



# Louisiana State University

## **Affect Corpus 2.0: An Extension of a Corpus for Actor Level Emotion Magnitude Detection**

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# Objectives



- Interest in emotion detection and emotion prediction:
  - ▣ Advertisements
  - ▣ Human-computer interactions
  - ▣ Social media mining
- Resources are needed to train and test emotion prediction models
- Current corpora focus on:
  - ▣ Sentence level emotion classification.
- Need for annotation at the actor level that includes:
  - ▣ Actors per story
  - ▣ Actor presence in a sentence and location in a story
  - ▣ Emotion magnitudes per actor

# What was done



- New annotations for Actor level affect magnitude detection
  - Actors per story
  - Emotion magnitudes per actor per sentence
  - Sentence parse for each sentence
  - For speech annotated stories:
    - Librivox used to obtain audio recordings
    - Additional recordings were produced by a professional reader
    - Praat text grids were used to annotate sentence boundaries
- Results of inter-annotator agreement analysis

# Annotation Tool

LSU Corpus Annotator - Current Story: 3\_our\_ladys\_child

Remove	wood-cutter	Remove	wood-cutter's wife	Remove	the little girl
Happy		Happy		Happy	
Angry		Angry		Angry	
Sad		Sad		Sad	
Surprised		Surprised		Surprised	
Afraid		Afraid		Afraid	

Virgin Mary  
The King  
the little angels  
the son  
the people  
second son  
queen's baby daugh

Done, Save Annotations to Text File Quit

Load File  Open File

Start Annotating Story Add New Actor  
Delete Actor from list

Go back to previous sentence

Sentence Number: 1

Record annotations and move to next sentence

# of Actors: 10

**They were so poor, however, that they no longer had daily bread, and did not know how to get food for her.**

One morning the wood-cutter went out sorrowfully to his work in the forest, and while he was cutting wood, suddenly there stood before him a tall and beautiful woman with a crown of shining stars on her head, who said to him, "I am the Virgin Mary, mother of the child Jesus."  
"Thou art poor and needy, bring thy child to me, I will take her with me and be her mother, and care for her."  
The wood-cutter obeyed, brought his child, and gave her to the Virgin Mary, who took her up to heaven with her.  
There the child fared well, ate sugar-cakes, and drank sweet milk, and her clothes were of gold, and the little angels played with her.  
And when she was fourteen years of age, the Virgin Mary called her one day and said, "Dear child, I am about to make a long journey, so take into thy keeping the keys of the thirteen doors of heaven."  
Twelve of these thou mayest open, and behold the glory which is within them, but the thirteenth, to which this little key belongs, is forbidden thee.  
"Beware of opening it, or thou wilt bring misery on thyself."  
The girl promised to be obedient, and when the Virgin Mary was gone, she began to examine the dwellings of the kingdom of heaven.  
Each day she opened one of them, until she had made the round of the twelve.  
In each of them sat one of the Apostles in the midst of a great light, and she rejoiced in all the magnificence and splendour, and the little angels who always accompanied her rejoiced with her.  
Then the forbidden door alone remained, and she felt a great desire to know what could be hidden behind it, and said to the angels, "I will not quite open it, and I will not go inside it, but I will unlock it so that we can just see a little through the opening."  
"Oh no," said the little angels, "that would be a sin."

# Text corpus Statistics



- 176 stories by 3 authors.
  - ▣ 15,302 sentences
- Neutral class: all emotion class magnitudes are zero
- About 45,120 NPs that did not include pronouns

# Speech corpus characteristics

	<b>Number of audio recordings</b>	<b>Male</b>	<b>Female</b>	<b>Number of speakers</b>
Grimms	59	38	21	32
Potter	18	11	7	15
H. C. Andersen	12	5	7	9

# Corpus Structure



- Emotion Magnitudes
  - ▣ Annotator
    - Actors
      - StoryName.actors
    - Magnitude vectors
      - StoryName.vectors
- Speech
  - ▣ StoryName.textgrids
- UIUC
- XML markup
  - ▣ StoryName.bart.xml

# Emotion vector

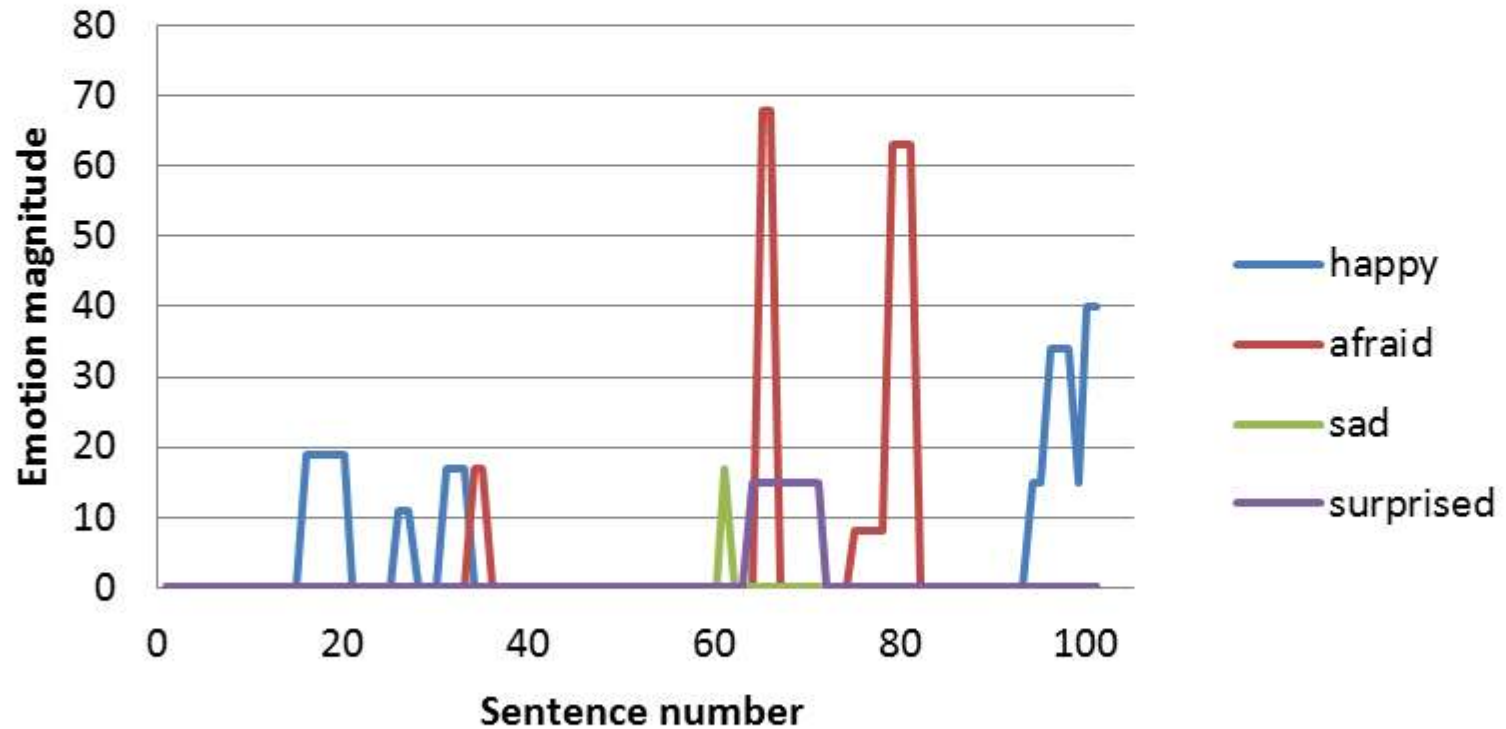


- [84,mrs. Rebecca puddle-duck,0,0,0,0,0,0,Jemima became much alarmed.]
- [84,jemima puddle-duck,0,0,0,42,66,1,Jemima became much alarmed.]
- [84,Kep,0,0,0,0,0,0,Jemima became much alarmed.]



# Emotion signal per actor

## Emotion signals for Tom Thumb



# Emotion signal information



- Visualization of emotion magnitudes per actor through story
- Examples:
  - ▣ Tom Thumb started out happy
  - ▣ Then, something happened that caused him sadness, surprise and a lot of fear.
  - ▣ These problems were resolved because the final emotion is happy

# Inter-Annotator Agreement

- 19 stories were annotated by 2 people
- Class: data set with all emotion magnitude assignments including neutral
  - Evaluate emotion class assignment: five classes vs. neutral
- Magnitude: data set limited to annotations where actor received at least one emotion magnitude assignment other than zero
  - Evaluate annotator agreement on emotion magnitude assignment
- The metrics used to evaluate inter-annotator agreement: Average observed agreement, Pi, alpha, S, Kappa.
- For categorical metrics, magnitude data was categorized into four groups:
  - 0-25 as low
  - 26-50 as medium low
  - 51-75 as medium high
  - 76-100 as high

# Inter-annotator metrics for emotion assignment

	<b>Happy</b>	<b>Angry</b>	<b>Sad</b>	<b>Surprised</b>	<b>Afraid</b>
<b>Avg_Ao</b>	0.897	0.867	0.872	0.794	0.742
<b><math>\pi</math></b>	0.222	0.463	0.280	0.086	0.089
<b>S</b>	0.863	0.823	0.829	0.725	0.657
<b>Kappa</b>	0.223	0.464	0.289	0.128	0.129
<b>Alpha</b>	0.222	0.463	0.280	0.086	0.089

	<b>Happy</b>	<b>Angry</b>	<b>Sad</b>	<b>Surprised</b>	<b>Afraid</b>
<b>Avg_Ao</b>	0.586	0.412	0.555	0.551	0.475
<b><math>\pi</math></b>	0.090	0.164	0.318	0.126	0.139
<b>S</b>	0.448	0.216	0.407	0.402	0.300
<b>Kappa</b>	0.096	0.186	0.332	0.186	0.182
<b>Alpha</b>	0.091	0.166	0.321	0.128	0.141

# Applications



- Speech/Text-to-Scene processing
- Text-to-Speech processing
- HCI
- Calibration of emotion recognition within multimedia systems
- Social media content analysis and Twitter dialog censoring of inappropriate language.
- Email content analysis
- Speech analysis of emotional cues, antiterrorism, and hate speech detection.
- Automatic virtual world synthesis or text-to-speech implementations

# On-going work: renderings that can use emotion magnitudes



Open mouth and happy pose



Sad pose



Afraid pose



Angry pose

# On-going work: 3-D rendering of a scene with emotion context and actors



# Conclusions



- New annotations for a well known set of children's stories for:
  - ▣ Emotion magnitude per actor
  - ▣ Actor detection
  - ▣ Actor presence in story
  - ▣ Speech
- Inter-annotator agreement metrics
- Multimodal resources that link NLP approaches to multimedia synthesis in speech and computer graphics are useful



# Future Work



- Speech extension
- 129 of 176 stories are already recorded and available from Librivox. 89 have text grid annotations



Questions?