The Search for Emotions, Creativity, and Fairness in Language

Saif M. Mohammad
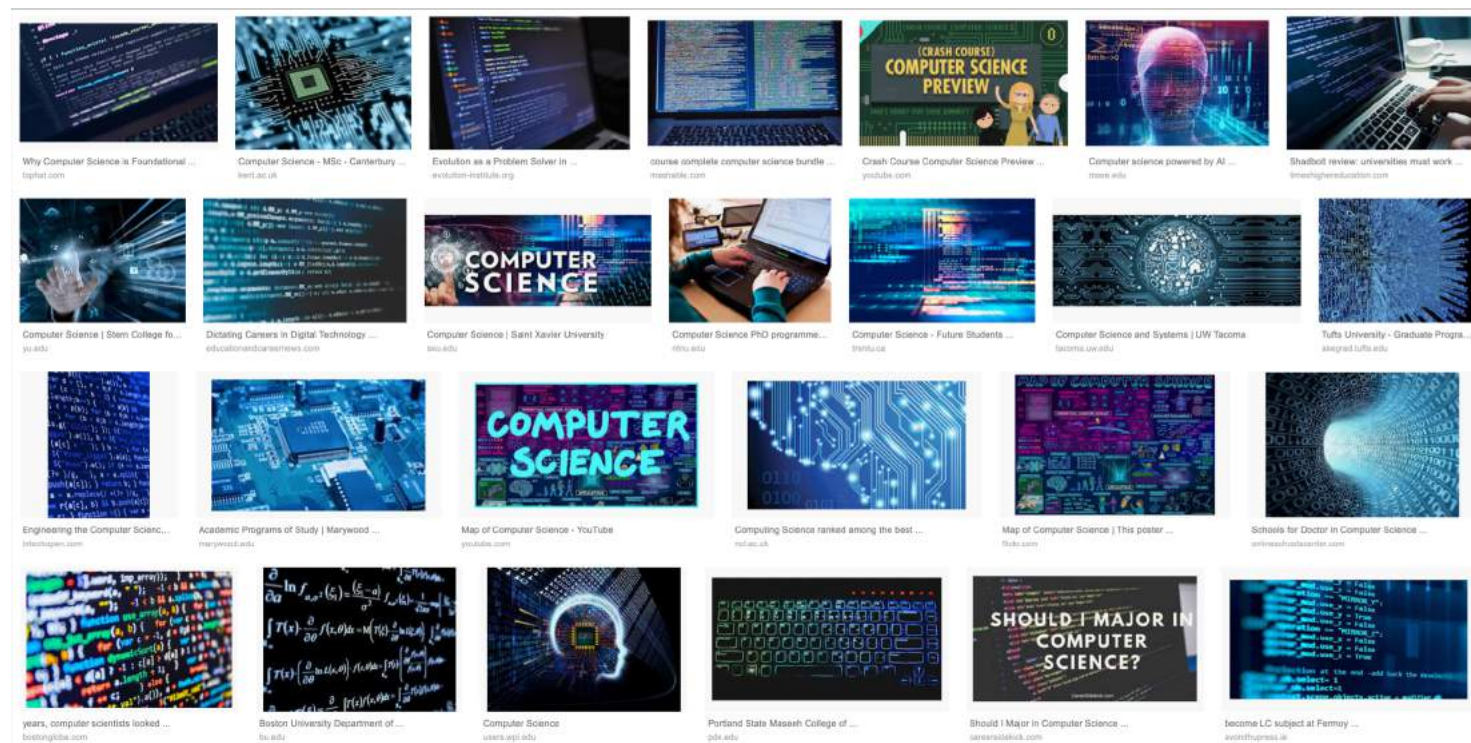Senior Research Scientist, National Research Council Canada

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What comes to mind when you hear the words…

Computer Science

Google images result for "computer science":

What comes to mind when you hear the words…
Computer Science

Google images result for "working in computer science":

Working in Computer Science

- People working on all kinds of compelling, interesting, and useful problems using computers as a tool for processing data

- People with diverse backgrounds and interest

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Natural Language Processing

Create machines/applications that have human abilities of language

- translate text from one language to another

- understand questions

- find answers from the internet
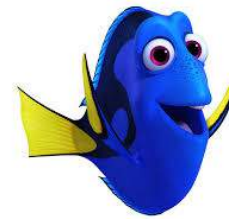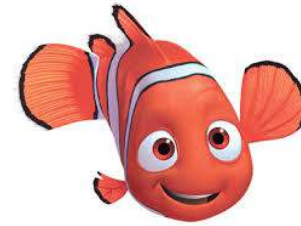
Computations Linguistics

Ask research questions

- how do people use language?
- how do kids learn language?
- why is language the way it is?

Emotions

- there is no cognition without emotion

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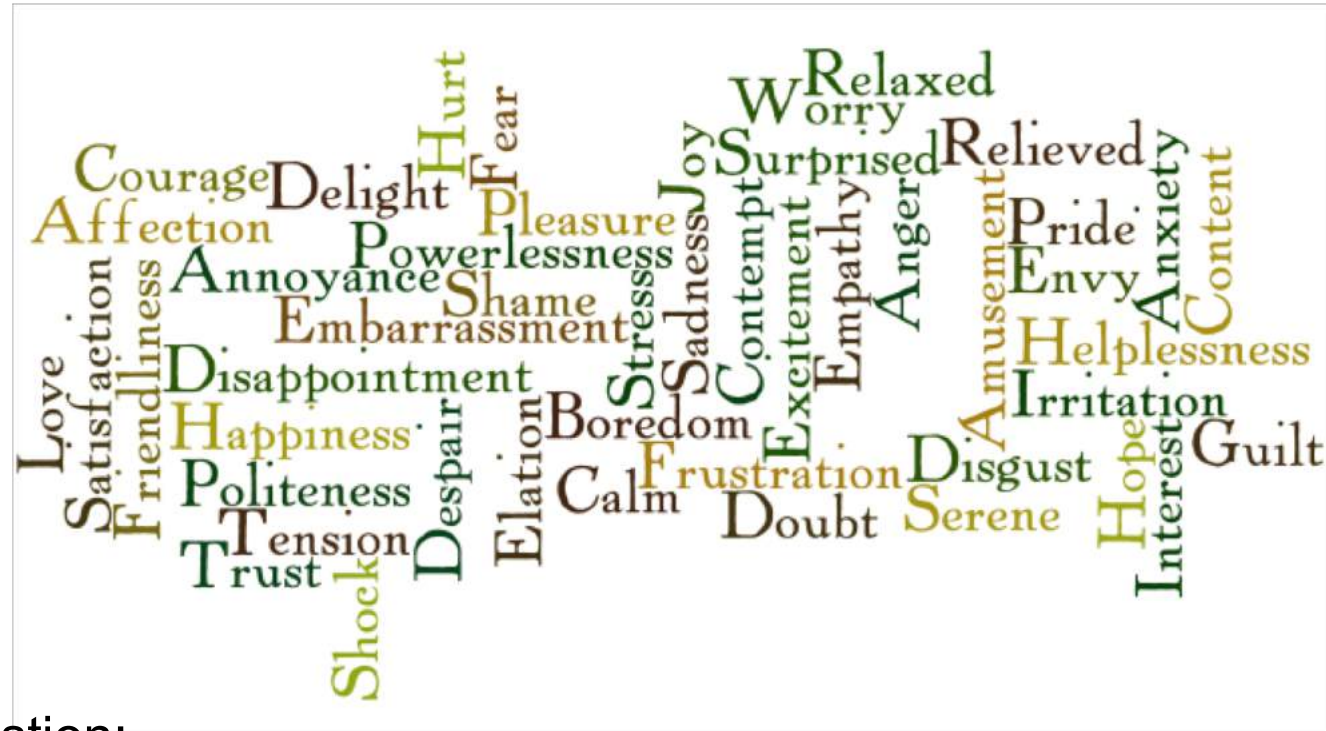# The Search for Emotions in Language

creativity   fairness

@SaifMMohammad

Emotions

How many emotions can we perceive?

Difficult question:
- fuzzy emotion boundaries, overlapping meanings, socio-cultural influences, etc.
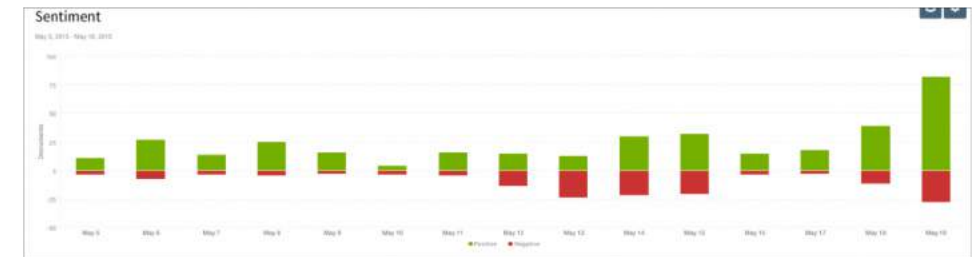
Some studies suggest 500 to 600 emotion categories!

Sentiment Analysis

Create applications for:

- Determining how much people like the latest iPhones, government policies, pop album
- Detecting cyber-bullying, fake news, depression, personality traits
- Creating game characters and virtual assistants that can detect and express emotions

Emotions in Language

Ask research questions:

- how do people use language to convey emotions?
- how are emotion words different from other words?
- does our personality impact how we view the world around us?

Creativity in Language (humans being creative when using language)

Computational Creativity (computers doing creative things)
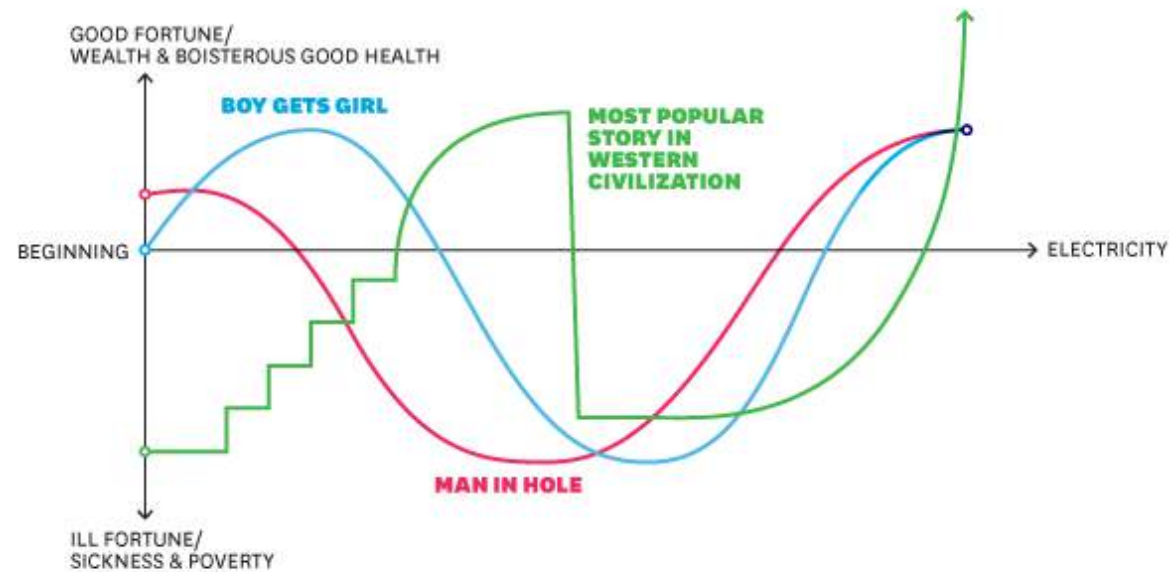
DETECTING SHAPES OF STORIES

Tracking Emotions in Stories

- Can we automatically track the emotions of characters?
- Are there some canonical shapes common to most stories?

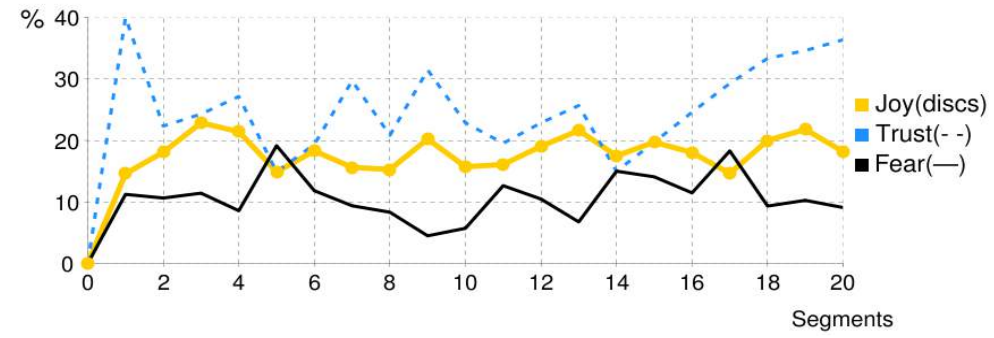**SIMPLE SHAPES OF STORIES**
As told by Kurt Vonnegut.

GOOD FORTUNE/
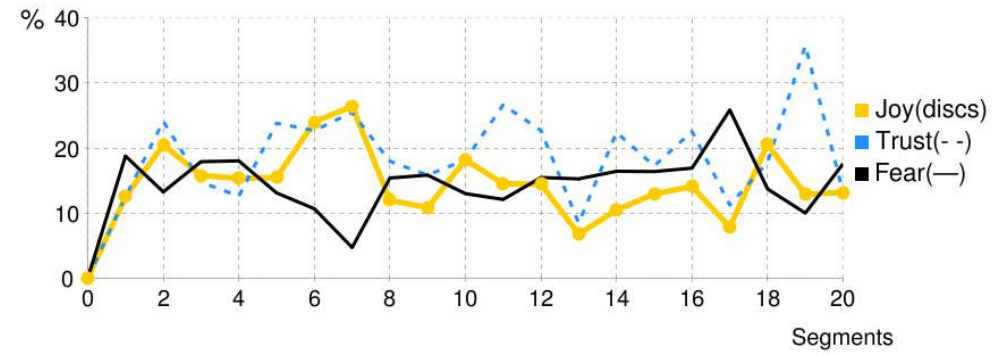WEALTH & BOISTEROUS GOOD HEALTH

BOY GETS GIRL

MOST POPULAR
STORY IN
WESTERN
CIVILIZATION

BEGINNING → ELECTRICITY

MAN IN HOLE

ILL FORTUNE/
SICKNESS & POVERTY
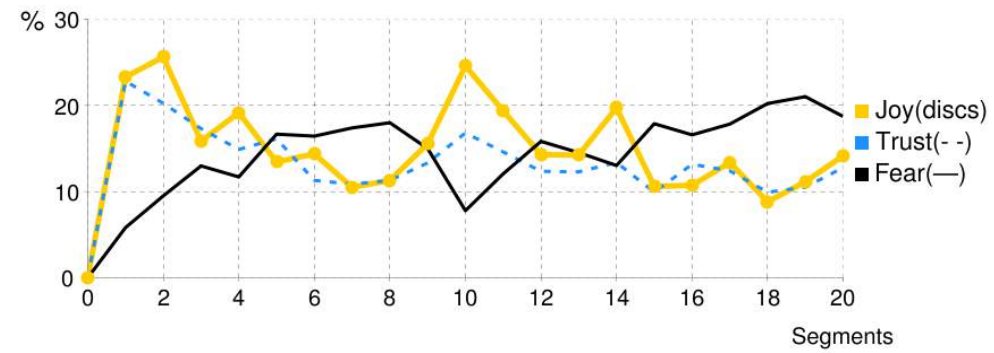
SOURCE DAVID YANG, VISUAL.LY
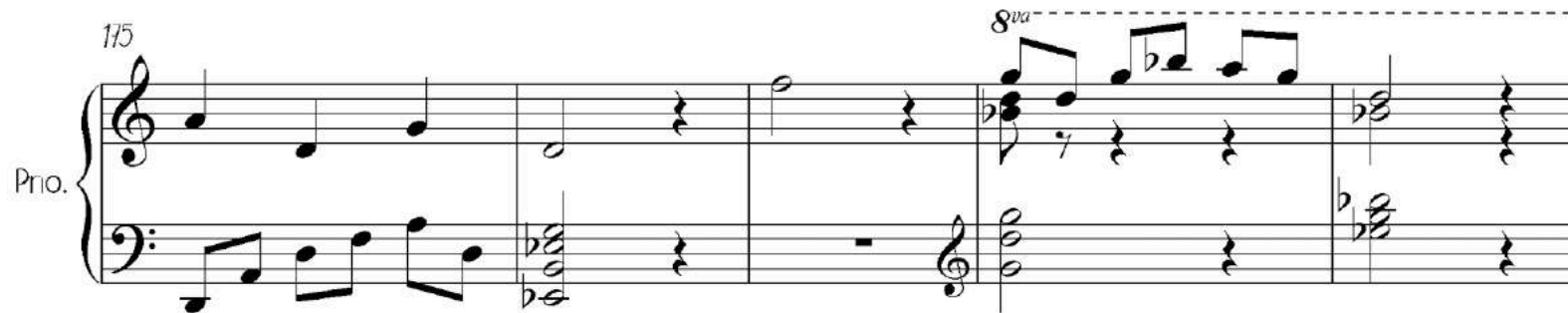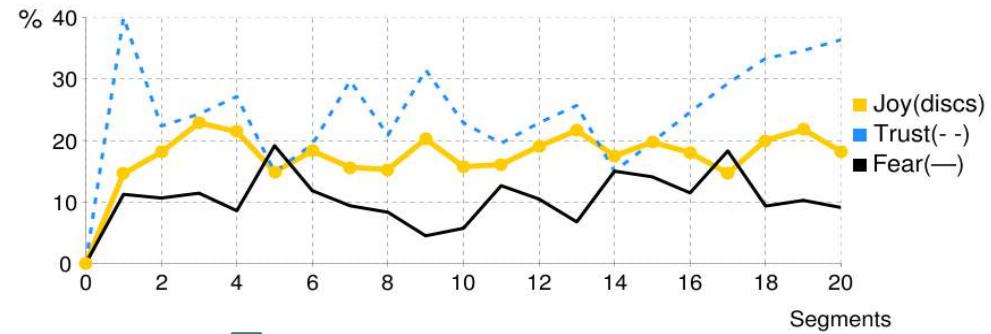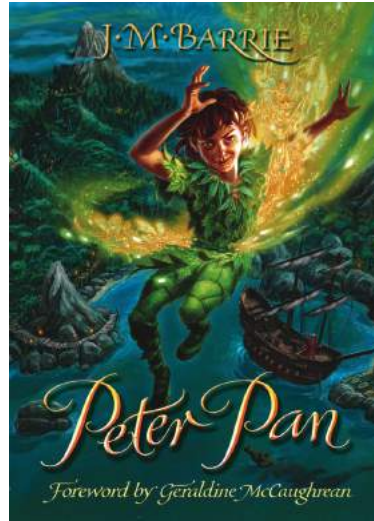
HBR.ORG

As You Like It

Hamlet

Frankenstein

13

A method to generate music from literature.
- music that captures the change in the distribution of emotion words.
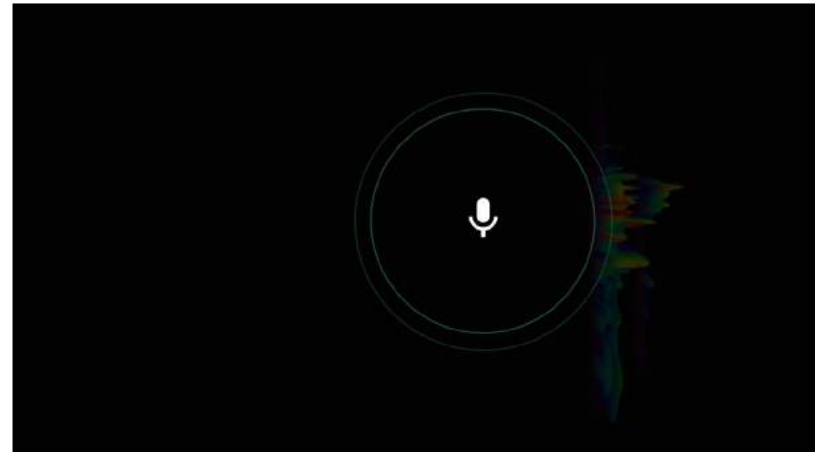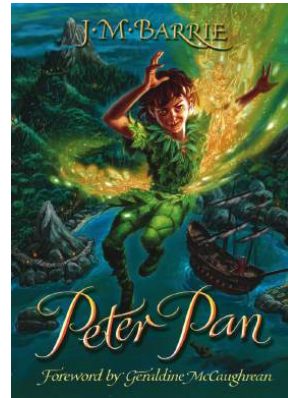
Music-Emotion Associations

- Major and Minor Keys
  - major keys: happiness
  - minor keys: sadness

- Tempo
  - fast tempo: happiness or excitement

- Melody
  - a sequence of consonant notes: joy and calm
  - a sequence of dissonant notes: excitement, anger, or unpleasantness

Hunter et al., 2010, Hunter et al., 2008, Ali and Peynirciolu, 2010,
Gabrielsson and Lindstrom, 2001, Webster and Weir, 2005

TransProse

Automatically generates three simultaneous piano melodies pertaining to the dominant emotions in the text, using the NRC Emotion Lexicon.

Examples

TransProse

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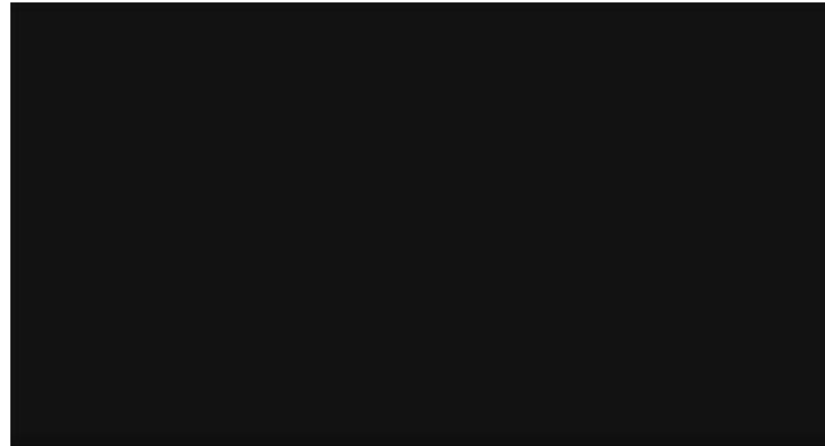
Examples

TransProse

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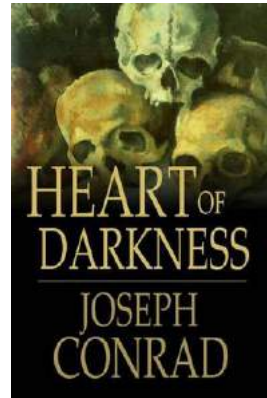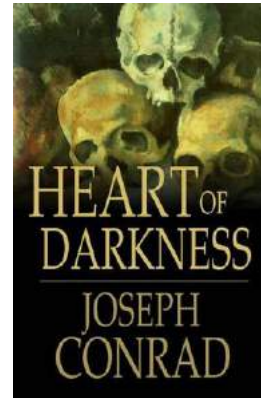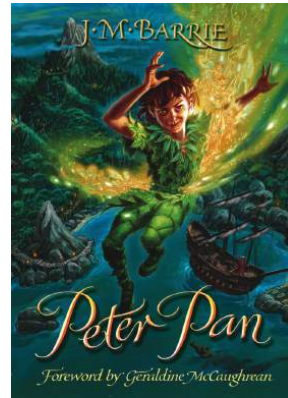
Examples

TransProse: www.musicfromtext.com
Music played 300,000 times since website launched in April 2014.

TransProse Music Played by an Orchestra, at the Louvre Museum, Paris

A symphony orchestra performs under the glass of the Louvre museum in Paris on Sept. 20. Accenture Strategy has created a symphonic experience enabled by human insight and artificial intelligence technology. (Michel Euler/AP)
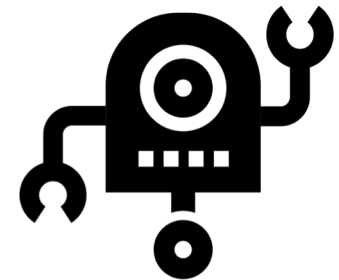
Do Machines Make Fair Decisions?

YES:

- they do not take bribes

- they can make decisions without being influenced by the user's gender, race, or sexual orientation

And NO—recent studies have demonstrated that predictive models built on historical data may inadvertently inherit inappropriate human biases

Created by Oksana Latysheva
from Noun Project

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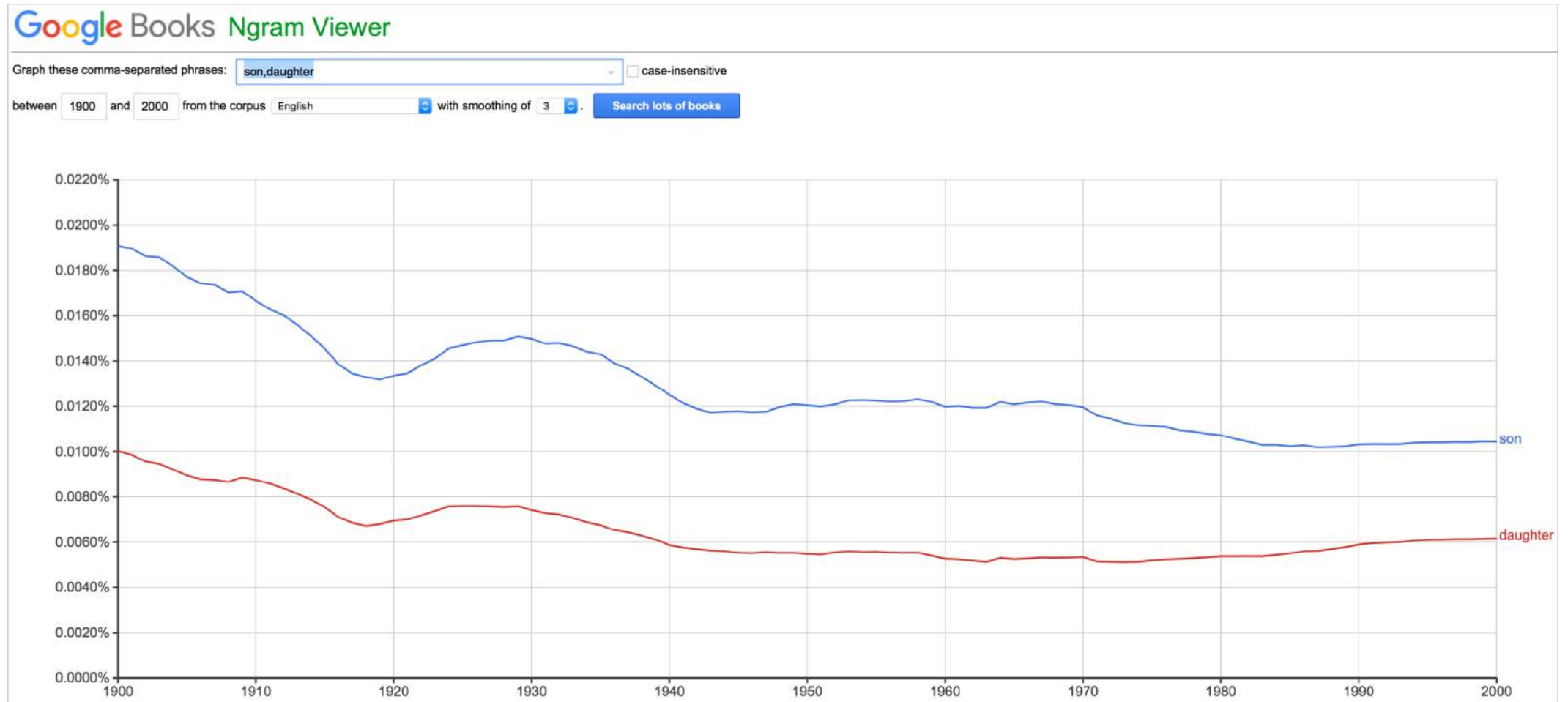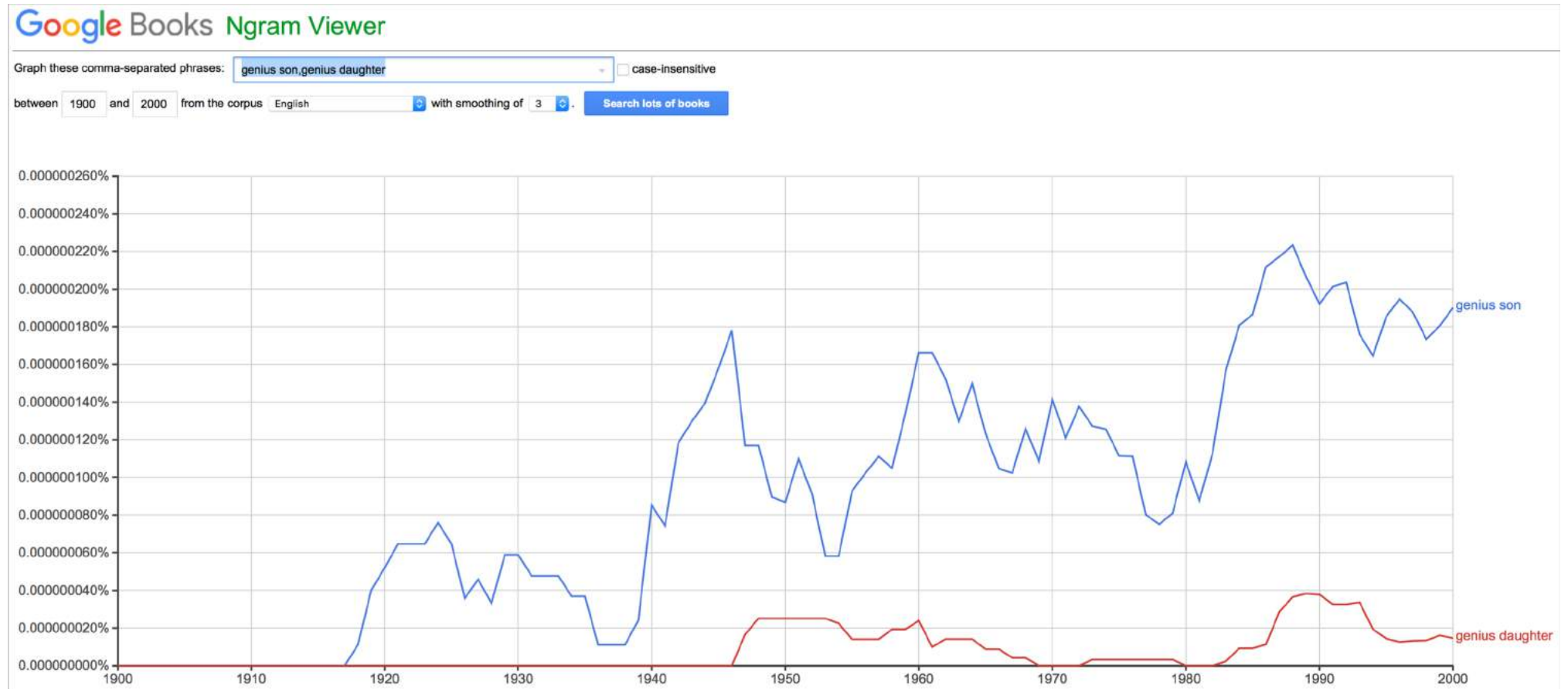
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Examples of Biased AI

- Tay, Microsoft's racist chat bot posting inflammatory and offensive tweets

- Amazon's AI recruiting tool biased against women
  - penalized resumes that included the word "women's," as in "women's chess club captain."

- Face recognition systems good for detecting faces of white men, but really bad for African American women

- Sentiment analysis systems biased to show
  - text containing mentions of African American names to be more angry
  - text containing mentions of women too be more emotional

Occurrences of "son" and "daughter" in the Google Books Ngram corpus

Occurrences of "genius son" and "genius daughter" in the Google Books Ngram corpus

Our Work

- Measuring inappropriate biases in AI systems and language
- Developing algorithms to prevent and mitigate inappropriate biases

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