Recent publications & Announcements
Methods to Compare Adverse Events in Twitter to FAERS, Drug Information Databases, and Systematic Reviews: Proof of Concept with Adalimumab

Abstract

Introduction

Adverse drug reactions (ADRs) are associated with significant health-related and financial burden, and multiple sources are currently utilized to actively discover them. Social media has been proposed as a potential resource for monitoring ADRs, but drug-specific analytical studies comparing social media with other sources are scarce.
Pharmacoepidemiologic Evaluation of Birth Defects from Health-Related Postings in Social Media During Pregnancy

Authors

Su Golder, Stephanie Chiuve, Davy Weissenbacher, Ari Klein, Karen O'Connor, Martin Bland, Murray Malin, Mondira Bhattacharya, Linda J. Scarazzini, Graciela Gonzalez-Hernandez

Open Access | Original Research Article
First Online: 03 October 2018

Abstract

Introduction

Adverse effects of medications taken during pregnancy are traditionally studied through post-marketing pregnancy registries, which have limitations. Social media data may be an alternative data source for pregnancy surveillance studies.

Objective

https://rdcu.be/8t1F
Data and systems for medication-related text classification and concept normalization from Twitter: insights from the Social Media Mining for Health (SMM4H)–2017 shared task

Abeed Sarker, Maksim Belousov, Jasper Friedrichs, Kai Hakala, Svetlana Kiritchenko, Farrokh Mehryary, Sifei Han, Tung Tran, Anthony Rios, Ramakanth Kavuluru, ... Show more

Journal of the American Medical Informatics Association, ocy114, https://doi.org/10.1093/jamia/ocy114

Published: 01 October 2018   Article history

Abstract

Objective

We executed the Social Media Mining for Health (SMM4H) 2017 shared tasks to enable the community driven development and taper early evaluation of
Social Media Mining for Birth Defects Research: A Rule-Based, Bootstrapping Approach to Collecting Data for Rare Health-Related Events on Twitter

Ari Z. Klein, Abeed Sarker, Haitao Cai, Davy Weissenbacher, Graciela Gonzalez-Hernandez

https://doi.org/10.1016/j.jbi.2018.10.001

Highlights

- Rare health-related events—in this case, birth defects—are reported on Twitter.
- An NLP-based approach was deployed to collect sparse tweets for manual annotation.

https://doi.org/10.1016/j.jbi.2018.10.001
**Call for Papers**

The AIME 2019 conference invites all interested researchers to submit original contributions regarding the development of theory, methods, systems, and applications of AI in biomedicine, including the application of AI approaches in biomedical informatics, healthcare organization and molecular medicine.

**Scope**

Contributions to theory and methods should present or analyze novel AI theories or methodologies for solving problems in the biomedial field. They may propose new theories and methods or extensions of existing ones. In both cases, the work should demonstrate its utility for solving biomedical problems and highlight its contribution to the underlying theoretical basis. Additionally, it should discuss assumptions, limitations and novelty with respect to the state of the art.

Contributions addressing systems and applications should describe the development, implementation or evaluation of innovative, AI-based tools and systems in the biomedical application domain. These papers should both link the work to underlying theory, and either analyze the potential benefits to solve biomedical problems or present empirical evidence of benefits in clinical practice.

The scope of the conference includes the following areas:

- Big data analytics,
- Machine learning, knowledge discovery and data mining,
- Biomedical ontologies and terminologies,
- Biomedical knowledge acquisition and management,
- Knowledge-based reasoning in biomedicine,
- Natural language processing.

The 17th World Congress of Medical and Health Informatics

Dear friends,

Branded by the International Medical Informatics Association (IMIA), MedInfo is a worldwide key event in digital health that gathers scientists, physicians, teachers, students, companies, institutions, and decision-makers. After having hosted its previous editions in Brazil and China, in 2019, MedInfo is back to Europe. For the first time, the event will be held in France, in Lyon, also called the “French Tech metropolis”. The city is located in the heart of the Auvergne-Rhône-Alpes region, which also happens to be a major player in health technologies.

AIM (the French Association for Medical Informatics) is organizing Medinfo 2019 and is happy to welcome you in Lyon on August 26-30, 2019. At each Medinfo conference, participants have the opportunity to share knowledge in an international context in order to improve health and the well-being of interconnected citizens everywhere in the world. So, come to discover, discuss, and share your opinion and experience about this year’s topic: “Health and Wellbeing: E-Networks for all”.

To find the dates for registration, please use the registration menu.

NOVEMBER 12, 2018
DON’T FORGET:
DEADLINE FOR PAPERS,
POSTERS AND PODIUM PAPERS

http://medinfo-lyon.org/en/
Data-centric text summarization methods to support evidence-based medicine

Abeed Sarker, Ph.D. (@sarkerabeed)
Research Associate
Institute for Biomedical Informatics
Department of Biostatistics, Epidemiology and Informatics

10/04/2018
Evidence-based medicine

- **Summarizing evidence**
  - Generating query-focused summaries of individual publications
  - Generating bottom-line recommendations from multiple publications

- **Appraising the quality of evidence**

Sample evidence-based answer

Which treatments work best for hemorrhoids?

Evidence-based answer
Excision is the most effective treatment for thrombosed external hemorrhoids (strength of recommendation [SOR]: B, retrospective studies). For prolapsed internal hemorrhoids, the best definitive treatment is traditional hemorrhoidectomy (SOR: A, systematic reviews). Of nonoperative techniques, rubber band ligation produces the lowest rate of recurrence (SOR: A, systematic reviews).

Evidence summary
External hemorrhoids originate below the dentate line and become acutely painful with thrombosis. They can cause perianal pruritus and excoriation because of interference with perianal hygiene. Internal hemorrhoids become symptomatic when they bleed or prolapse (TABLE). Reported a low recurrence rate of 6.5% at a mean follow-up of 17.3 months. A prospective, randomized controlled trial (RCT) of 98 patients treated nonsurgically found improved pain relief with a combination of topical nifedipine 0.3% and lidocaine 1.5% compared with lidocaine alone. The NNT for complete pain relief at 7 days was 3.

Reprinted with permission from the Journal of Family Practice
Corpus creation

- 456 Clinical queries
- Bottom-line recommendations: 1396
- Bottom-line answers with quality grades: 1225
- Detailed justifications (single-document summaries): 3036
- Unique referenced articles: 2908
Summarization

- **Target**: 3-sentence summary (query-focused, extractive)

- **Past methods**
  - Sentence positions (e.g., higher score for later sentences)
  - Sentence classifications (e.g., ‘Outcome’ sentences)

- **Proposed methods**
  - Target-sentence-specific summarization\(^1,2\)
  - Sentence classification and selection customized to query type
  - Use of semantic associations for scoring

- **Scores combined via the Edmundsonian paradigm**
  - \(\text{Score}_x = \beta_1 S_1 + \beta_2 S_2 + \beta_3 S_3 + \beta_4 S_4 \ldots\)


Data-centric scoring features

Query-specific customizations

- The contents of evidence-based answers depend on the types of questions

<table>
<thead>
<tr>
<th>Topic</th>
<th>Frequency</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment and Prevention</td>
<td>193</td>
<td>0.423</td>
</tr>
<tr>
<td>Pharmacological</td>
<td>146</td>
<td>0.320</td>
</tr>
<tr>
<td>Management</td>
<td>135</td>
<td>0.296</td>
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<tr>
<td>Diagnosis</td>
<td>109</td>
<td>0.239</td>
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<tr>
<td>Test</td>
<td>73</td>
<td>0.160</td>
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<tr>
<td>Procedure</td>
<td>32</td>
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<tr>
<td>Prognosis</td>
<td>23</td>
<td>0.050</td>
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<td>Physical Finding</td>
<td>23</td>
<td>0.050</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>16</td>
<td>0.035</td>
</tr>
<tr>
<td>Etiology</td>
<td>10</td>
<td>0.022</td>
</tr>
<tr>
<td>History</td>
<td>7</td>
<td>0.015</td>
</tr>
<tr>
<td>Device</td>
<td>6</td>
<td>0.013</td>
</tr>
</tbody>
</table>

Maximal marginal relevance with n-grams and semantic types

\[ MMR_{sijkx} = \lambda(CosSim(s_{ijkx}, q_i)) - (1 - \lambda) \max_{s_c \in S_{sel}} (CosSim(s_{ijkx}, s_c)) \]

Customized scores for associations between semantic types

Evaluation and results

- Automatic evaluation using ROUGE

<table>
<thead>
<tr>
<th>System</th>
<th>F-Score</th>
<th>95% CI</th>
<th>Percentile Rank (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Three</td>
<td>0.15482</td>
<td>0.151 - 0.158</td>
<td>55.9</td>
</tr>
<tr>
<td>Last Three Outcome</td>
<td>0.15920</td>
<td>0.155 - 0.163</td>
<td>74.2</td>
</tr>
<tr>
<td>Random</td>
<td>0.15251</td>
<td>0.149 - 0.156</td>
<td>46.1</td>
</tr>
<tr>
<td>First Three</td>
<td>0.13994</td>
<td>0.136 - 0.143</td>
<td>36.9</td>
</tr>
<tr>
<td>All Outcomes</td>
<td>0.15936</td>
<td>0.155 - 0.164</td>
<td>74.2</td>
</tr>
<tr>
<td>Position Independent</td>
<td>0.16019</td>
<td>0.157 - 0.164</td>
<td>78.1</td>
</tr>
<tr>
<td>Naive Bayes</td>
<td>0.15551</td>
<td>0.152 - 0.159</td>
<td>55.9</td>
</tr>
<tr>
<td>SumBasic</td>
<td>0.15818</td>
<td>0.155 - 0.162</td>
<td>69.9</td>
</tr>
<tr>
<td>FastSum (modified)</td>
<td>0.15769</td>
<td>0.154 - 0.161</td>
<td>69.9</td>
</tr>
<tr>
<td>MEAD</td>
<td>0.16332</td>
<td>0.160 - 0.167</td>
<td>85.4</td>
</tr>
<tr>
<td>QSpec (without query types)</td>
<td>0.16627</td>
<td>0.162 - 0.170</td>
<td>94.3</td>
</tr>
<tr>
<td>QSpec</td>
<td><strong>0.16780</strong></td>
<td>0.164 - 0.172</td>
<td>96.8</td>
</tr>
<tr>
<td>QSpec (regression)</td>
<td>0.16479</td>
<td>0.161 - 0.169</td>
<td>92.5</td>
</tr>
</tbody>
</table>

\[
\text{SCORE}_{s_{ijkt}} = \alpha \text{RP}_{s_{ijkt}} + \beta \text{LEN}_{s_{ijkt}} + \gamma \text{PIPS}_{s_{ijkt}} + \delta \text{PDP}_{s_{ijkt}} + \\
\epsilon \text{MMR}_{s_{ijkt}} + \zeta \text{ST}_{s_{ijkt}} + \eta \text{ASSOC}_{s_{ijkt}}
\]

Quality of evidence prediction

- Strength of recommendation taxonomy—three-level scale (A, B, C)

- Difficult problem with low inter-rater agreement (mean agreement ~0.5)

- Raters tend to categorize borderline evidence as B

<table>
<thead>
<tr>
<th></th>
<th>System</th>
<th>Expert 1</th>
<th>Expert 2</th>
<th>Expert 3</th>
<th>Expert 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>0.61</td>
<td>0.58</td>
<td>0.69</td>
<td>0.71*</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Q: Are there big differences in beta-blockers in treating essential hypertension?

Automatic extractive summary:
Because the pathophysiology of hypertension differs in older and younger patients, we designed this meta-analysis to clarify the efficacy of beta-blockers in different age groups.

In placebo-controlled trials, beta-blockers reduced major cardiovascular outcomes in younger patients (risk ratio [RR] 0.86, 95% confidence interval [CI] 0.74-0.99, based on 794 events in 19,414 patients) but not in older patients (RR 0.89, 95% CI 0.75-1.05, based on 1,115 events in 8,019 patients).

Beta-blockers should not be considered first-line therapy for older hypertensive patients without another indication for these agents; however, in younger patients beta-blockers are associated with a significant reduction in cardiovascular morbidity and mortality.

(Quality of evidence: A)

PMID: 16754904
Future directions

- Multi-document summarization to generate bottom-line recommendations
  - Two-step summarization approach\(^1\)
  - Customized strategies for question types in the second step\(^2\)

- Speeding up the summarization process by reducing reliance on *clunky* tools & packages

- Use more efficient text representation methods (e.g., dense vectors)

- Extrinsic evaluation—generating rapid reviews

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