Computational Analysis of Religious and Ideological Linguistic Behavior

University of Virginia, MS in Data Science Capstone

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Client: Peter Ochs
Sponsor: ARL

Problem: How to work with Value-Based Groups?

What is a value-based group?

- *Religious*
- *Political*
- *Any group motivated by a set of values*

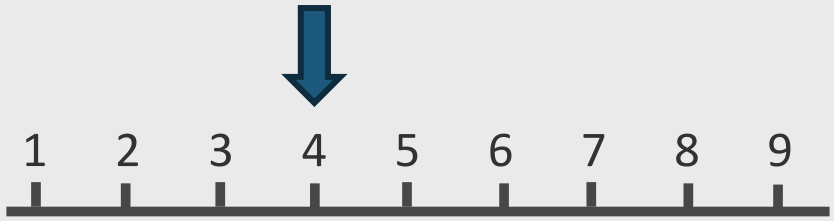
Who needs to work with value-based groups?

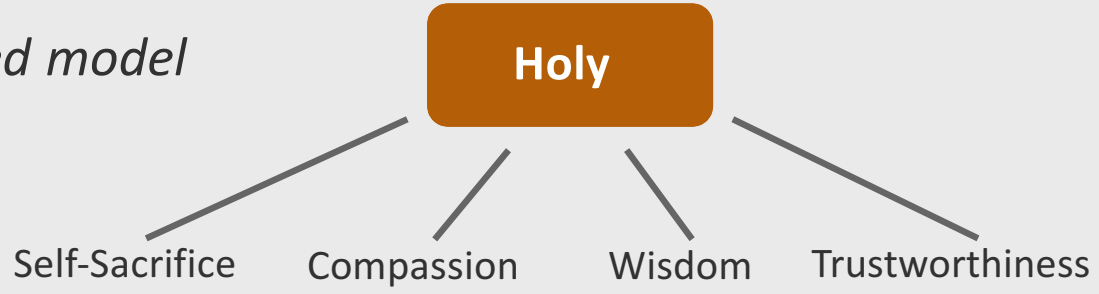
- *US Government*
- *Humanitarian Groups*
- *Business Leaders*

UVA Initiative on Conflict, Politics, and Religion

1-9 Linguistic Rigidity Scale

- *Number of definitions not the definition itself is what matters*
- *Venuti et al. automated model*





Objectives & Goals

Large-Scale Goals:

- *Real-time recommendations to organizations on the ground*

Team Goals:

- *Tune the Signal Processing Model*
- *Test a Deep Learning Model*
- *Language Agnostic*
- *Other Groups*

Technical Approach

Technical Approach: Signal Processing

Performative Signals

- *Number of judgements (noun + "to be" verb + adj/adv)*
- *Context Vectors (Semantic Density and Cosine Similarity)*
- *Network Analysis (Eigenvector Centrality)*

Semantic Signals

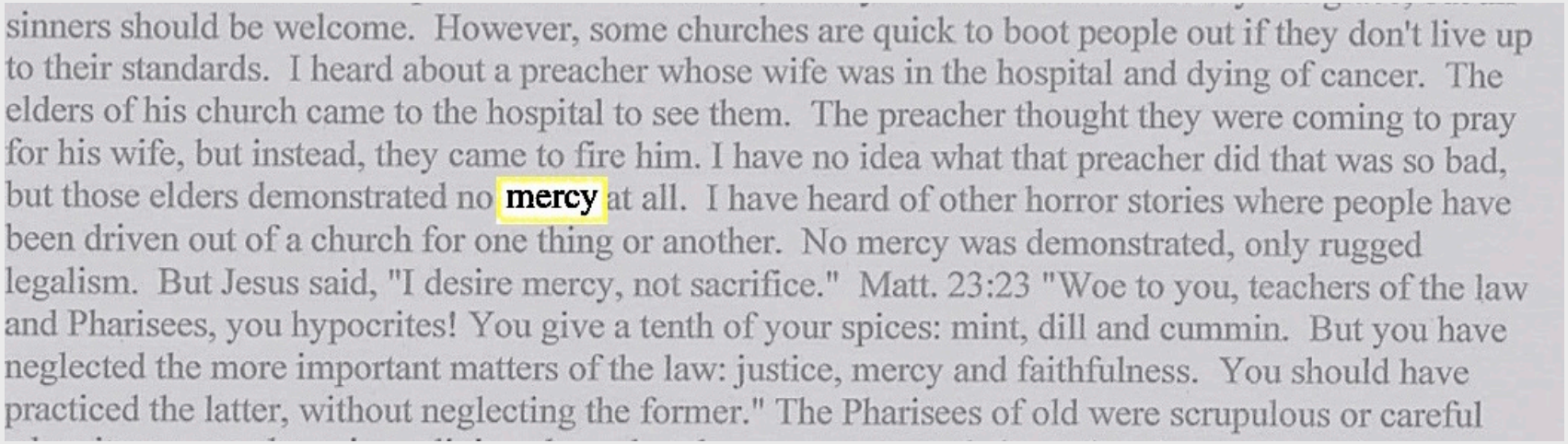
- *Topic Modeling*
- *Sentiment Analysis*

Technical Approach: Context Vectors

sinners should be welcome. However, some churches are quick to boot people out if they don't live up to their standards. I heard about a preacher whose wife was in the hospital and dying of cancer. The elders of his church came to the hospital to see them. The preacher thought they were coming to pray for his wife, but instead, they came to fire him. I have no idea what that preacher did that was so bad, but those elders demonstrated no mercy at all. I have heard of other horror stories where people have been driven out of a church for one thing or another. No mercy was demonstrated, only rugged legalism. But Jesus said, "I desire mercy, not sacrifice." Matt. 23:23 "Woe to you, teachers of the law and Pharisees, you hypocrites! You give a tenth of your spices: mint, dill and cummin. But you have neglected the more important matters of the law: justice, mercy and faithfulness. You should have practiced the latter, without neglecting the former." The Pharisees of old were scrupulous or careful

Raw Text

Technical Approach: Context Vectors



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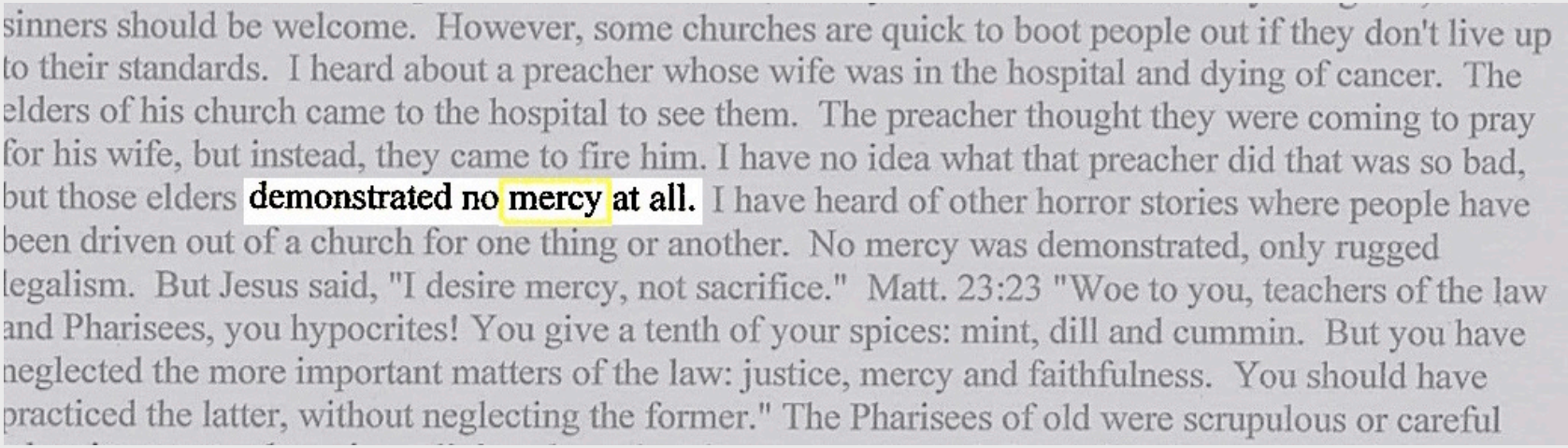
Identify Keywords

Technical Approach: Context Vectors



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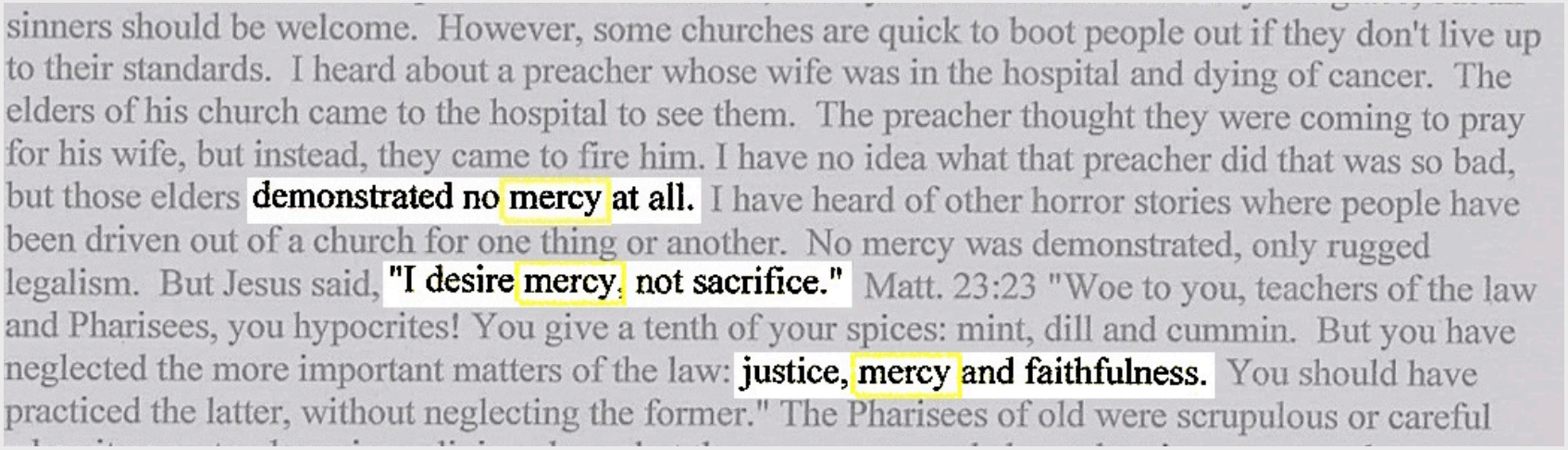
Collect words in context vector

Technical Approach: Context Vectors



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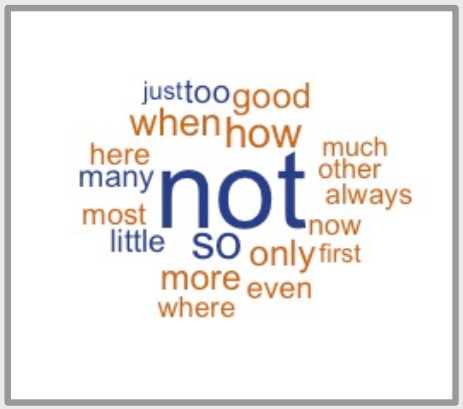
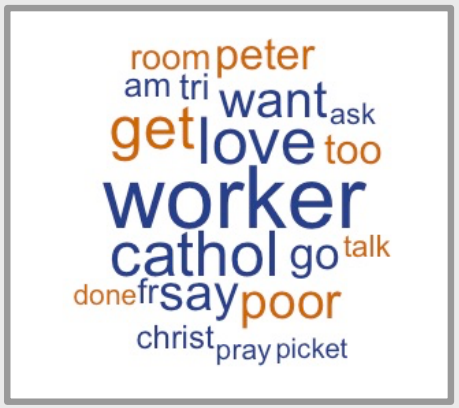
- **Repeat for all occurrences of keyword**
- **Singular Value Decomposition to vector of length 100**
- **Calculate Average Semantic Density and Distributional Co-occurrence Score**

Value Words


just too good
when how
here much
many not other
always
most now
little so only first
more even
where

daughter
anyth poverti
worker love
my gospel
must we sheep
prais abandon
us god our
easi suffer destitut
thank lazarus


room peter
am tri want ask
get love too
worker
cathol go talk
done fr say poor
christ pray picket

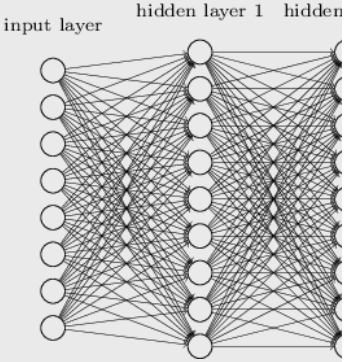
Judgement Classification

- judgement = pronoun +key word
- *Number of judgements (noun + “to be” verb + adj/adv)*

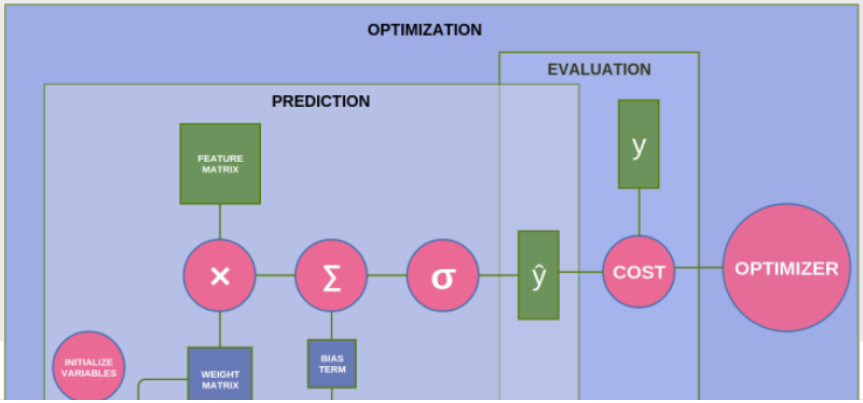
Technical Approach: Deep Learning

	peace	catholic	holy	...
document_001	0	1	0	...
document_002	3	0	5	...
document_003	0	0	0	...
⋮	⋮	⋮	⋮	⋱

	Bahai	Dorothy Day	Integral Yoga	Sea Shepherds
document_001	0	1	0	0
document_002	1	0	0	0
document_003	0	0	0	1
⋮	⋮	⋮	⋮	⋱



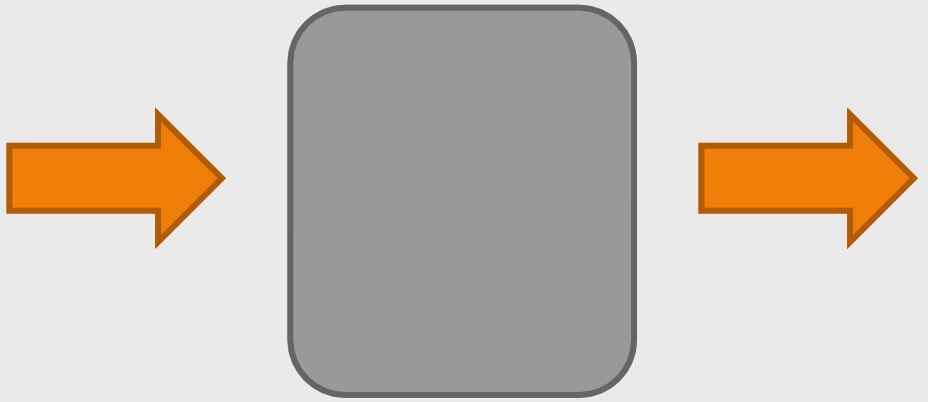
- Network is broken into sub-networks
- Each sub-network is signal
- Deep Learning techniques so the network can learn the proper weights and biases



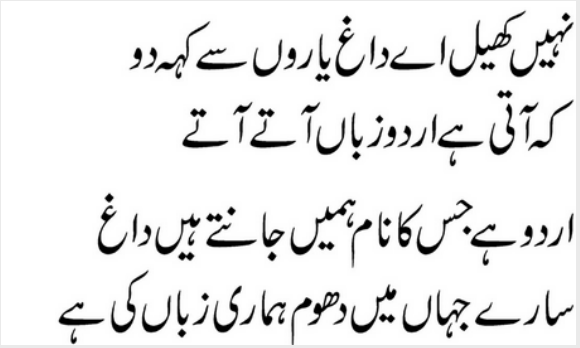
Model Revisions

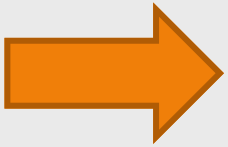
- document based – show who to work with and when
- instead of scoring groups, score individual documents

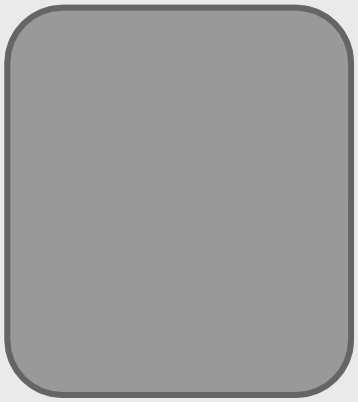
Expected Results

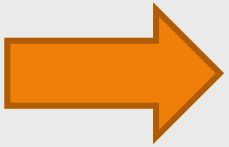
Text  **7**

Expected Results









7

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