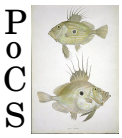

Principles of Complex Systems, Vols. 1, 2, & 3D
CSYS/MATH 6701, 6713, & a pretend number
University of Vermont, Fall 2023
Assignment 12
"A movie about a real conversation."

Due: Friday, January 26, by 11:59 pm
https://pdodds.w3.uvm.edu/teaching/courses/2023-2024pocsverse/assignments/12/
Some useful reminders:
Deliverator: Prof. Peter Sheridan Dodds (contact through Teams)
Assistant Deliverator: Chris O'Neil (contact through Teams)
Office: The Ether
Office hours: See Teams calendar
Course website: https://pdodds.w3.uvm.edu/teaching/courses/2023-2024pocsverse
Overleaf: LaTeX templates and settings for all assignments are available at https://www.overleaf.com/read/tsxfwwmwdgxj.

All parts are worth 3 points unless marked otherwise. Please show all your workingses clearly and list the names of others with whom you ~~conspired~~ collaborated.

For coding, we recommend you improve your skills with Python, R, and/or Julia. The (evil) Deliverator uses (evil) Matlab.

Graduate students are requested to use LaTeX (or related TeX variant). If you are new to LaTeX, please endeavor to submit at least n questions per assignment in LaTeX, where n is the assignment number.

Assignment submission:

Via Brightspace or other preferred death vortex.

Please submit your project's current draft in pdf format via Brightspace by the same time specified for this assignment. For teams, please list all team member names clearly at the start.

- Please use Overleaf for writing up your project.
- Build your paper using:
  https://github.com/petersheridandodds/universal-paper-template
- Please use Github and Gitlab to share the code and data things you make.
- For this first assignment, just getting the paper template up is enough.

1. Begin formulating project ideas.

   See storyology slides.

   General suggestion: Come up with some rich, text-based set of stories for analysis.

   For example: One (longish) book, or a book series, or a TV series.

   Data would be the original text (books), subtitles, screenplay, or scripts (TV series).

   - You must be able to obtain the full text.
   - You will want something with at least around 10^5 words. More than 10^6 would be great.
   - Transcripts of shows may be good for extracting temporal character interaction networks.

   Please talk about possibilities with others in the class.

   For this assignment, simply list at least one possibility, noting the approximate text size in number of words, or whatever measure of size makes sense.

2. Lexical calculus:

   Derive the word shift equation for simple additive lexical instruments.

   You will have the derivation per class.

   The idea is to simply work through it yourself.

   There are no advanced mathematics here.

   But over and over, people do not understand what's going on.

   Word shifts are a kind of discrete derivative (difference) with words on the inside.

   Per lectures, the goal is to derive.

$$\delta h_{\mathrm{avg},i} = \frac{100}{\left| h_{\mathrm{avg}}^{(\mathrm{comp})} - h_{\mathrm{avg}}^{(\mathrm{ref})} \right|} \underbrace{\left[h_{\mathrm{avg}}(w_i) - h_{\mathrm{avg}}^{(\mathrm{ref})} \right]}_{+/-} \underbrace{\left[p_i^{(\mathrm{comp})} - p_i^{(\mathrm{ref})} \right]}_{\uparrow/\downarrow}$$

   Performed in class and in numerous papers [1, 2, 3].

References

[1] P. S. Dodds and C. M. Danforth. Measuring the happiness of large-scale written expression: Songs, blogs, and presidents. *Journal of Happiness Studies*, 11(4):441–456, 2009. pdf

[2] P. S. Dodds, K. D. Harris, I. M. Kloumann, C. A. Bliss, and C. M. Danforth. Temporal patterns of happiness and information in a global social network: Hedonometrics and Twitter. *PLoS ONE*, 6:e26752, 2011. pdf

[3] P. S. Dodds, E. M. Clark, S. Desu, M. R. Frank, A. J. Reagan, J. R. Williams, L. Mitchell, K. D. Harris, I. M. Kloumann, J. P. Bagrow, K. Megerdoomian, M. T. McMahon, B. F. Tivnan, and C. M. Danforth. Human language reveals a universal positivity bias. *Proc. Natl. Acad. Sci.*, 112(8):2389–2394, 2015. Available online at http://www.pnas.org/content/112/8/2389. pdf