

Designing a Framework for Tangible Interfaces in End-User Programming

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Motivation

The body of research literature in End-User Programming has been growing over several decades. We design a framework in order to explore and identify the critical dimensions of EUP research, and to ultimately highlight potential challenges and guide further endeavors in this field. Since there currently exist thousands of relevant artifacts, we utilize unsupervised machine learning approaches to characterize our framework.

Background

End-User Programming

- Designed to allow non-professional software developers to program computers.

Tangible User Interfaces (TUIs)

- Provides tangible representations of digital information and controls.



Methodology

Compile list of keywords to characterize data set.

Collect artifacts from digital libraries using selected keywords.

Prune data set based on type and relevance.

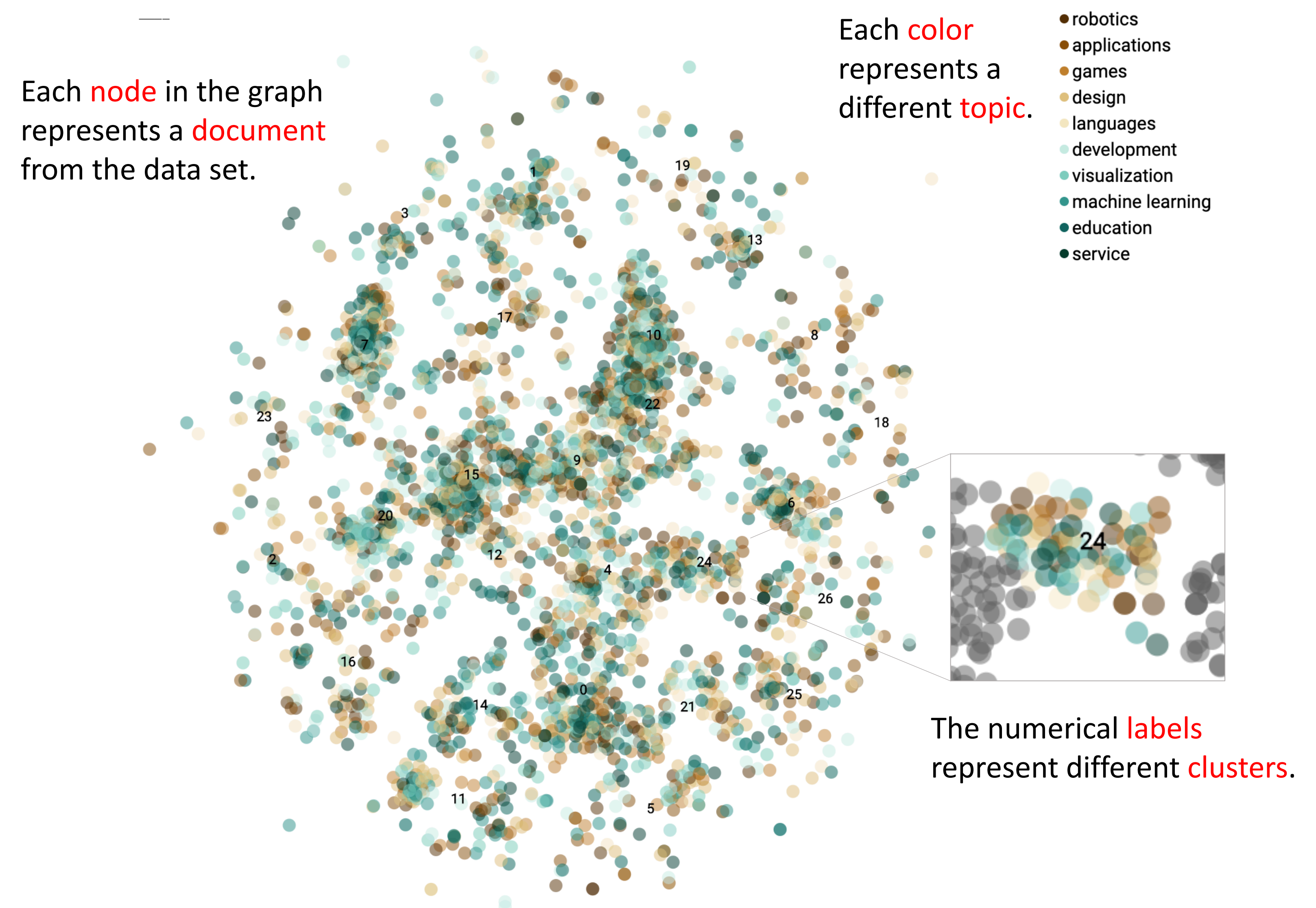
Use LDA topic modeling to discover abstract topics that characterize documents.



We use the OpenOrd force-directed layout algorithm to better distinguish clusters within our set of documents. This algorithm is based on the Fruchterman-Reingold algorithm and undergoes five phases to achieve the final graph layout: liquid, expansion, cool-down, crunch, and simmer.

Results

- Used topic modeling to detect semantic patterns in our data set, and to form clusters of documents with high similarity scores.
- Built a web interface of our model and enabled interaction techniques (mouse click, hover, zoom, etc.) to explore data and develop a framework.



Conclusions

- Methods have not been sufficient in developing a final framework.
- High generality of topics led not to region definition within graph, but rather to novel ways of combining multiple research threads.

Next Steps

- Continue to refine data set to prune out less relevant artifacts.
- Make improvements to our developing web application to allow users to interact with data.
- Utilize this web interface to generate meaningful labels.