Computer support to analyze IS propaganda

Magnus Sahlgren, Lisa Kaati, Tim Isbister, Katie Cohen, Babak Toghiani-Rizi

magnus.sahlgren@foi.se
IS online propaganda

Online jihad

Professionally edited material
- Magazines (Dabiq, Rumiyah)
- Video

User-generated content
- Blogs
- Forums
- Twitter
- Social networks
IS online propaganda

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English language
IS online propaganda

Understanding motivating factors
Development of the organization
Counter narratives
Monitoring
IS online propaganda

Understanding motivating factors

Development of the organization

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Previous studies

Winter (2015, one month of material)
Zelin (2015, one week sample)
Ingram (2016, 9 issues of Dabiq)
Winter (2017, one month of material)
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Computer support

Bigger data, longer time periods

Thematic analysis
  - Theory-driven
  - Data-driven
Computer support

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Thematic analysis

What are the main themes of the propaganda?

Theme ≈ list of words (i.e. a dictionary)

**Brutality:** execute, punish, behead, admonish

Thematic analysis = count occurrences of words
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Potential problems

Overestimation: context-sensitivity ("execute")

Underestimation: vocabulary variation ("IS/ISIS/ISIL/Daesh")
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Potential solutions

Overestimation: word-sense disambiguation

Underestimation: semantic word vectors
Thematic analysis
Potential solutions

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Potential solutions

Overestimation: word-sense disambiguation

Underestimation: semantic word vectors
Semantic word vectors
Thematic analysis
Theory-driven approach

Themes from Winter (2015, 2017)

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<td>Victimhood</td>
<td>losses, survival, victim, victimhood</td>
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<tr>
<td>War</td>
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Dictionaries are augmented using word vectors
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Thematic analysis
Data-driven approach

*Topic models* infer the main topics in the data based on the document structure

Problematic to use if there is no clear document structure (or if it has high variance)

Alternative approach: cluster word vectors
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1. Build word vectors
2. Build similarity matrix
3. Prune the matrix (remove low similarities)
4. Cluster the similarity space (using a mixture model)
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Data

- Dabiq: 15 issues
- Rumiyah: 7 issues
- Blogs: 10 manually identified pro-IS blogs
- Tweets: 17,000 pro-IS accounts
- Baseline: Islamic Horizons (15 issues), The Muslim Sunrise (15 issues), Passion Islam (13 issues)

3 million words in total
(c.f. Tolstoy “War and Peace” ≈ 500,000 words)
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2. Segmenation and tokenization
3. Multiword identification (using mutual information)
4. Named entity recognition (persons and places)
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<td>Abu Hurayrah</td>
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Results

Winter’s themes
Results

Winter’s themes

- Victimhood
- Utopia
- War
- Brutality
- Belonging

Legend:
- Tweets
- Baseline
- Rumiyah
- Dabiq
- Blogs
Results

Winter’s themes
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Winter’s themes

- **Dabiq**: Belonging, War, Utopia, Victimhood
- **Rumiyah**: Belonging, Brutality, War, Utopia
- **Tweets**: Belonging, War, Utopia
- **Blogs**: Belonging, War, Utopia, Victimhood
- **Baseline**: Belonging, War, Utopia, Victimhood
## Results

### Data-driven themes

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</tr>
<tr>
<td>Death</td>
<td>killing, wounded, injured, deaths</td>
</tr>
<tr>
<td>Knife</td>
<td>cutting, stabbing, blade, throat</td>
</tr>
<tr>
<td>Prohibition</td>
<td>fornication, alcohol, drugs, ribā</td>
</tr>
<tr>
<td>Family</td>
<td>daughter, woman, marry, birth</td>
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<tr>
<td>Slave</td>
<td>master, concubine, servants, slavegirl</td>
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<tr>
<td>Prohibition</td>
<td>fornication, alcohol, drugs, ribā</td>
</tr>
<tr>
<td>Family</td>
<td>daughter, woman, marry, birth</td>
</tr>
<tr>
<td>Slave</td>
<td>master, concubine, servants, slavegirl</td>
</tr>
<tr>
<td>Vehicles</td>
<td>vehicle, tanks, drive, hummers</td>
</tr>
</tbody>
</table>
Results
Data-driven themes
Results

Data-driven themes

- **Vehicles**
- **Slave**
- **Prohibition**
- **Knife**
- **Family**
- **Explosive**
- **Death**

Legend:
- **Baseline**
- **Blogs**
- **Tweets**
- **Rumiyah**
- **Dabiq**
Results
Data-driven themes
Results
Data-driven themes
Variation over time

Winter’s themes
Variation over time

Winter’s themes

Dabiq 1−15, Rumiyah 16−22

Word frequency

Magazine nr

Category
Belonging
Brutality
Utopia
Victimhood
War

0.00
0.01
0.02
0.03
0.04
0.05
0
5
10
15
20

Magazine nr
Variation over time

Data-driven themes
Variation over time
Data-driven themes
Summary

Thematic analysis enables analysis of big data, over longer time periods, and in soft real time

Complement to expert analysis

Importance of multidisciplinary approaches

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