Intelligent Text Extraction and Summarization for an Improved Community Initiative

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PROJECT SUMMARY

We present an intelligent system that was used to process textual information, generate knowledge, and automatically summarize key findings of the My Meadville community statements.

▶ My Meadville is a non-profit organization with the goal of highlighting the positive work that is being done in the city of Meadville, PA, and bringing upfront the enhancements and improvements that can be made.
▶ My Meadville conducted a large number of interviews with the residents of Meadville during the community events and transcribed these interviews into textual data files.
▶ Our system processes these community statements, finds important keywords, and then produces a summary of the key excerpts from all data.

MY MEADVILLE MANUAL DATA ANALYSIS

Value Statement: Health and Safety
We will be a healthy community in which everyone has access to health care, fresh food, quality housing, and support services.

Supporting Data: Fresh food
▶ “We value the different variety of foods available in Meadville.”
▶ “Value a community that puts a focal point on healthy food options grown locally.”
▶ “... Values the family businesses and small food places ...”

SYSTEM DESIGN

Input files .docx files
Pre-processing
Processing
Summarization

- Convert DOCX files to TXT files
- Extract responses in the input file
- Rank all words, phrases and sentences
- Combine excerpts and keywords
- Convert texts to join sentences
- Find organization names

METHODOLOGY: KEY POINTS

Processing (three layers):
1. The text rank layer builds a word graph for voting on the importance based on [Mihalcea 2004].
2. For sentiment analysis Scikit-learn was used to implement naive Bayes variations, Logistic Regression, Linear support vector clustering, and stochastic gradient descent classifier algorithms.
3. Stanford Named Entity Recognizer was used to locate organization names as they are all important.

Example:

First Layer:
{"graf": [0, "Uh", "uh", "Uh", 0, 0],
[1, "more", "more", "JJ\r\", 1, 1],
[2, "children", "child", "NNS", 1, 2],
[3, "activities", "activity", "NNS", 1, 3],
[8, "and", "and", "CC", 0, 4],
[4, "events", "event", "NNS", 1, 5],
}

Second Layer:
{"count": 1, "ids": [1, 2, 3], "pos": "np",
"rank": 0.8883432728390975,
"text": "more children activities"}
{"count": 1, "ids": [15, 16], "pos": "np",
"rank": 0.66691020745008741, "text": "hefty fee"}

Third Layer:
{"dist": 0.0859352445283789, "idx": 0,
"text": "Uh more children activities and events .",
"dist": 0.05265600431403769, "idx": 4,
"text": "but it all comes with a hefty fee too ."}

TRANSCIBED DATA

Over 200 interviews
Min words = 334
Max words = 30,465

SAMPLE OUTCOME

▶ Text summary and keywords were extracted from each interview.

I think those are nice events , and the downtown mall. they did a few years ago
Keywords: nice events, downtown mall, friendly activities, stuff