

Cross-Religion Center Location

Location assignment of a Cross Religion Center
Using ML \LaTeX

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Agenda

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Outline of the Problem

Outline

The aim of this analysis is to provide the optimal location of a Cross Religion Center in the United States of America. The location should promote interfaith dialogue and minimize traveling costs for the faithful. This will be achieved by placing it in a location that minimizes its geographical distance from every Church taking into account the number of faithful that are registered in the respective Church.

The Dataset

Dataset

The dataset contains information about populations of churches per county of the United States of America. It consists of 3075 rows (counties) and 235 columns.

- **CaseID** : an id for the entry
- **CNAME** : an id for the entry
- **STCODE** : an id for the entry
- **CCODE** : an id for the entry
- **TOTPOP** : an id for the entry
- **TOTMEMB** : an id for the entry

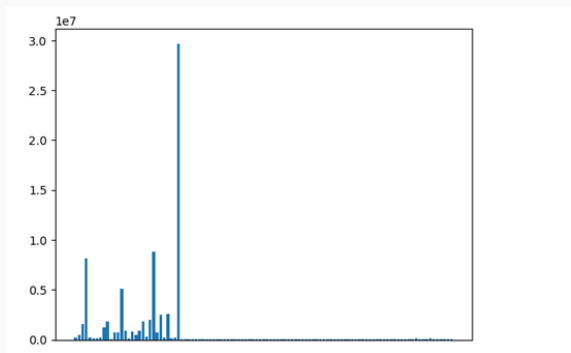
Dataset

The dataset contains information about populations of churches per county of the United States of America. It consists of 3075 rows (counties) and 235 columns.

- Columns that end with 'M' eg : AOG_M, denoting the number of members of Church AOG in the County.
- Columns that end with 'C' eg : AOG_C, denoting the number of Churches AOG in the County.

TOTCHUR and Columns that end with '_C' will be discarded as only the population will be used to determine the location of the cross religion center.

EDA



Total population per Church

Total Population per Church

CATH_M 29688058

METH_M 8790025

SBC_M 8121069

JEWS_M 5112024

EPISC_M 2544320

Catholic, Methodist, Southern Baptists, Jews and Protestant Episcopal Church are the 5 most populated churches.

Cherokee.AL, Madison.IL and Fresno.CA have the highest per-person ratio of Orthodox Christian members.

	CNAME	ORT_PERC
163	Cherokee, AL	0.011342
617	Madison, IL	0.002304
132	Fresno, CA	0.002275
3025	Racine, WI	0.001944
2276	Providence, RI	0.001734
...
1033	Marion, KY	0.000000
1034	Marshall, KY	0.000000
1035	Martin, KY	0.000000
1036	Mason, KY	0.000000
3068	Weston, WY	0.000000

The 3 most extreme counties with respect to the distribution of their churches across religions (LOF).

Hinsdale, CO

Kings, NY

Billings, ND

Analysis

A Cross-Religion Center should be located in an area with high religious diversity to ensure representation and inclusivity. It must be geographically central for accessibility to a large portion of the population and minimize transportation.

Analysis

- **Step 1** : Build hypothetical per Religion centers with the use of weighted k-Means with 1 centroid where weights will be the population of every county for the specified religion .
- **Step 2** : Perform weighted k-Means with 1 centroid to the per Religion centers , this time the weights will be the total Religion population .

Results

Results

Results for per religion centroids are :

	Church	Population	Long	Lat
0	SDA_M	250845	-98.133112	39.117811
1	AOG_M	457222	-95.860523	37.474369
2	ABC_M	1528732	-87.854617	40.457396
3	SBC_M	8028377	-88.622321	34.313007
4	COB_M	188976	-84.750488	39.657158
..
102	UCHRC_M	603	-76.526848	40.361065
103	UCA_M	75155	-76.902829	42.061985
104	VEDS_M	769	-94.480991	38.800026
105	VLNTR_M	7427	-89.071103	40.556448
106	CGP_M	28497	-87.284998	35.914694

Per Religion Churches

Results

Results for the coordinates of the Cross-Religion Center are :

	Church	Long	Lat
0	Cross-Religion Center	-86.921807	39.216167

Per Religion Churches

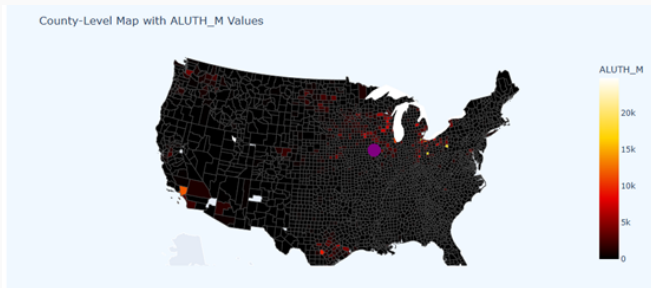
Visual Representation

For the visualization purposes an interactive Dash app was built. In the first plot one can see a heatmap of the population of every church along with the centroid derived from the first weighted k-Means. Churches can be changed through the scrollbar. In the second plot one can see every centroid, with size depending on the total population of each church, along with a red star which is the proposed location of the cross religious center.

Visual Representation

Visual Representation

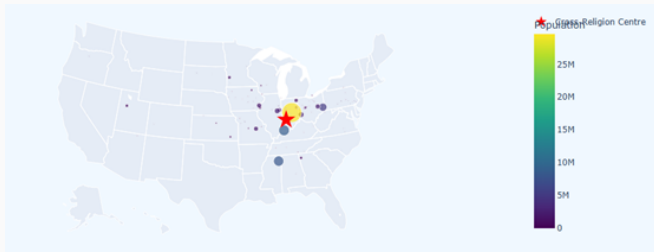
Heatmap with the location of the virtual centroid for ALUTH_M



Per Religion Churches

Visual Representation

Location of the Virtual Religion Centers and the Cross Religio Center



Per Religion Churches