To feel or not to feel: Emotion Detection in Shakespeare's plays

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Project for the course in Text Mining and Sentiment Analysis (DSE)

Aim of the project

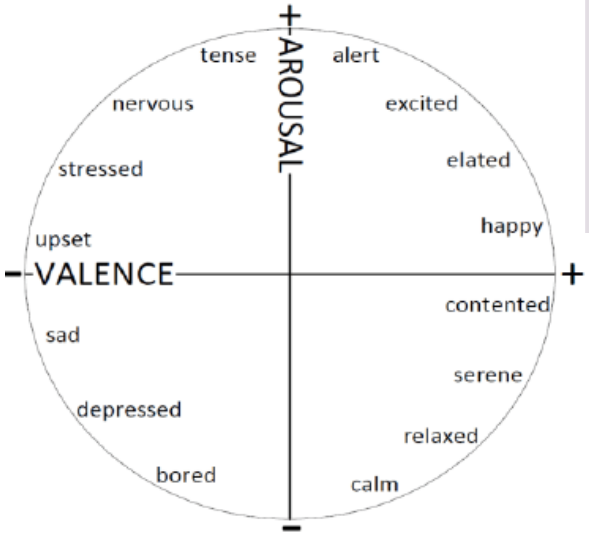
Creatively use Large Language Models to perform Emotion Detection on works of fiction.

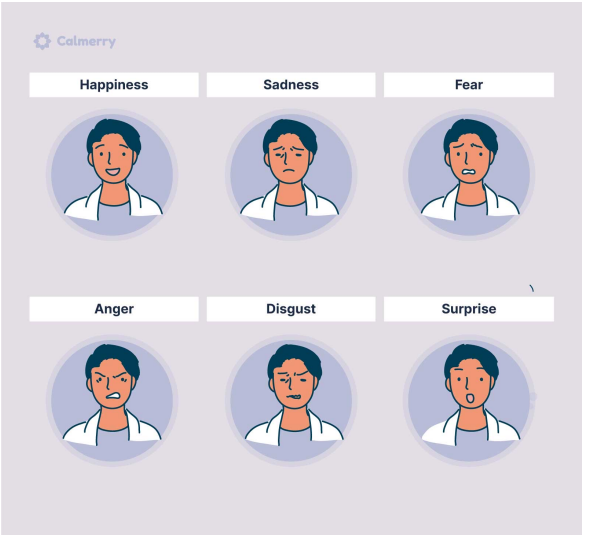
Three tasks:

1. Characterize the ”**emotional profile**” of a character
2. Understand the **evolution of this profile** through the plot
3. Understand the ”**emotional interactions**” between characters

What are emotions?
Why are they relevant in fictions?

- Two different **models of emotions** from Psychology:
  - Categorical Model (Paul Ekman)
  - Dimensional Model (James A. Russell)
- Emotions seem to play a **crucial role in our reading experience** of fictional works: ToM[1] and empathy[2] enhanced when the reader is emotionally involved in the plot!





[1] Kidd, David Comer and Emanuele Castano (Oct. 2013). "Reading Literary Fiction Improves Theory of Mind". In: Science
[2] Bal, P. Matthijs and Martijn Veltkamp (Jan. 2013). "How Does Fiction Reading Influence Empathy? An Experimental Investigation on the Role of Emotional Transportation". en. In: PLOS ONE

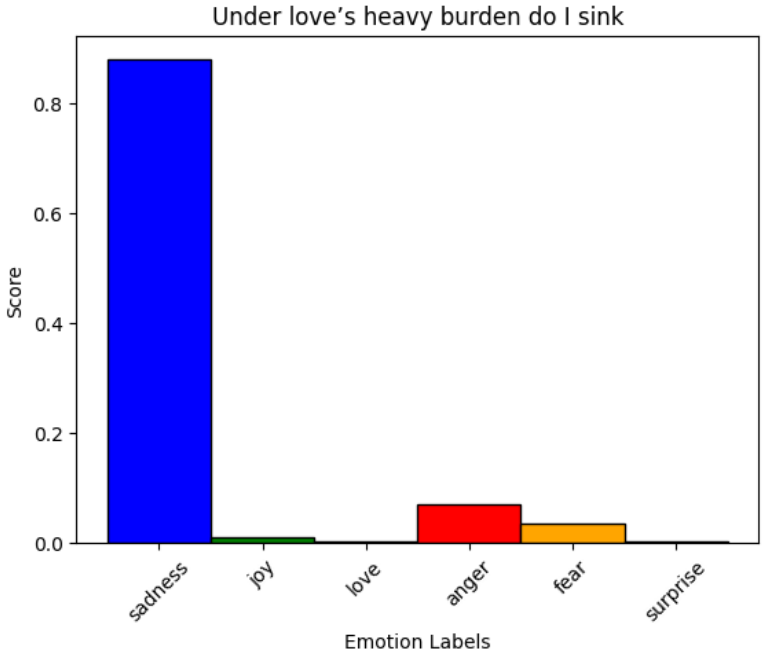
Data and methodology

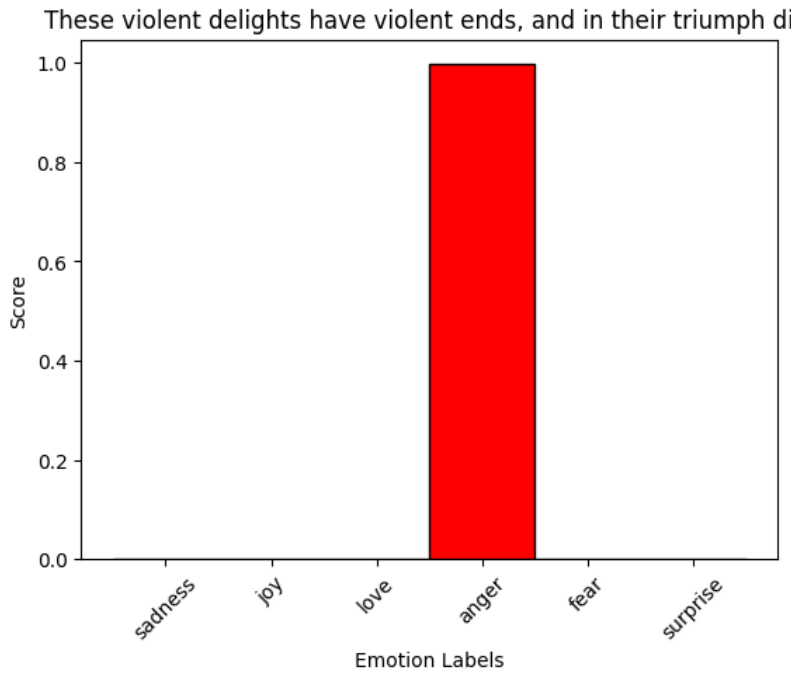
Why Shakespearian plays?

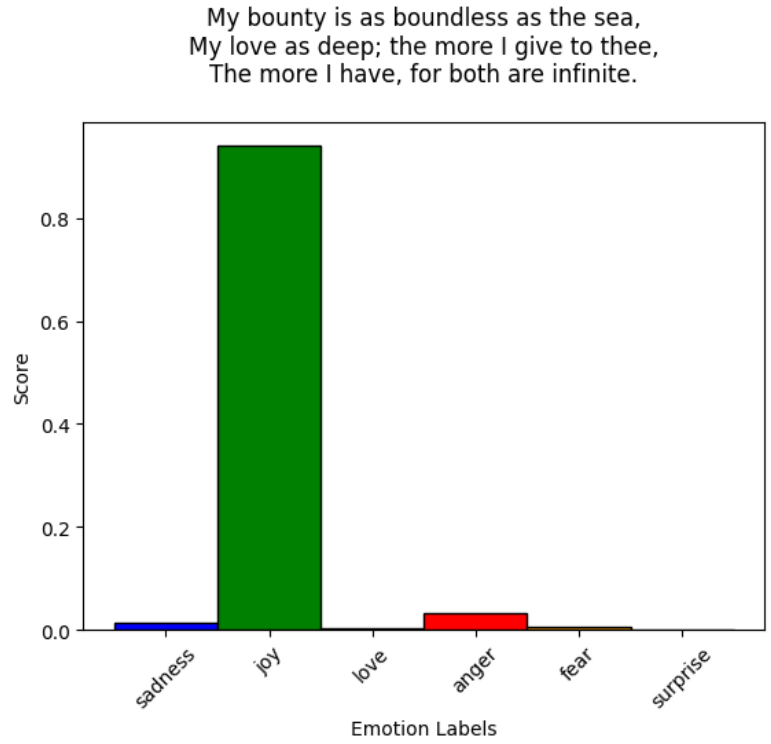
- To simplify the problem, we need **structure**!
- A play has some key features:
  - It has a **dialogical form**: we know who is speaking and who is expressing an emotion;
  - It is organized in **acts**: an act is usually homogeneous with respect to the characters, set and situations.

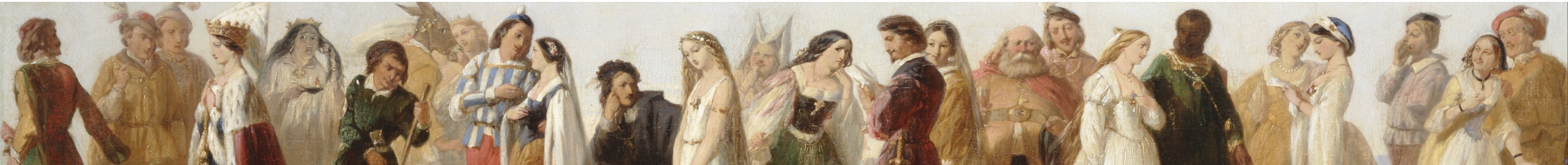
Transformers: emotion classification is performed by Distilbert-base-uncased model fine-tuned on the Twitter's Emotion Dataset (retrieved from Hugging Face)

Results – Sentence classification



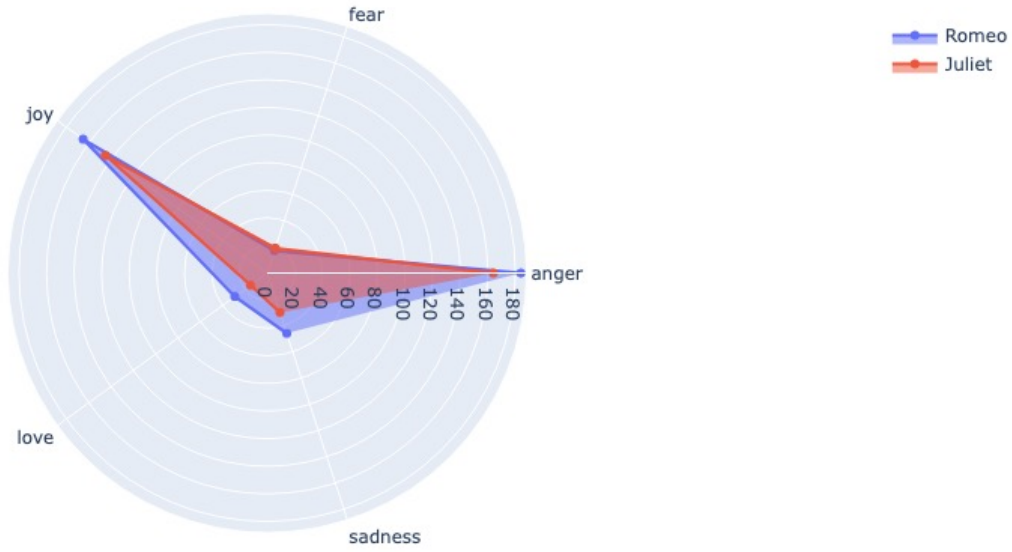


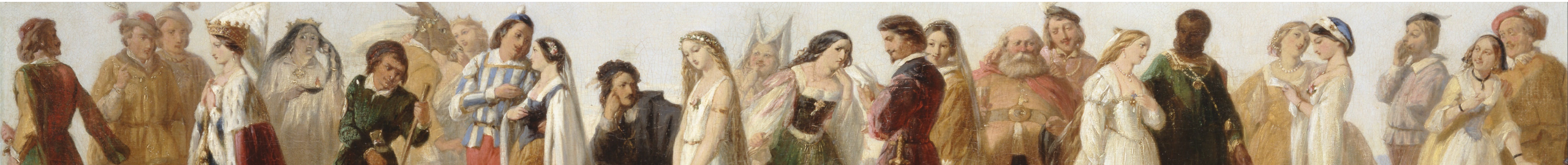




Results – Emotional profile

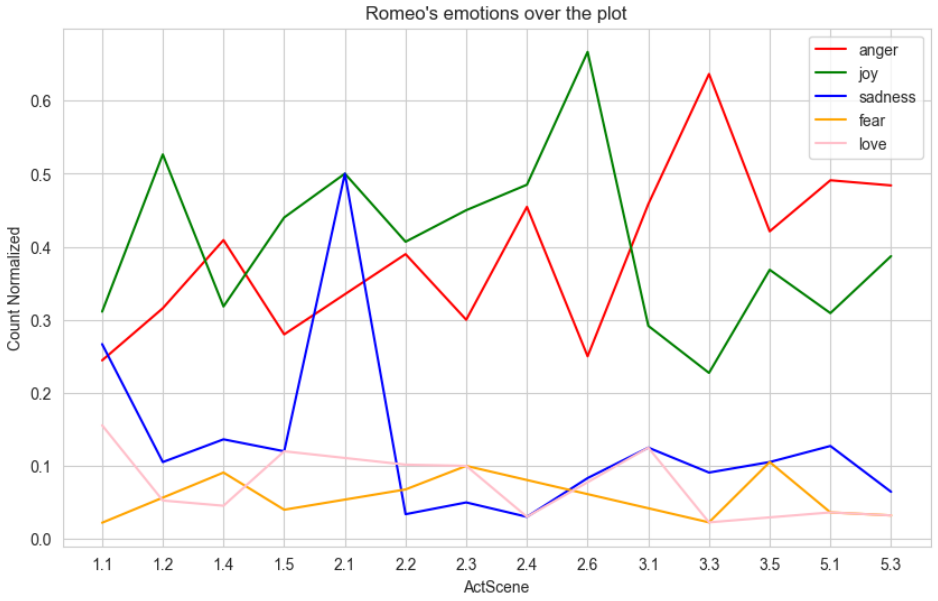
Emotional profile: for each emotion, we define an ”emotional score” as the fraction of sentences played by the character classified as belonging to that emotion.

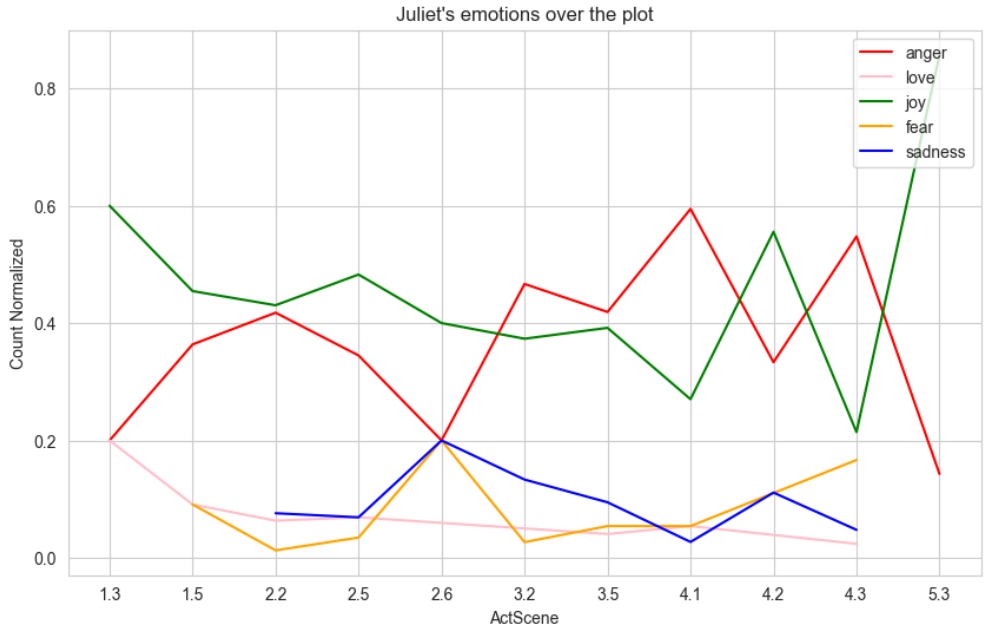


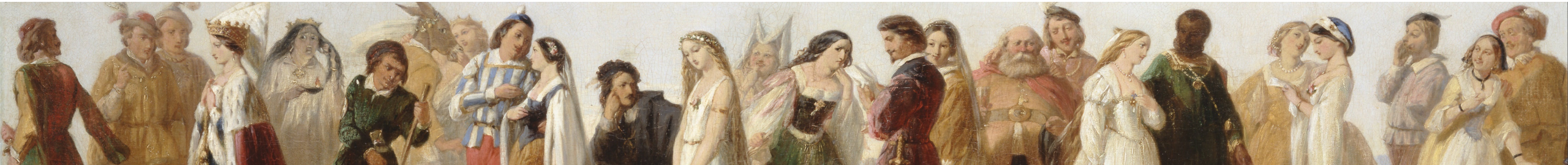


Results – Emotional evolution

Evolution through the plot: to study the emotional evolution of the character through the plot, we re-define compute the “emotional score” for each act in which the character speaks.





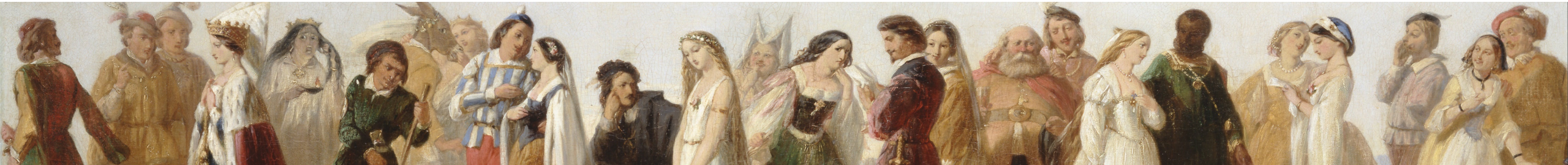


Results – Characters interactions (I)

Approach (1): model the emotion series as **time series**.

- The assumption of **autocorrelation** is credible!
- We can perform a **Granger Causality Test**

	Romeo-Anger-x	Juliet-Joy-x
Romeo-Anger-y	1	0.1262
Juliet-Joy-y	0.0788	1



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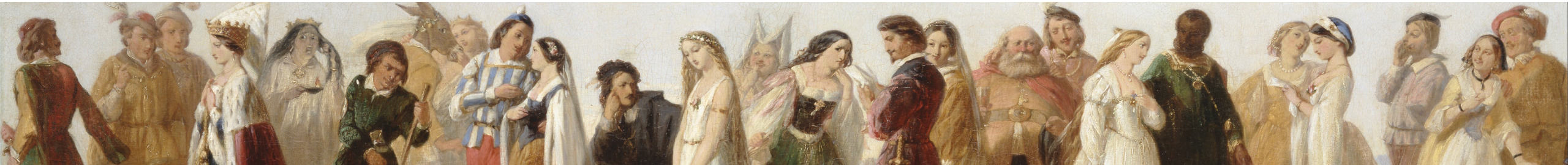
Approach (2): build an **“emotional” social network** of the play’s characters.

- **Nodes**: characters of the play.
- **Links**: directed arrows from character A to character B if A ”speaks to” character B. Arrows are labelled with the emotion of the sentence.

”speaks to”: character B’s name (and only her name) is explicitely mentioned in the sentence.



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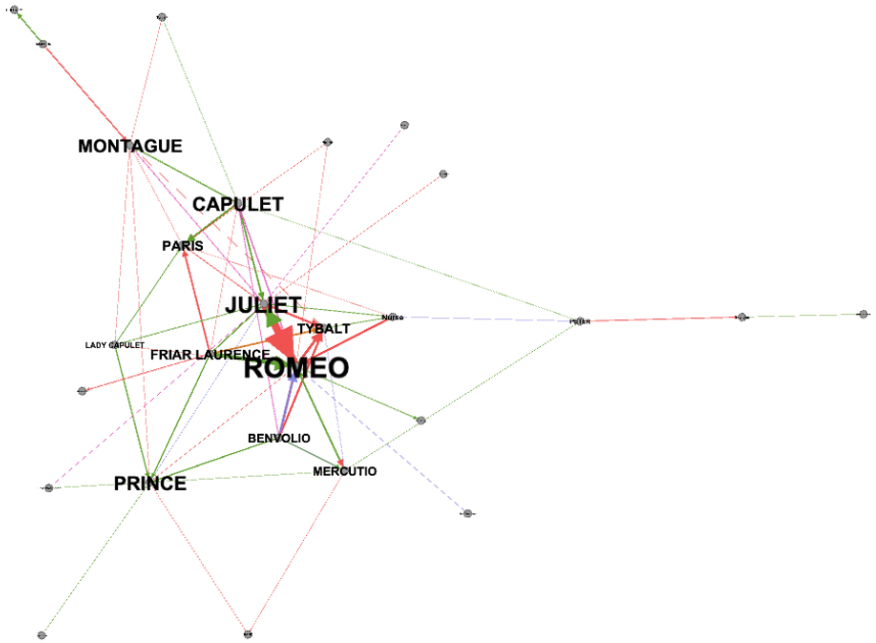

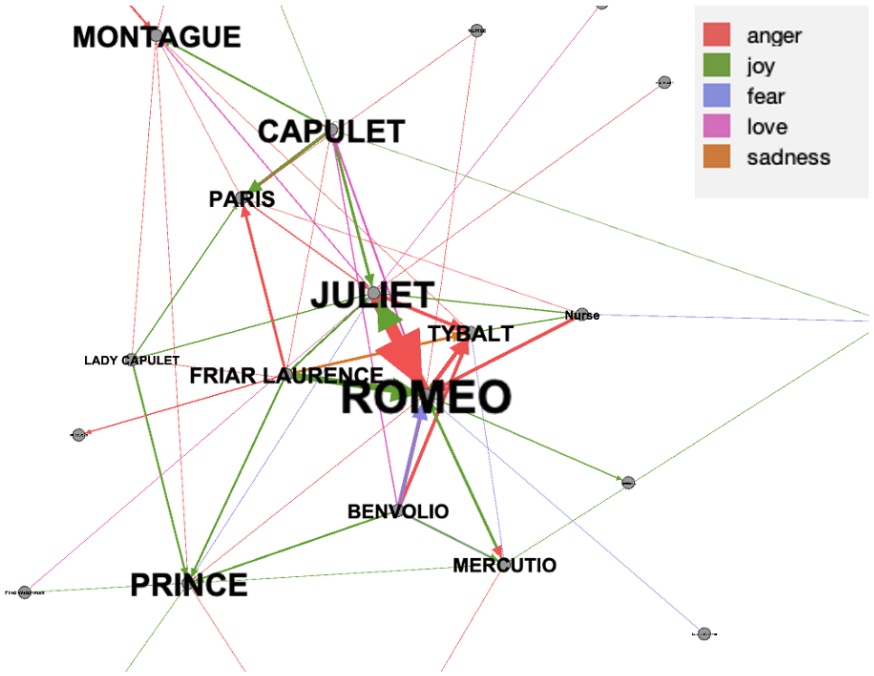

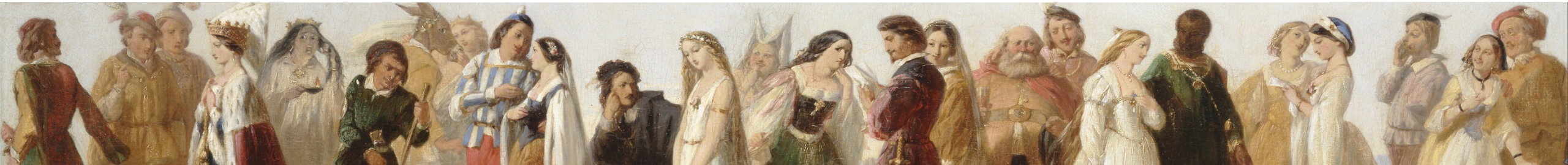

Conclusions

- We defined three tasks and, for each task, proposed a methodology to address the problem;
- Main limitation: we do not have a metrics of the quality of the results!
- Further improvements:
  - Improve the language models: fine tuning on an annotated corpus of fictional works, preferably from 16th century English;
  - Improve the concept of ”speaking to” someone;
  - Gain more insights into the characters’ interactions.