

Introduction

- The macroeconomic downturn will create major financial difficulties for nonprofit organizations. Research shows that the median total revenue of nonprofits decreased around \$10,000 after the 2008 recession and 5% more of total organizations fell below the \$50,000 threshold.
- Facing an upcoming economic downturn due to the pandemic, what can we learn from history to better handle the challenge?
- This study seeks to address the following questions:
 - 1.How did nonprofit programming in the United States change after the 2008 economic downturn?
 - 2.What types of nonprofit organizations are more likely to change their programming when experiencing financial precarity?

Methods & Objectives

- This study used the National Center for Charitable Statistics (NCCS) data for nonprofits that filed a 990 form between 1999-2011.
- Our sampling frame included the organizations that reported program descriptions both before and after 2008 (n=76,058). Those with multiple 990 forms were only included once, resulting a final sample of n=17,603.
- A text mining, deep learning natural language processing method Word2vec was applied to discover language patterns and features of program descriptions. The model turns texts into vectors and then uses the “distance” between emerging vectors characterized by unique words to calculate the similarity between clusters. In the research, we applied two pre-trained embeddings, one is based on Google News, the other is based on Wikipedia called GloVe.
- The t-Distributed Stochastic Neighbor Embedding (T-SNE) method, a dimensionality reduction approach was used to visualize and calculate the amount of programmatic change between each type of organization.
- T-test was conducted to assess if the mean difference in programmatic change organizational types was significant before and after 2008. A mean and standard deviation of cosine similarity will be provided to support conclusion in other aspects.

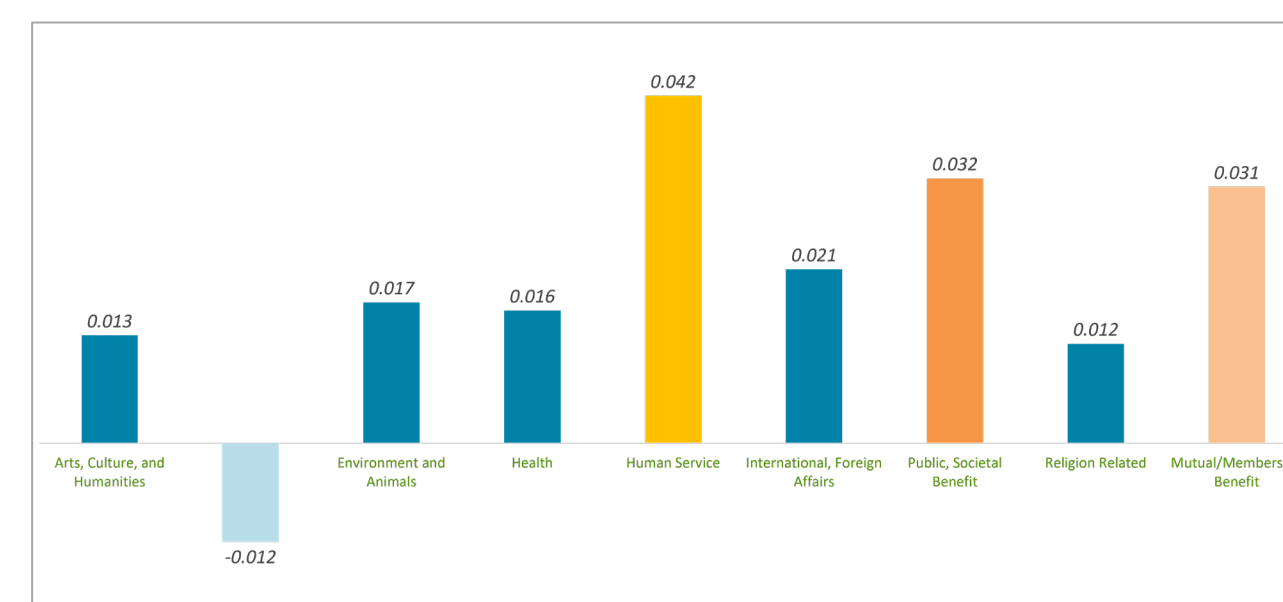
Results

Click graphs to enlarge

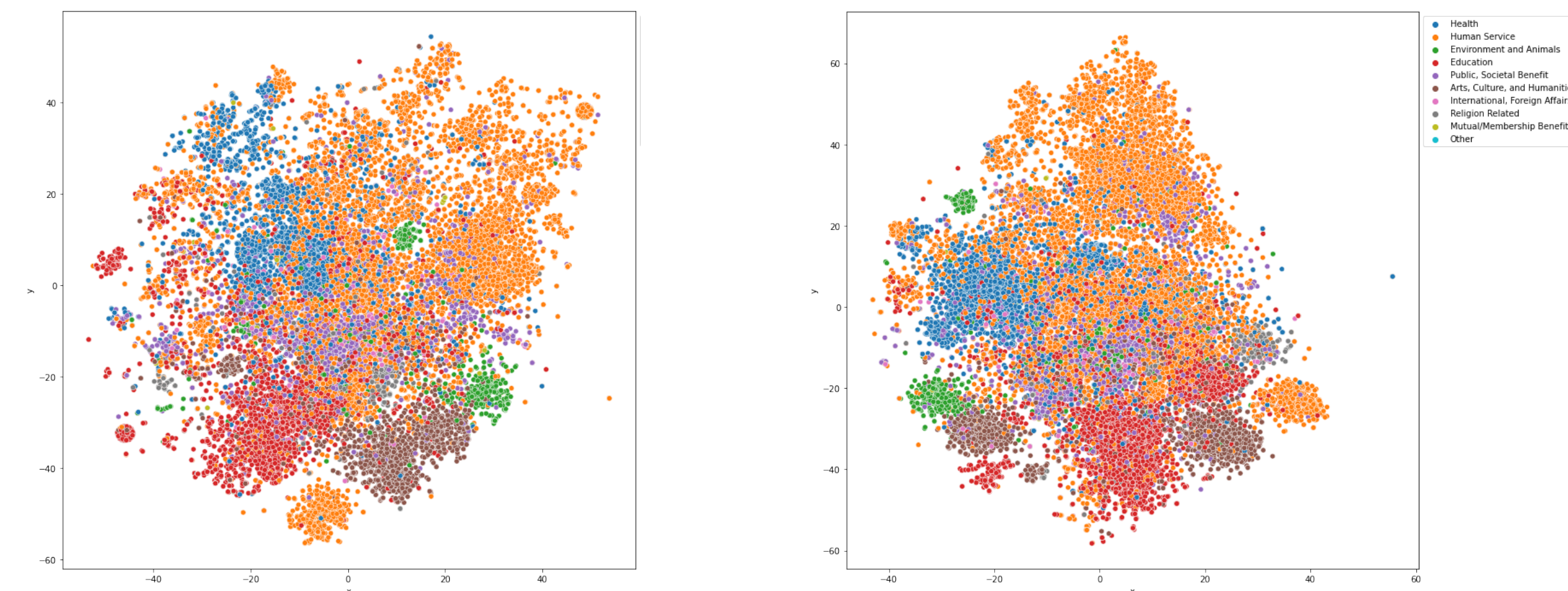
The cluster of program descriptions are denser after 2008 than before, suggesting **that programming across nonprofits became more similar after the great recession**. Before 2008, nonprofits might have had a diverse service offering. The information from cosine similarity also support this results. For example, the similarity in description of health almost is almost the same($Mean_{before}=0.60$, $Std_{before}=0.14$, $Mean_{after}=0.61$, $Std_{after}=0.12$). However, the similarity in human service changes more ($Mean_{before}=0.47$, $Std_{before}=0.13$, $Mean_{after}=0.51$, $Std_{after}=0.11$). After experiencing the economic downturn, some organizations retreated to their original program structure.

Many of the organizations did not change their programming a significant level ($p=.05$), indicating that nonprofits and their associated programming were stable overall. However, **some types of organizations, especially human services appeared to be more vulnerable to changing their programming than others before and after 2008**. Meanwhile, the mean distance within this group decreased and the cosine similarity increased, which indicates that human service organization programming became less diverse and more uniform in nature in response to the economic crisis. Human service programs that changed the most included employment, public safety, disaster preparedness, and relief.

Mean of Cosine Similarity



The Organization Distribution before 2008 The Organization Distribution After 2008



Conclusions

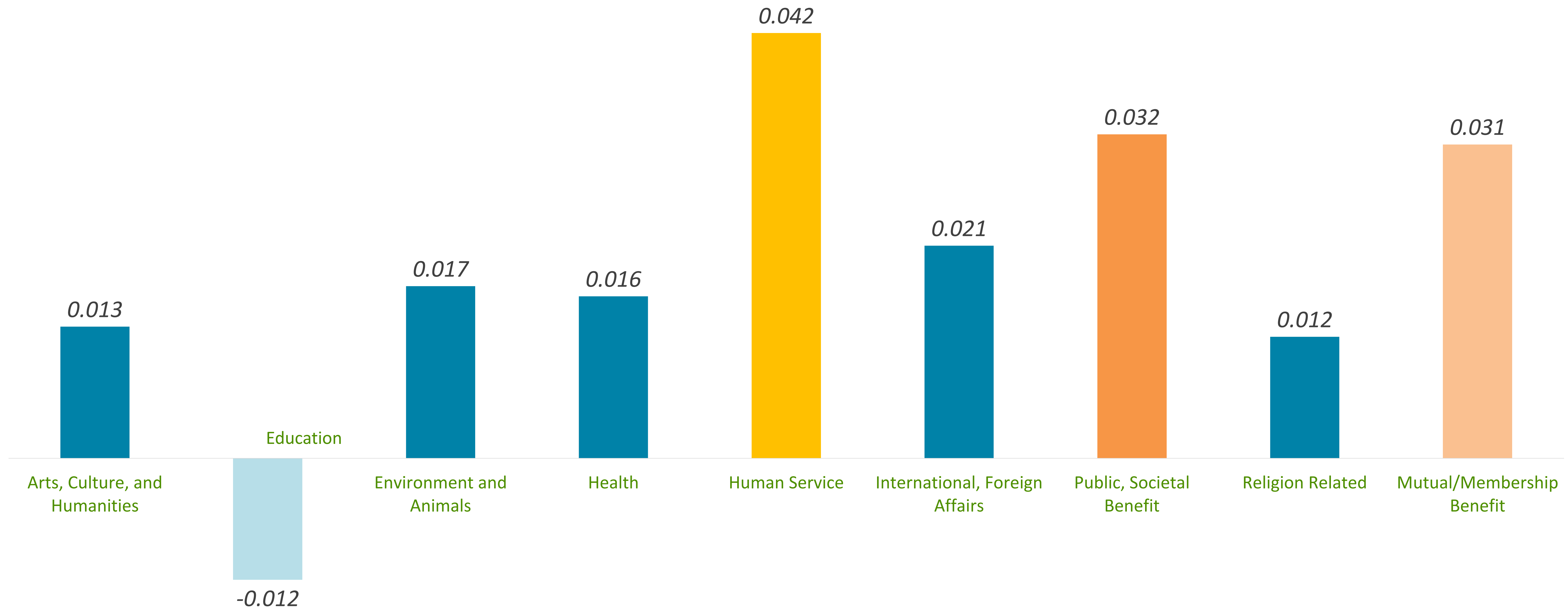
- Overall, organizations provided a more diverse array of programs before, rather than after the 2008 economic downturn.
- The general human service group changed more programs than other types of organizations, suggesting they are at greater risk of program disruption during challenging economic times.
- This information could prove useful and has important implications for social services providers who work within these organizations. Targeting long-term funding and diversifying financial mechanisms may be needed to help sustain human service programming successfully when faced with economic downturns.
- During the pandemic lots of funding may shift to health-related projects on purpose, the systemic change due to mix of economic downturn and health might be a future work.

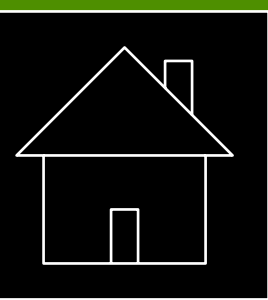
References & Acknowledgements

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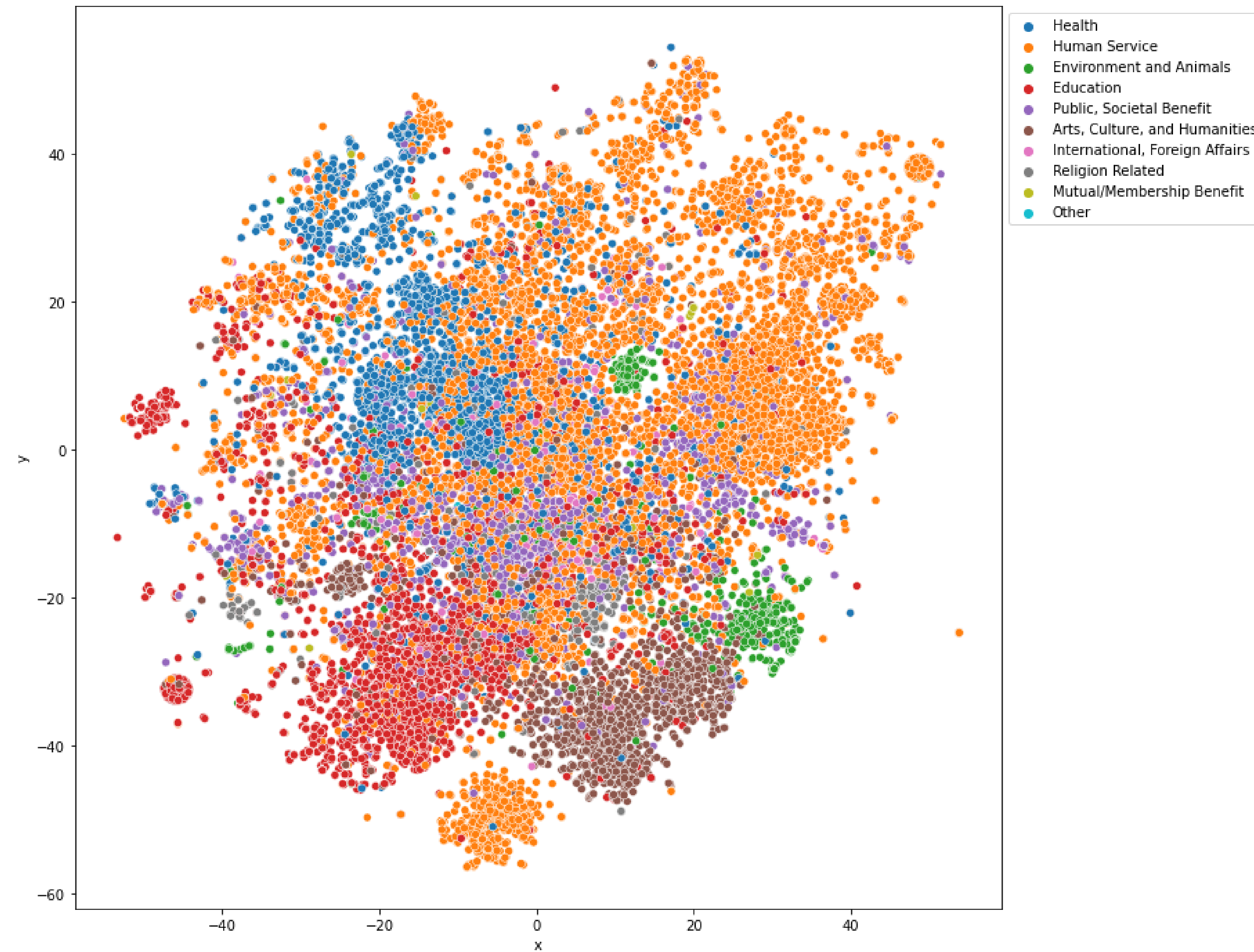
Graphs 1

Mean of Cosine Similarity Difference before and after 2008





The Organization Distribution based on Program Description **before** 2008(GloVe)



The Organization Distribution based on Program Description **after** 2008(GloVe)

