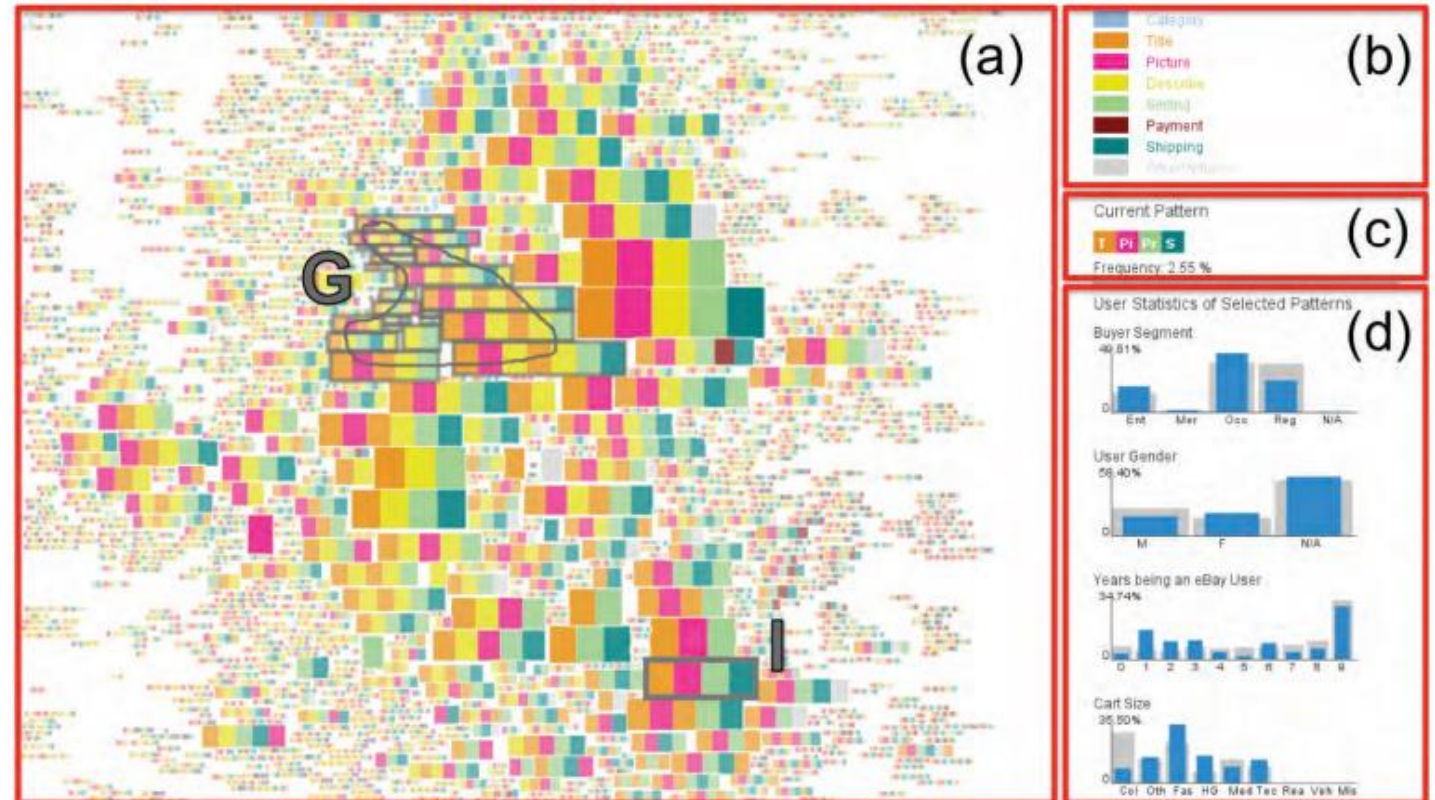
1. Path Navigation
  - Optimal path
  - Segmented paths
  - 2D patterns
2. Data Clustering
  - Visual cluster exploration
  - Hierarchical clustering
3. Visualization Approaches
  - Transition matrices
  - Multiple visualizations
  - Multiple views
4. Analysis Architectures
  1. Stored-data analysis
  2. Real-time analysis



Taken from [1]

# Categorization

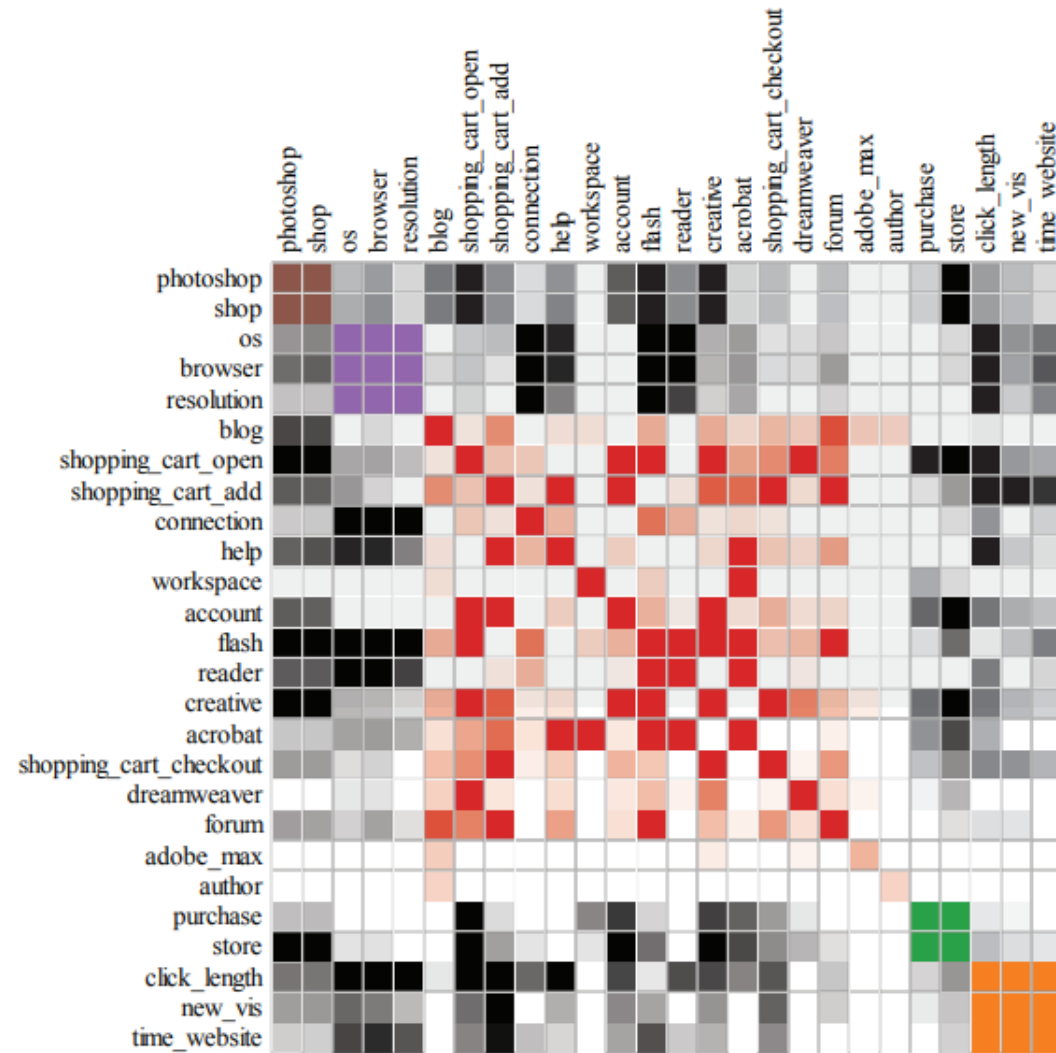
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Taken from [2]

# Categorization

1. Path Navigation
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Taken from [3]



# Discussion

- The importance of having **low-level** and **high-level** views on the dataset.
- A low-level view is concerned more with understanding user activities. A high-level view is concerned more with the number of users and clicks count.
- Path navigation provide a great example for low-level view, while data clustering provide a great example for high level view.





# Recommendations

- Aim to find a balanced view between understanding tasks and considering the number of clicks or users carrying these tasks.
- Take into consideration using or combining multiple methods and techniques in the visualization systems.



# Limitations

- Search results are limited due to limited vocabulary used.
- No forward citation done.
- Number of papers reviewed is few,  
but the research on Clickstream data is still in the early stage [5]



# References

- [1] Waterson, S. J.; Hong, J. I.; Sohn, T.; Landay, J. A.; Heer, J. & Matthews, T. What did they do? understanding clickstreams with the WebQuilt visualization system. Proceedings of the Working Conf. On Advanced Visual Interfaces, 2002, 94-102.
- [2] Wei, J.; Shen, Z.; Sundaresan, N. & Ma, K.-L. Visual cluster exploration of web clickstream data. 2012 IEEE conf. on visual analytics science and technology (VAST), 2012, 3-12.
- [3] Kateja, R.; Rohith, A.; Kumar, P. & Sinha, R. VizClick visualizing clickstream data. 2014 International Conf. on Information Visualization Theory and Applications (IVAPP), 2014, 247-255.
- [4] Shi, C.; Fu, S.; Chen, Q. & Qu, H. VisMOOC: Visualizing video clickstream data from massive open online courses. 2015 IEEE Pacific visualization symposium (PacificVis), 2015, 159-166.
- [5] Frhan, A. J. Website clickstream data visualization using improved Markov chain modelling in apache flume. MATEC Web of Conferences, 2017, 125, 04025.



Thank You