CharIOT - Charity Integration and Opportunity Tool

1 Introduction

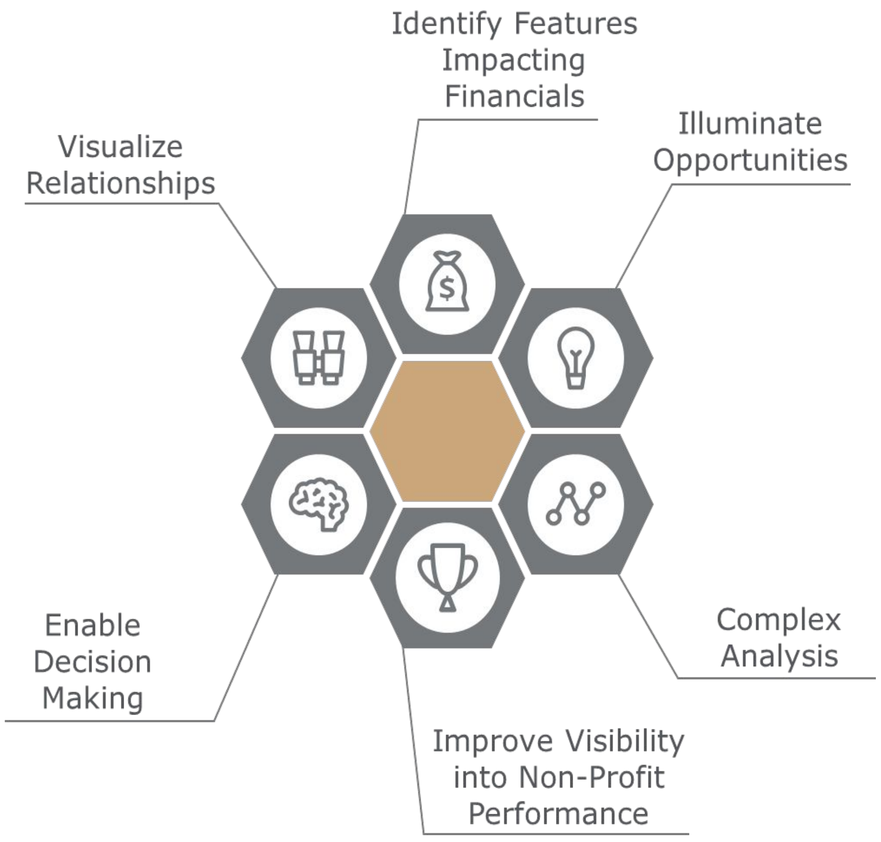
PROBLEM:
No cost-effective tool exists for assessing charitable donation flows in U.S that provides meaningful detail without being overly granular and highly complex.

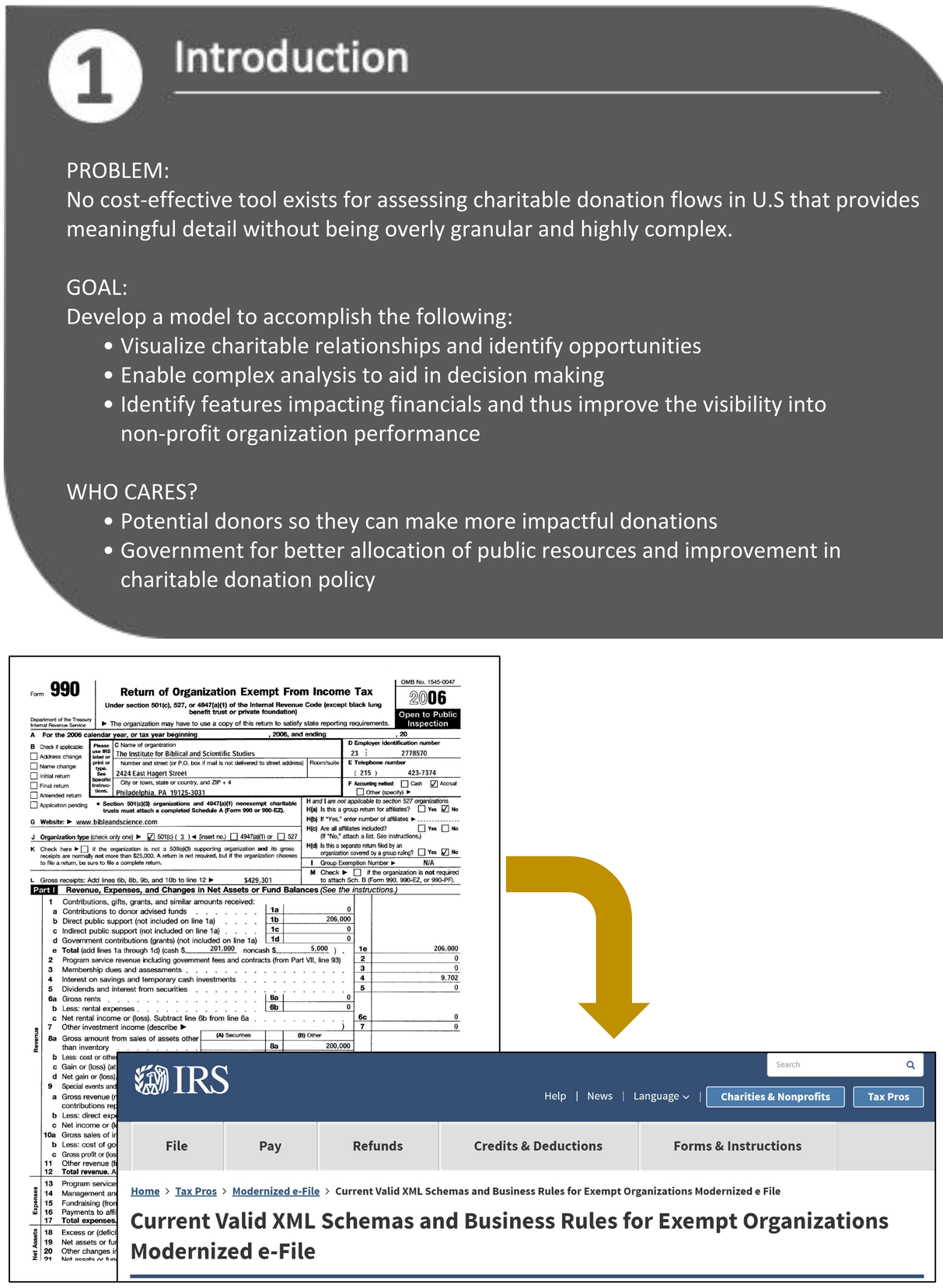
GOAL:
Develop a model to accomplish the following:

- Visualize charitable relationships and identify opportunities
- Enable complex analysis to aid in decision making
- Identify features impacting financials and thus improve the visibility into non-profit organization performance

WHO CARES?

- Potential donors so they can make more impactful donations
- Government for better allocation of public resources and improvement in charitable donation policy




Form **990** — **Return of Organization Exempt From Income Tax**
Under section 501(c), 527, or 4947(a)(1) of the Internal Revenue Code (except black lung benefit trust or private foundation)
► The organization may have to use a copy of this return to satisfy state reporting requirements.
OMB No. 1545-0047 — 2006 — Open to Public Inspection
Department of the Treasury Internal Revenue Service
A For the 2006 calendar year, or tax year beginning , 2006, and ending , 20
B Check if applicable: Address change; Name change; Initial return; Final return; Amended return; Application pending
C Name of organization: The Institute for Biblical and Scientific Studies
Number and street (or P.O. box if mail is not delivered to street address): 2424 East Hagert Street
City or town, state or country, and ZIP + 4: Philadelphia, PA 19125-3031
D Employer identification number: 23 : 2778570
E Telephone number: (215) 423-7374
F Accounting method: Cash ☑ Accrual
G Website: ► www.bibleandscience.com
J Organization type (check only one) ► ☑ 501(c) (3) ◄ (insert no.) 4947(a)(1) or 527
K Check here ► if the organization is not a 509(a)(3) supporting organization and its gross receipts are normally not more than $25,000. A return is not required, but if the organization chooses to file a return, be sure to file a complete return.
L Gross receipts: Add lines 6b, 8b, 9b, and 10b to line 12 ► $429,301
H(a) Is this a group return for affiliates? Yes ☑ No
H(b) If "Yes," enter number of affiliates ►
H(c) Are all affiliates included? Yes No
H(d) Is this a separate return filed by an organization covered by a group ruling? Yes ☑ No
I Group Exemption Number ► N/A
M Check ► if the organization is not required to attach Sch. B (Form 990, 990-EZ, or 990-PF).
Part I Revenue, Expenses, and Changes in Net Assets or Fund Balances (See the instructions.)
1 Contributions, gifts, grants, and similar amounts received: 1e 206,000
2 Program service revenue including government fees and contracts (from Part VII, line 93) 2 0
3 Membership dues and assessments 3 0
4 Interest on savings and temporary cash investments 4 9,702
5 Dividends and interest from securities 5 0
6a Gross rents 6c 0
7 Other investment income (describe ►) 7 0
8a Gross amount from sales of assets other than inventory (A) Securities (B) Other 8a 200,000
Revenue / Expenses / Net Assets

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Current Valid XML Schemas and Business Rules for Exempt Organizations Modernized e-File

2 Data

The data used for this project is the IRS 990 Filings dataset used by the U.S. Internal Revenue Service (IRS) to gather financial information on nonprofit organizations. The data has the following characteristics:

- Data for each 990 filing is provided in an XML file and is scraped into a matrix using R About 1.2 GB in size (roughly 225 MB zipped) when all files combined, with about 670,000 rows of grantmaking network links
- Tax years 2011-2016

The visualization is supplemented with ZIP code data from the U.S. Census Bureau, and is enhanced with categorizations from Latent Dirichlet Analysis and predictions from pairwise association mining.

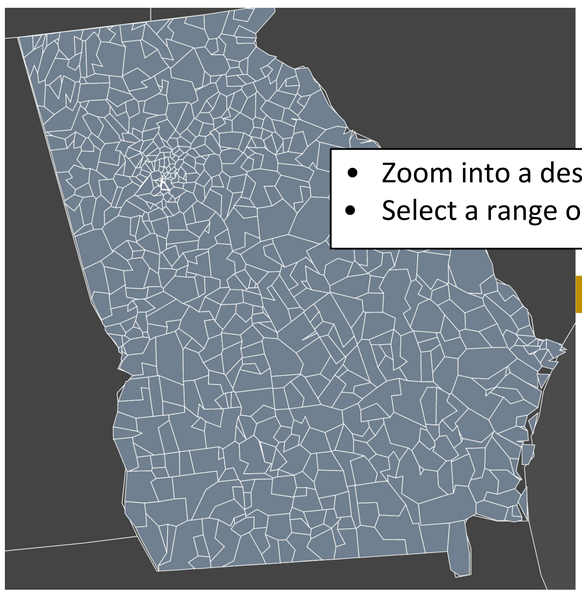
3 Experiments and Results

EXPERIMENTS:
The team set out with ambitious goals for this project and through trial and error were able to create a final product, however, not all of the approaches tried were used in the end product. The experiments are as follows:

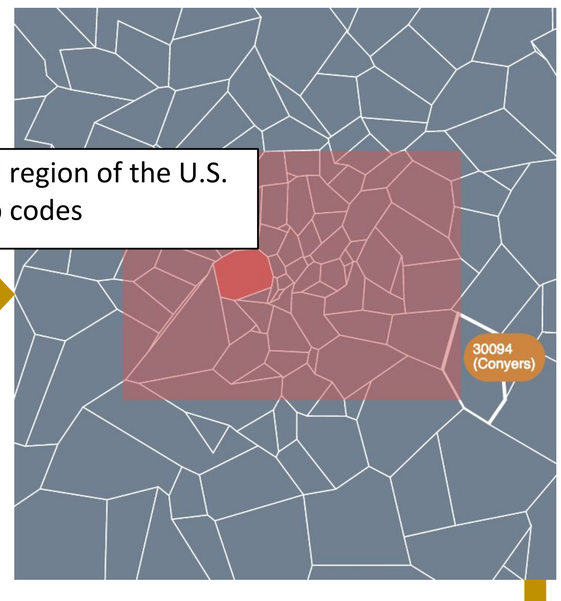
- D3.js: focus group participants were impressed by the speed of data retrieval and display.
- Market basket analysis: because the regression and random forest models we tried were ineffective at predicting grant flows between ZIP codes, we instead opted for a pairwise association mining approach that could tell which pairs of ZIP codes commonly receive grants together.
- Latent Dirichlet Analysis (LDA): this approach was used to add descriptive labels to the organization based off of their mission statements, allowing us to successfully group key words.
- Clustering: a Gaussian mixture model was used to group ZIP codes into groups of economic activity. These groups are displayed as each the color of each ZIP code in the graph view.

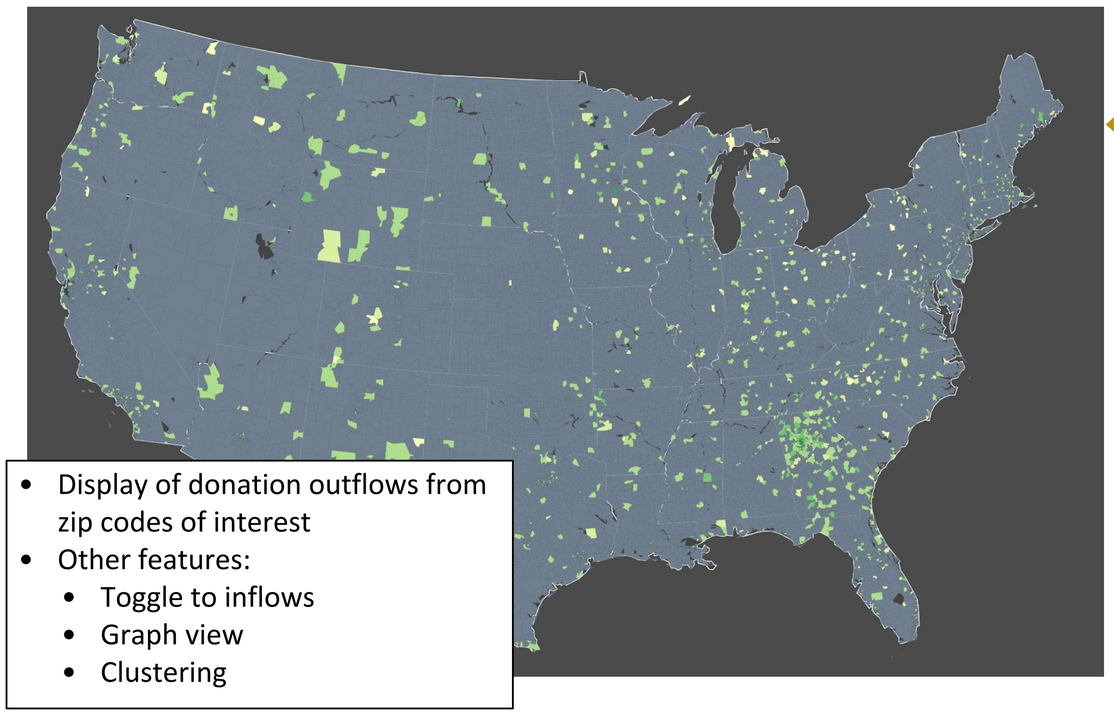
RESULTS:

- Simple yet powerful geographic visualization
- Textual categorization and socioeconomic clustering for deeper insight
- Predictive modeling compared to actual results for gap identification
- Innovation created via multiple parts; not too simple, not too complex
- Focus groups were an integral part of the iterative process of developing this product



- Zoom into a desired region of the U.S.
- Select a range of zip codes





- Display of donation outflows from zip codes of interest
- Other features:
  - Toggle to inflows
  - Graph view
  - Clustering