

Moment, Meaning, and Metaphor: Analyzing the Evolution of Metaphor Use in Renaissance Poetry With Natural Language Processing

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August 2, 2024

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What is Metaphor?

met·a·phor



/ˈmedəˌfôr/ • *noun*

a figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable.

synonyms

antonyms

thesaurus

Definitions from Oxford Languages

Poetry Can Be Complicated...

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Figure 1: “dim / i /nu / tiv // e” by E. E. Cummings

SpaCy's Machine Learning Process

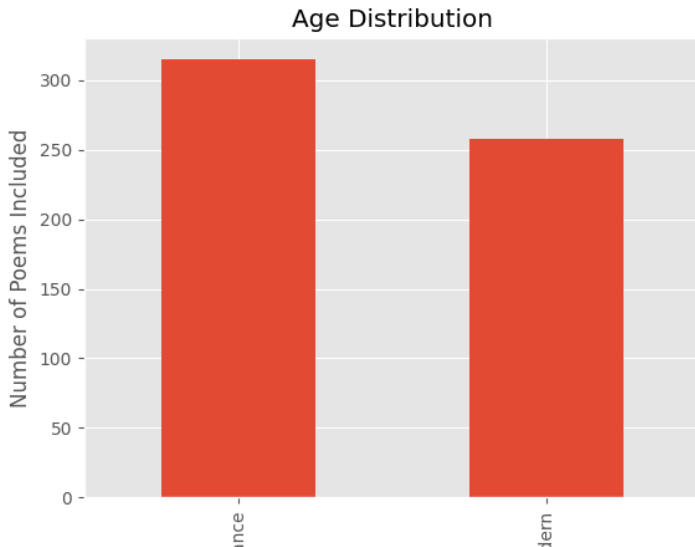


Between Renaissance and modern English poetry, in what ways has the use of metaphor in poetry changed over time with regards to period, authorship, and metaphor-to-poem-length ratio, and how can these changes be quantified and modeled by a computer program?

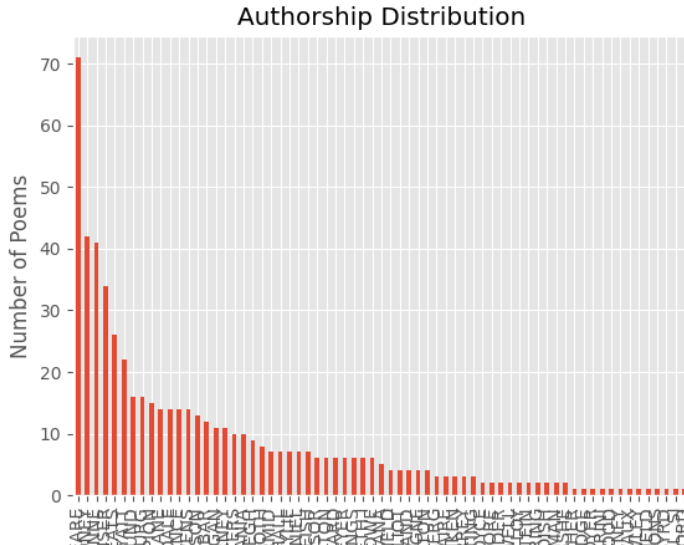
Dataset Selection: Poems from poetryfoundation.org

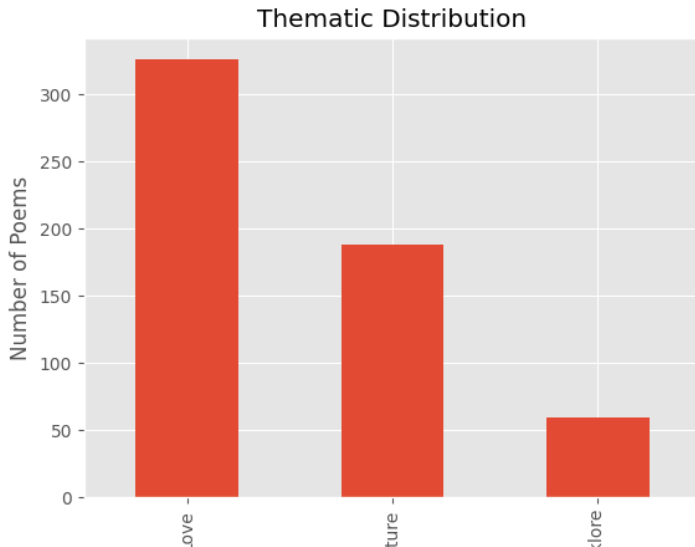
Δ author Author name	Δ content Poem content	Δ poem name Poem name	Δ age Poem's style era	Δ type Category
WILLIAM SHAKES... 12% SIR PHILIP SIDNEY 7% Other (460) 80%	506 unique values	509 unique values	Renaissance 55% Modern 45%	Love 57% Nature 33% Other (59) 10%
WILLIAM SHAKESPEARE	Let the bird of loudest lay On the sole Arabian tree Herald sad and trumpet be, To whose sound ch...	The Phoenix and the Turtle	Renaissance	Mythology & Folklore
DUCHESS OF NEWCASTLE MARGARET CAVENDISH	Sir Charles into my chamber coming in, When I was writing of my Fairy Queen; I pray said he when Que...	An Epilogue to the Above	Renaissance	Mythology & Folklore
THOMAS BASTARD	Our vice runs beyond all that old men saw, And far authentically above our laws, And scorning virt...	Book 7, Epigram 42	Renaissance	Mythology & Folklore
EDMUND SPENSER	Lo I the man, whose Muse whilome did maske, As time her taught in lowly Shepheards weeds, Am now e...	from The Faerie Queene: Book I, Canto I	Renaissance	Mythology & Folklore

Exploratory Data Analysis: Age



EDA: Authorship





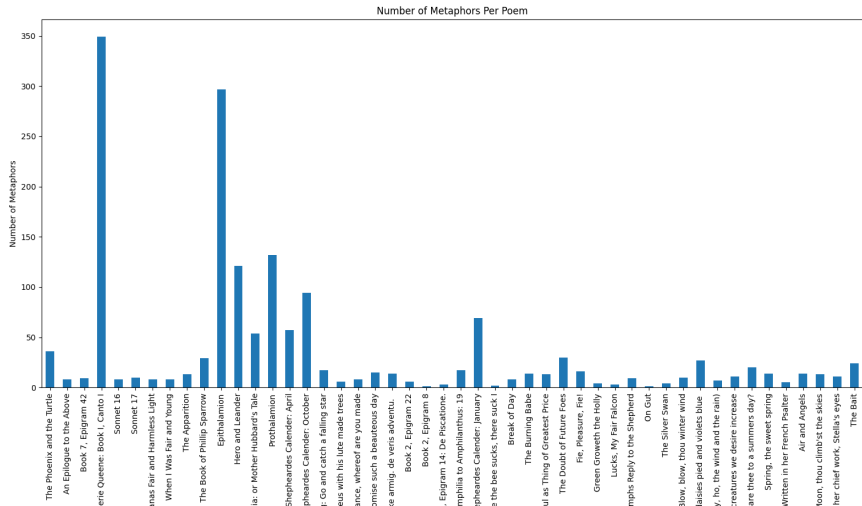
Code: POS Tag Sequences

```
for i, row in newdf.iterrows():
    nlp = spacy.load("en_core_web_sm")
    poem = row['content']
    processed = nlp(poem)
    TypeOne_Two = [[{"POS": "NOUN"}, {"POS": "VERB"}, {"POS": "NOUN"}], [{"POS": "NOUN"}, {"POS": "VERB"}, {"POS": "DET"}, {"POS": "NOUN"}]]
    TypeThree = [{"POS": "ADJ"}, {"POS": "NOUN"}]
    TypeFour = [{"POS": "NOUN"}, {"POS": "VERB"}]
    TypeFive = [{"POS": "NOUN"}, {"POS": "AUX"}, {"POS": "VERB"}]
    TypeSix = [{"POS": "NOUN"}, {"POS": "PART"}, {"POS": "NOUN"}]
    TypeSeven = [{"POS": "NOUN"}, {"POS": "PART"}, {"POS": "ADJ"}, {"POS": "NOUN"}]
    TypeEight = [{"POS": "ADJ"}, {"POS": "CONJ"}, {"POS": "NOUN"}]
    TypeNine = [{"POS": "VERB"}, {"POS": "NOUN"}]
    total = [[{"POS": "NOUN"}, {"POS": "VERB"}, {"POS": "NOUN"}], [{"POS": "NOUN"}, {"POS": "VERB"}, {"POS": "DET"}, {"POS": "NOUN"}], [{"POS": "ADJ"}, {"POS": "NOUN"}], [{"POS": "NOUN"}, {"POS": "VERB"}], [{"POS": "NOUN"}, {"POS": "AUX"}, {"POS": "VERB"}], [{"POS": "NOUN"}, {"POS": "PART"}, {"POS": "NOUN"}], [{"POS": "NOUN"}, {"POS": "PART"}, {"POS": "ADJ"}, {"POS": "NOUN"}], [{"POS": "ADJ"}, {"POS": "CONJ"}, {"POS": "NOUN"}], [{"POS": "VERB"}, {"POS": "NOUN"}]]
```

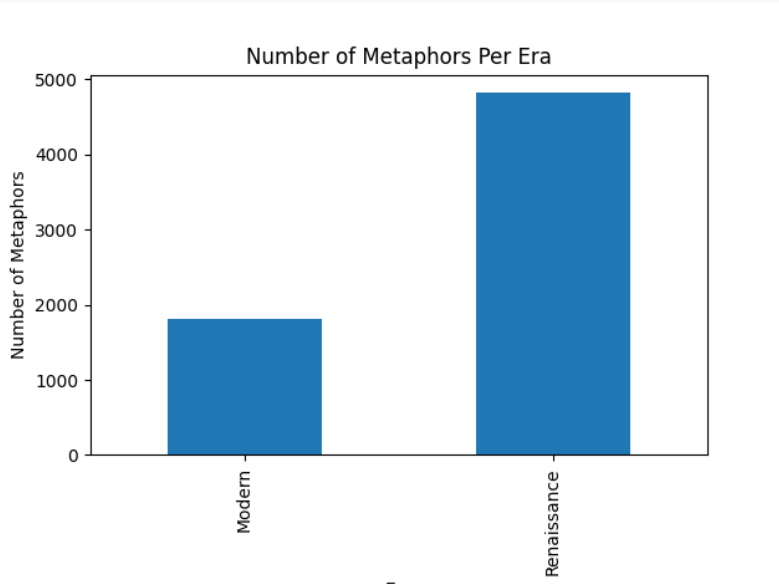
Testing and Accuracy

```
y_true_all = [0,0,1,1,1,0,0,0,0,1,0,0,0,1,1,0,1,1,1,0,1,1,1,0,0,0,1,0,1,1,  
1,0,0,1,0,0,0,1,0,1,1,0,0,1,1,0,1,1,0,0,1,0,1,0,0,1,1,1,0,1,1,1,0,1,1,0,0,0,0,1,  
0,1,1,1,1,1,1,1,1,1,1,1,0,0,0,0,1,1]  
y_pred_all = [1,1,1,1,1,1,1,1,1,1,1,1,1,1,0,1,1,1,1,1,0,0,0,1,1,1,1,1,1,1,1,1,  
1,1,1,1,1,1,1,0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,0,0,0,1,1,1,1,1,1,1,1,1,1,1,  
1,1,1,1,1,0,0,0,0,1,1,1,1,1,1,1,1,1,0]  
  
accuracy = f1_score(y_true_all, y_pred_all)  
print(accuracy)  
  
57.8%
```

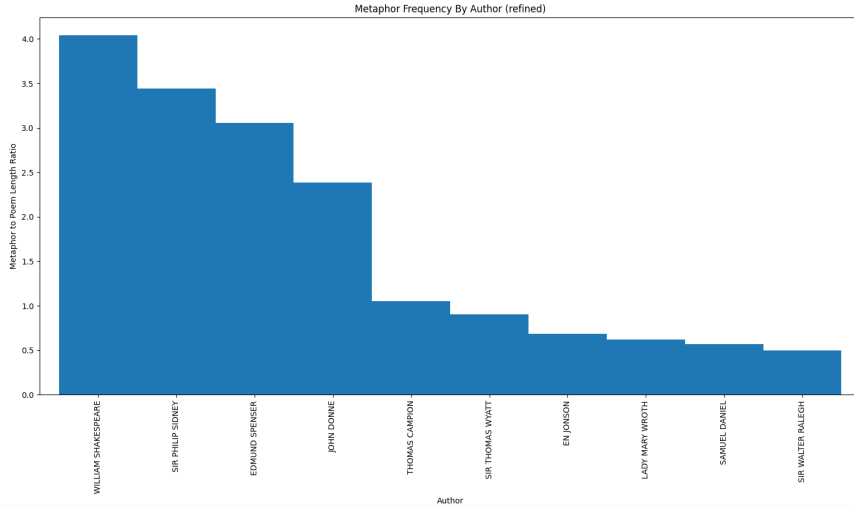
Results: Successful Metaphor Extraction



Results: Metaphor Frequency by Period



Results: Metaphor Frequency By Author – Top 10



Heuristics Based

Personal Bias

General Expansion

General decline in metaphor use

Heuristic bias or idiosyncrasy?

Better understanding of human-machine relationships

References

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