Text Analytics Industry Use Cases
(& the Path Forward for Text Analytics)

Aiaioo Labs - 2012
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  – 10 years in industry
  – Research interests: NLP and ML

• Sumukh
  – 8 years in industry
  – PhD from University of Melbourne

• Madhulika
  – 6 years in industry
  – MS from UT Austin
  – Internships at Microsoft and RRI
1: AI Algorithms
2: Text Analytics Technology
3: Business Use Cases
Research on AI Algorithms

Tools for Text Analytics

Tools for Education

Tools for Graph Analysis

Bangalore, India
Let x be 3. y is 9. What is x times y? While x is less than y, print x and then increment x.

The program executed successfully.

<table>
<thead>
<tr>
<th>Variables</th>
<th>y=9.0</th>
<th>x=9.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>27.0</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>8.0</td>
<td></td>
</tr>
</tbody>
</table>

Run program

Translate to: Kannada, English, Hindi, Tamil, French, German, Japanese or Chinese
Text Analytics APIs

How we handle all kinds of things people say
What is Text Analytics?

Insights from Text

Meaning from Text
Business Use Cases

All that tech talk is fine, but how can you make us a heap more money next month?
Two Ways of Using Text Analytics

- Decision Making
- Operations
People signal their intent to buy on Twitter. Find more leads.

Your Customers announce their intent to buy by asking for product and service recommendations on Twitter.
Decision Making - Use Case

A social media - community engagement measurement tool & dashboard - A SourceN Venture!
Text Analytics Details

How to handle all kinds of things people say
What is Text Analytics?

- Hypothesis testing
- Countable
- Bayesian inference
- Computation
- Psychology
- Study of Language
- Text Analytics
- Linguistics
- IR
- NLP
- Grammar based
- If - then
- Discriminative
- Bayesian
- ML
- Social Media
- Documents
- WWW
- A | BCD
Entity Extraction

Mapping Business Needs to Text Analytics

Comparative Analysis

Entity Extraction

Event Extraction

Entity Extraction

Which

Who

When

Entity Extraction

Mapping Business Needs to Text Analytics

Comparative Analysis

Entity Extraction

Event Extraction

Entity Extraction

Entity Extraction
I am looking for a Hyundai car in B’lore
I am looking for a Hyundai car in Bangalore

Semantic Analysis: I/Person am looking for a Hyundai/Thing car/Thing in Bangalore/Place

Entities:

I                   Person
Hyundai car          Thing
Bangalore            Place
Relation Extraction

Text:  Tim Cook is the new CEO of Apple Computers

Analysis:  Tim/Person Cook/Person is the new CEO of Apple/Org Computers/Org

Relation:  CEO_of
Tim Cook (Person)  Apple Computers(Org)
Sentiment Analysis

Raw Text: I am sad that Steve Jobs died

Analysis: This person holds a positive opinion on Steve Jobs

Sentiment Holder: I
Object of Sentiment: Steve Jobs
Polarity of Sentiment: positive
Two Kinds of Sentences

Convey intention: I want to buy a computer.

Information: There was heavy snowfall in Sikkim.
Intention Analysis

Raw Text: Are you sad that Steve Jobs died?

Analysis: This person is inquiring about someone’s emotions concerning Steve Jobs.

Intention Holder: I
Intention: inquire
## Intention Analysis – Categories of Intention

<table>
<thead>
<tr>
<th>Categories</th>
<th>Parent Category</th>
<th>Department</th>
<th>Urgency</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase</td>
<td>Sales</td>
<td>High</td>
<td>CRM</td>
<td></td>
</tr>
<tr>
<td>Sell</td>
<td>Procurement</td>
<td>Medium</td>
<td>ERP</td>
<td></td>
</tr>
<tr>
<td>Inquire</td>
<td>Help/Sales</td>
<td>High</td>
<td>CRM</td>
<td></td>
</tr>
<tr>
<td>Direct</td>
<td>Operations</td>
<td>High</td>
<td>CRM</td>
<td></td>
</tr>
<tr>
<td>Compare</td>
<td>Market Research</td>
<td>Low</td>
<td>CRM</td>
<td></td>
</tr>
<tr>
<td>Suggest</td>
<td>Market Research</td>
<td>Low</td>
<td>Social</td>
<td></td>
</tr>
<tr>
<td>Opine</td>
<td>Design</td>
<td>Low</td>
<td>Social</td>
<td></td>
</tr>
<tr>
<td>Praise</td>
<td>Opine</td>
<td>Design</td>
<td>Low</td>
<td>Social</td>
</tr>
<tr>
<td>Criticize</td>
<td>Opine</td>
<td>Design</td>
<td>Low</td>
<td>Social</td>
</tr>
<tr>
<td>Complain</td>
<td>Customer Service</td>
<td>High</td>
<td>CRM/Social</td>
<td></td>
</tr>
<tr>
<td>Accuse</td>
<td>Customer Service</td>
<td>Critical</td>
<td>CRM</td>
<td></td>
</tr>
<tr>
<td>Quit</td>
<td>Customer Service</td>
<td>Critical</td>
<td>CRM/Social</td>
<td></td>
</tr>
<tr>
<td>Express</td>
<td>Call Center Training</td>
<td>Low</td>
<td>Transcripts</td>
<td></td>
</tr>
<tr>
<td>Thank</td>
<td>Express</td>
<td>Call Center Training</td>
<td>Low</td>
<td>Transcripts</td>
</tr>
<tr>
<td>Apologize</td>
<td>Express</td>
<td>Call Center Training</td>
<td>Medium</td>
<td>Transcripts</td>
</tr>
<tr>
<td>Empathize</td>
<td>Express</td>
<td>Call Center Training</td>
<td>Medium</td>
<td>Transcripts</td>
</tr>
</tbody>
</table>
Event Analysis

Raw Text: There is heavy snowfall in Sikkim.

Analysis: Snowfall event

Event: snowfall
### Event Analysis

#### Categories

- Acquisition
- Merger
- Spin Off
- Sale
- Partnership Formation
- Declaration of Bankruptcy
- Renaming
- Closing Down
- Opening Facility
- Closing Facility
- Business Deal
- Product Launch
- Product Withdrawal
- Employee Joining
- Employee Resignation
- Employee Change of Position
Fact Analysis

Raw Text: Bangalore is the capital of K’taka

Analysis: capital_of_relation exists

Entity: Bangalore/Place
       Karnataka/Place

Relation: Bangalore capital_of K’taka
Uses

Decision Making - Reports
Pulling report from CRM tools on loyalty, competition, etc. Computation of metrics.

Operations
Intention Analysis in customer service, online reputation management & placement of ads or in Alerting Systems.
Decision Making Uses

Tracking Large Numbers of Users

For strategy decisions – politics, launches

Metrics

Dials for navigating by
Decision Making Example – Using Quit Intention

Quit message chart for Facebook during the week after Google+ launched.
Types of Reports

1. Time Series Graphs
2. Charts
3. Tag Clouds
   - Identifies popular topics
4. Event Summaries
5. Sentiment Report
6. Dials – Complaint Metrics
I deny that [ it can never [ be said that this is not [ a beautiful car ] ] ].
Jane believes that John and not Bruce is very handsome.

About what/whom is the opinion?
## Error Compensation!

<table>
<thead>
<tr>
<th>Section</th>
<th>Problem</th>
<th>Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accuracy</strong></td>
<td>• Low accuracy</td>
<td>• Trade off recall for precision</td>
</tr>
<tr>
<td><strong>Precision</strong></td>
<td>• Low Precision</td>
<td>• Use ratios and timelines</td>
</tr>
<tr>
<td><strong>Domain</strong></td>
<td>• Different domain</td>
<td>• Retraining</td>
</tr>
</tbody>
</table>
What was selected

Precision (tp/tp+fp)
Recall (tp/tp+fn)

What was selected

tn

fp tp fn

actual target
Example

Precision = \{\text{inquire}=0.81, \\
\text{direct}=0.5163, \text{accuse}=0.6944, \\
\text{wish}=0.918, \text{compare}=0.851, \\
\text{sell}=0.9621, \text{complain}=0.8622\}\}

Recall = \{\text{direct}=0.6, \text{inquire}=0.3078, \\
\text{accuse}=0.5102, \text{wish}=0.6021, \\
\text{compare}=0.4145, \text{sell}=0.4069, \\
\text{complain}=0.5853\}\}
Example

F-Score = \{\text{direct}=0.5566, \\
\text{inquire}=0.4993, \text{accuse}=0.5952, \\
\text{wish}=0.7435, \text{compare}=0.5939, \\
\text{sell}=0.6257, \text{complain}=0.7104\}
What you can learn about a brand:

1: Who are a product’s strongest competitors?

2: How commoditized is the market?

3: What are the weaknesses of the product?

4: How loyal are customers in an industry?
Measurement Proxy:

Use **opine intention**

**CSAT** = number of positive mentions of brand / number of opinionated mentions of brand
Example – 2: Who are a product’s competitors?

Measurement Proxy:

Use compare intention
competitor’s strength = number of mentions of competitor / number of mentions of all brands or generic products
Measurement Proxy:

Use *purchase intention*

commoditization =

number of mentions of brands / number of mentions of generic product

Example – 3: How commoditized is the market?
Example – 4: How loyal are customers?

Measurement Proxy:

Use quit intention

inverse of loyalty = number of quit intentions / total mentions
Measurement Proxy:

Use purchase intention desirability = number of purchase intentions / total mentions
Measurement Proxy:

Use complain intention

reliability = number of complain intentions / total mentions

Example – 6: How reliable is a product?
Operations Uses

Timeliness

For investing

Prioritization / Routing

Dealing with large numbers
The customer lodges a complaint

An accusation may result

Signal of intention to leave.

Call Center Customer Churn Model
The customer complains about a pain point (optional)

Inquires about a product feature

Signals intention to purchase or upgrade

Call Center Customer Sales Opportunity Model
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