THE LITERATURE REVIEW

Dr. Garrett Dancik

Literature Review (or Literature Survey)

- The purpose of a **literature review** is to summarize an area of research in a way that requires you to
    - investigate the topic by forcing you to examine, describe, and evaluate the validity of multiple sources
    - organize and classify the sources in a reasonable manner for the benefit of the reader.
- A literature review should summarize the *primary* literature which contains *research* articles
    - A **research article** describes a study carried out by the author and generally involves an investigation of a specific question following a reproducible methodology
    - A **review article** summarizes primary literature and therefore talks about what others have done.
        - Review articles can be good sources of background and can (and should) be used to identify research articles

Literature Review (content)

- Your literature review includes **references** for
  - Background:
    - Provide background information ("Cancer is a genetic disease")
  - Significance:
    - Motivate why the research problem is important ("Bladder cancer is the 4th most common cancer in males…")
  - Related work:
    - Describes relevant research projects (Two databases for analyzing genomic data in cancer include KMplot and Oncomine…")
    - Describes different ways of answering the question
    - Describes related methods that have been used for either similar or different purposes ("Several models have been proposed to study these systems, including molecular dynamics [6,12], lattice gas [7,9,13,17,19,20] and cellular automata (CA) models [5,11,14-16,21-23]")

Literature Review – Why?

- A literature review is necessary for formulating your research question in a way that takes into account what others have done

- For a research paper (and proposal), a literature review
  - provides background
  - describes significance (why is the topic important?)
  - includes related work and limitations
  - motivates the current research problem

- The literature review includes background in the area of your research but does _not_ mention your specific project.

Lit Review example #1 (outline)

- Research topic: Cellular automata (CA) models of evacuation (all of these would include references)
  - Significance: statistics regarding fires and other emergencies involving evacuation when obstacles are present
  - Background: Description of cellular automata models
  - Related work: description of various models used to study evacuations and crowds, both mathematical and computational
  - Related work and significance: examples of CA models, not (necessarily) related to traffic, and questions that have been answered using CA models
    - CA models of influenza – identification of strategies to limit disease
    - CA models of fox and rabbit (predator and prey) – identification of parameters favoring the fox or rabbit
  - Limitations – one CA model was used to identify the location of an optimal door, but this was limited to a classroom setting and did not include kin or competitive behavior.

Lit Review example #2 (outline)

- Research topic: using Twitter data to predict election outcome
  - Background: Description of twitter, and social media more generally
  - Background: Description of electoral process in area of question
  - Background: Description of current polling methods
  - Related work: Description of other projects looking at predicting elections, e.g., based on the economy, etc
  - Related work: Examples of other analyses carried out using Twitter data
    - Demographics of Twitter users: https://www.aaai.org/ocs/index.php/ICWSM/ICWSM11/paper/viewPaper/2816
    - Study of user influence on Twitter (http://www.sciencedirect.com/science/article/pii/S0306457316300589)
  - Related work: Examples where Twitter has been used to make predictions
    - As a "social sensor" for Earthquakes (http://dl.acm.org/citation.cfm?id=1772777)
    - Relationship between Twitter mood and the stock market
    - Using Twitter to predict crime (https://ieeexplore.ieee.org/document/7117012)

Citation format (IEEE styles)

Bibliography

[1] R. Hisakata, S. 'ya Nishida, and A. Johnston, "An adaptable metric shapes perceptual space," *Curr. Biol.*, vol. 26, no. 14, pp. 1911–1915, Jul. 2016.

[2] E. Musk, "The secret Tesla Motors master plan (just between you and me)," *Tesla Blog*, 02-Aug-2006. [Online]. Available (URL omitted for space) [Accessed: 29-Sep-2016].

[3] C. W. V. Hogue, "Structure databases," in *Bioinformatics*, 2nd ed., A. D. Baxevanis and B. F. F. Ouellette, Eds. New York, NY: Wiley-Interscience, 2001, pp. 83–109.

[4] J. Sambrook and D. W. Russell, *Molecular cloning: a laboratory manual*, 3rd ed. Cold Spring Harbor, NY: CSHL Press, 2001.

- **Citations should be managed with Zotero (https://www.zotero.org/download/)**
  - Download both Zotero and the Zotero Connector (for Firefox, Chrome, or Safari)
  - Download the Word Processor plugin: https://www.zotero.org/support/word_processor_integration
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Plagiarism

- **Plagiarism** is defined as the act of claiming the words or ideas of another person as your own.
- To avoid plagiarism and to properly acknowledge credit, you must cite the following in your text:
  - a description of a contribution from another source
  - a summary of information from a source
  - factual information that is not common knowledge
  - exact wording, which must be quoted (typically **not used for research articles**)

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Writing Research Papers, Lester & Lester, Jr.

Common mistakes

- Significance needs to be clearly stated (ideally with supporting articles / data)
  - To support models of evacuation: There are around 4,000 school building fires each year, leading to around 75 injuries each year in the United States (https://www.usfa.fema.gov/downloads/pdf/statistics/v14i14.pdf)

- Make sure to discuss *limitations* of current research. You cannot do good research without understanding the work that has been done, including the limitations
  - In a cellular automata model of evacuation [1], the authors found the optimal location of a door. However, their analysis only considered a simple classroom setup, a single door, and all individuals in the model behaved the same way.
  - An experiment conducted on ~700,000 Facebook users found that the users exposed to more positive content tended to post more positive content [2]. However, although the authors claimed having evidence for "emotional contagion", the authors used a sentiment analysis and did not directly measure the emotional status of Facebook's users.

Common mistakes

- Related work needs to be described in some detail. What is a finding/claim, and what is the evidence for it?
  - Do not say: Cellular automata models have been used to model evacuation from a room.
  - Do say: Cellular automata models have been used to find the optimal door locations for evacuation in rooms with obstacles.
- Follow all directions
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