Humorous Caption Generation for New Yorker Cartoons

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Introduction

We present a method for automatically generating humorous captions to New Yorker Cartoons. Every week, the New Yorker runs a cartoon captioning contest where readers can submit funny captions to an uncaptioned cartoon. We propose that one method to produce humorous captions is by using keywords from the two parts of the "incongruity" apparent in the image. Given a description file with a manual description of these images, we show the results of extracting keywords and replacing a single word in a known cliche for humorous effect.

Materials and Methods

We wanted our algorithm to be as fully automated as possible, so rather than manually creating keywords, we decided to extract them from an existing dataset of manual descriptions.

Of particular importance to us was the incongruity column, which points out what part of the image is out of context

For keyphrase extraction, we used a standard huerisitc to select candidate phrases, finding noun phrases. But we use a unique ranking algorithm to find keywords that encapsulate both parts of the incongruity, by pairing nouns not a part of the same noun phrase, and then selecting the words with the max and and min ngram probability.

The first class PhraseDictionary supported ranked retrieval of the phrases based on indexed information retrieval. We did a ranked retrieval prioritizing phrases with a high ngram probability according to the Microsoft web corpus language model.

The CaptionGenerator class takes in two keywords. For each keyword, it calls the PhraseDictionary search method, and then loops through each of the returned phrases in ranked order. For each phrase, it tokenizes the phrase into words and uses the nltk part of speech tagger to locate nouns. It then finds the NN or NNS tag with the greatest index in the sentence. It then replaces this noun with the other keyword.

```
(ROOT
  (S
    (NP (NN business) (NN meeting))
    (VP (VBN held) (PP (IN in) (NP (NN subway))))))
```

```
[[(business, -2.907), (meet, -3.918)],
 [(subway, -5.074)]]
```

```
Max ngram:

[(business, -2.907), (subway, -5.074)]
[(meet, -3.918), (subway, -5.074)]

Min ngram in subset:

[(business, -2.907), (subway, -5.074)]

Keywords:

    [business, subway]
```

Figure 1a. A Stanford tree parse of an incongruity description

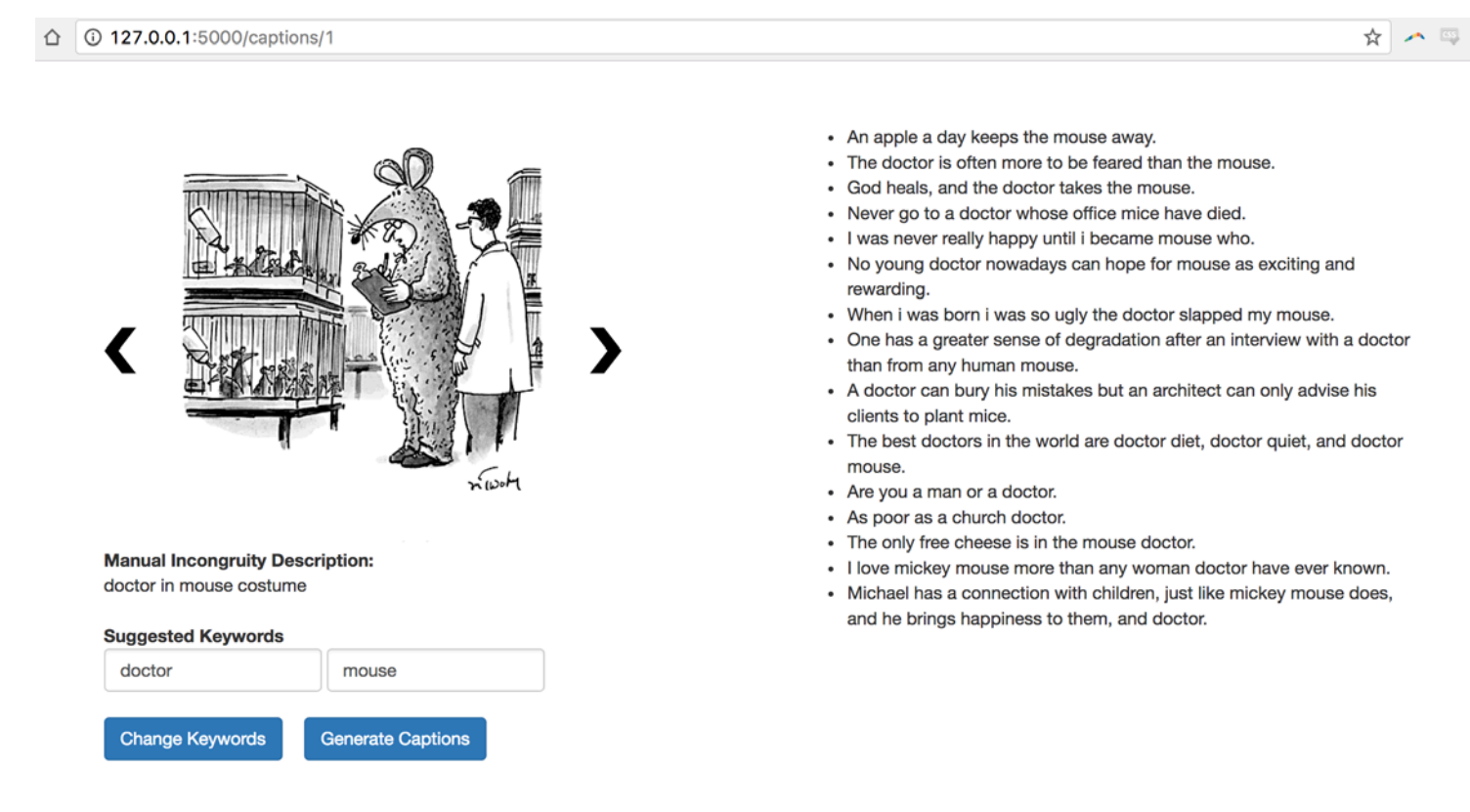**Figure 1b.** The candidate words, separated by noun phrase

Figure 1c. The candidate ranking algorithm

```
Keywords:  doctor mouse

Retrieved:  an apple a day keeps the doctor away

Tagged:  an/DT apple/NN a/DT day/NN
keeps/VBZ the/DT doctor/NN away/RB

Caption:  an apple a day keeps the mouse away
```

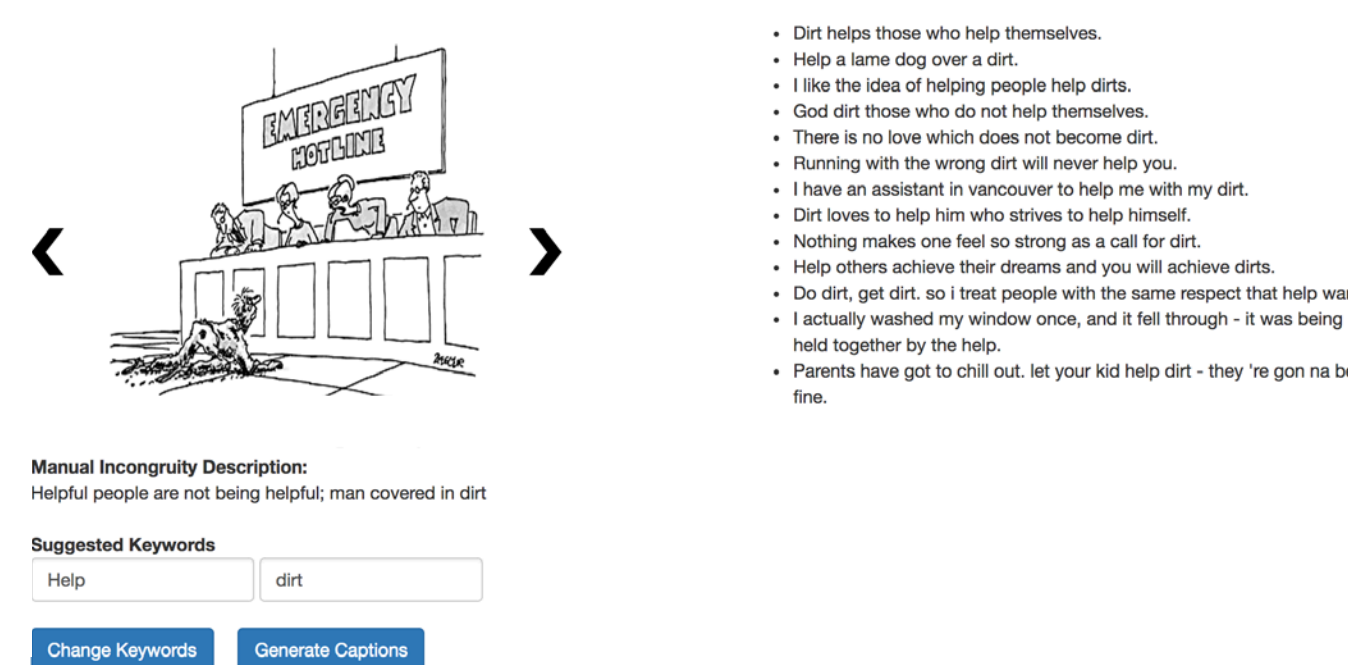**Figure 3.** The Lexical Replacement algorithm used by CaptionGenerator

Figure 5 and 6. Screen shots from the web application, featuring a cartoon and its generated caption

Key Phrase Extraction Results		
Incongruity Description	Ngram-Scored Candidates	Extracted Keywords
doctor in mouse costume	[[(doctor, -4.038)],[(mouse, -4.43), (costume, -4.55)]]	doctor, mouse
business meeting held in subway	[[(business, -2.907), (meet, -3.918)],[(subway, -5.074)]]	business, subway
Helpful people are not being helpful; man covered in dirt	[[Help, -3.077), (people, -3.131)],[(man, -3.579)], [(dirt, -4.745)]]	Help, dirt
giant monsters in a city	[[(city, -3.242), (monster, -4.386),(giant, -4.574)]]	giant, city

Figure 2. Results of keyphrase extraction for the first four incongruity descriptions

Results

Figure 2 displays the results for keyphrase extraction. The algorithm produces good results for descriptions with 2-3 candidate words, producing pairs that accurately capture both parts of the incongruity. As another example, "main in suit with surfboard" is summarized as "man, surfboard," which fits the image of a man running through an office with a surfboard.

The caption generator's best captions are those that are most common. The other captions are dismissed as less successful because they are less grammatical.. As phrases became longer and less common in everyday speech, substitution was more likely to produce a non-sensible phrase.

Nevertheless, the caption generation algorithm seems to produce humorous captions of decent quality with limited human input. The only human input needed is a single sentence description of the original incongruity.

Conclusion

In this paper, we showed that linguistic theory could be applied to generate keywords and later cartoon captions with humorous effect.

While intuitively, some of these captions seem funny, the most important next step would be to obtain evaluations of the captions.

Lessons learned from this algorithm could be used to produce humor-generating algorithms in other circumstances. Using linguistic patterns from existing jokes in new circumstance may prove to be an effective strategy. Overall, we are hopeful that algorithms like this one can be employed in a variety of contexts, and serve to illuminate the nature of humor.

```
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Figure 3. The Lexical Replacement algorithm used by CaptionGenerator

- An apple a day keeps the mouse away.
- The doctor is often more to be feared than the mouse.
- God heals, and the doctor takes the mouse.
- Never go to a doctor whose office mice have died.
- I was never really happy until i became mouse who.
- No young doctor nowadays can hope for mouse as exciting and rewarding.
- When i was born i was so ugly the doctor slapped my mouse.
- One has a greater sense of degradation after an interview with a doctor than from any human mouse.
- A doctor can bury his mistakes but an architect can only advise his clients to plant mice.
- The best doctors in the world are doctor diet, doctor quiet, and doctor mouse.
- Are you a man or a doctor.
- As poor as a church doctor.
- The only free cheese is in the mouse doctor.
- I love mickey mouse more than any woman doctor have ever known.
- Michael has a connection with children, just like mickey mouse does, and he brings happiness to them, and doctor.

Manual Incongruity Description:
doctor in mouse costume

Suggested Keywords

doctor	mouse

Change Keywords   **Generate Captions**

- Dirt helps those who help themselves.
- Help a lame dog over a dirt.
- I like the idea of helping people help dirts.
- God dirt those who do not help themselves.
- There is no love which does not become dirt.
- Running with the wrong dirt will never help you.
- I have an assistant in vancouver to help me with my dirt.
- Dirt loves to help him who strives to help himself.
- Nothing makes one feel so strong as a call for dirt.
- Help others achieve their dreams and you will achieve dirts.
- Do dirt, get dirt. so i treat people with the same respect that help want.
- I actually washed my window once, and it fell through - it was being held together by the help.
- Parents have got to chill out. let your kid help dirt - they 're gon na be fine.

Manual Incongruity Description:
Helpful people are not being helpful; man covered in dirt

Suggested Keywords

| Help | dirt |

[Change Keywords] [Generate Captions]