Interactive Exploration of LEHD
A Case Study in Knowledge Discovery

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Sensemaking Loop

This loop should happen fast, otherwise we lose our train of thought
Sensemaking and Big Data

Data Production >>>>>>> Data Consumption

How to visualize Petascale data?
How to visualize hundreds of dimensions?
How to make the process responsive? (delay cost)
What is a good question to start with?
The Explorables Collaborative

http://explorables.cmucreatelab.org/

An effort to understand the challenges in visualizing, exploring, and analyzing large and complex data.
Explorable Visual Analytics

http://eva.cmucreatelab.org

Browser-based
Supporting large-scale data
Easy navigation in a high dimensional space
Responsive interaction; facilitating knowledge discovery
Shareable stories; facilitating knowledge dissemination
EVA Demo

**Data**? large, complex, high spatial and temporal resolution, opportunities for real and meaningful discoveries

Census Longitudinal Employer-Household Dynamics (LEHD)  
[http://lehd.ces.census.gov/](http://lehd.ces.census.gov/)

Pennsylvania section (~2.8 million data points with 45 dimensions), Census Blocks geospatial resolution, spanning over 10 years
Technical Aspects

**Technologies:** Web-based, JavaScript, HTML, Three.js & WebGL ([http://threejs.org/](http://threejs.org/))

**Open Source:** [https://github.com/nebeleh/EVA](https://github.com/nebeleh/EVA)

**Current Capability:** 4~5 M points with 10s of dimensions (1~2 GB of RAM)
Observations

**High Resolution:** Knowledge discovery is highly dependent on the amount of details a user can see.

**Explorability:** Seeing the data from multiple perspectives increases the chance of recognizing unexpected patterns. This can be beneficial in the formation of new hypotheses and possible new discoveries.

**Responsiveness:** Facilitates an uninterrupted train of thought.

**Storytelling:** Guided tours as a powerful means of knowledge dissemination.
Next Steps: Human Data Interaction

Inaccurate but fast vs. accurate but slow:
screen-aware solutions which benefit from our cognitive limits

Non-episodic interaction:
steering and active feedback, interactive query building

Interactivity:
compensation for our inability to perceive high-dimensional space
Thank You
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