

Title: Utilizing Artificial Intelligence to process residency survey responses

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Artificial Intelligence (AI) has the potential to improve information management and implementation of adult learner feedback in residency training

Introduction

Residency programs struggle to manage large amounts of feedback received annually on surveys. There is currently no literature on Natural Language Processing (NLP) to facilitate organization/interpretation of this material. Leaving the utilization of feedback to nonsystematic review by faculty represents a large quality gap with valuable input likely underutilized. We propose design of an NLP neural network to assist in the interpretation of residency program feedback. NLP could be used to better organize and interpret written feedback by any specialty where large amounts of written information are consistently collected. Even small programs could generate hundreds of pages of written feedback annually between program, rotation, and lecture surveys as well as the multitude of 360-degree assessments programs perform. The Kaiser Permanente San Jose psychiatry residency generates on average 14,400 words of free-text feedback per graduating class per year. There is precedent for such evaluation of survey material from the corporate sector where customer feedback is evaluated similarly by NLP. There has been some early recognition of the utility of NLP for managing information in medical education (1). However, difficulties are also noted including methodological difficulties, lack of understanding of NLP among medical professionals and sensitive nature of the information when utilizing NLP/AI in medical education (2).

Methods

NLP requires training a neural network to recognize terminology and assign value to syntax (Fig 1). This would require ‘training’ the neural network using existing resident feedback and providing information on how to categorize words and phrases as well as allowing the network to recognize common spelling or syntactical errors. The network is then presented with examples of novel material and the output/interpretation is evaluated. Primary outcome includes recognition of recurrent phrases/themes such as, “attending is not timely” and providing residency leadership with streamlines feedback about attendings, rotations, individual residents. A more basic structure involves abstracting the general sentiment of written feedback as “positive”, “neutral” or “negative” and identifying critical issues for further assessment (Fig 2). In both models initial pilot testing is evaluated by experts to determine suitability of the output and utility. This is then repeated for quality improvement of the output and utility of the tool.

Discussion

- NLP is underutilized in medical education
- Program leadership can struggle to integrate large volumes of information generated by adult learners
- Tools to streamline this process and improve implementation of feedback are needed
- This project proposes two concepts for analyzing residency feedback
- Tools such as this could be implemented in any specialty
- Additional uses include faculty development and novel collaborator identification for scholarly projects based on prior publications that converge on concepts or methodologies rather than merely narrow areas of investigation

Future Directions

- Identification of best analysis platform for build NLP neural network
- Stakeholder and NLP expert collaborator identification
- Pilot build/testing of neural network
- Application to broader data set within residency
- Evaluation of implementation

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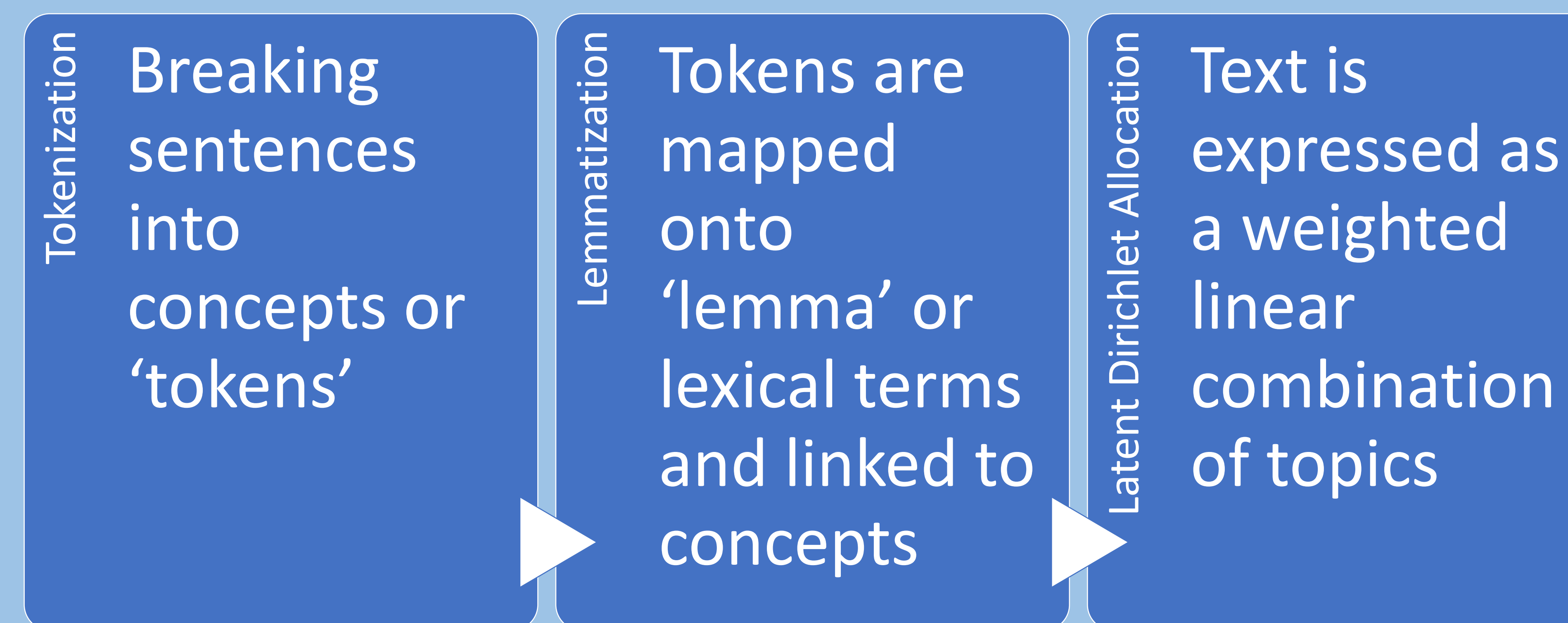


Figure 1. NLP conceptual process

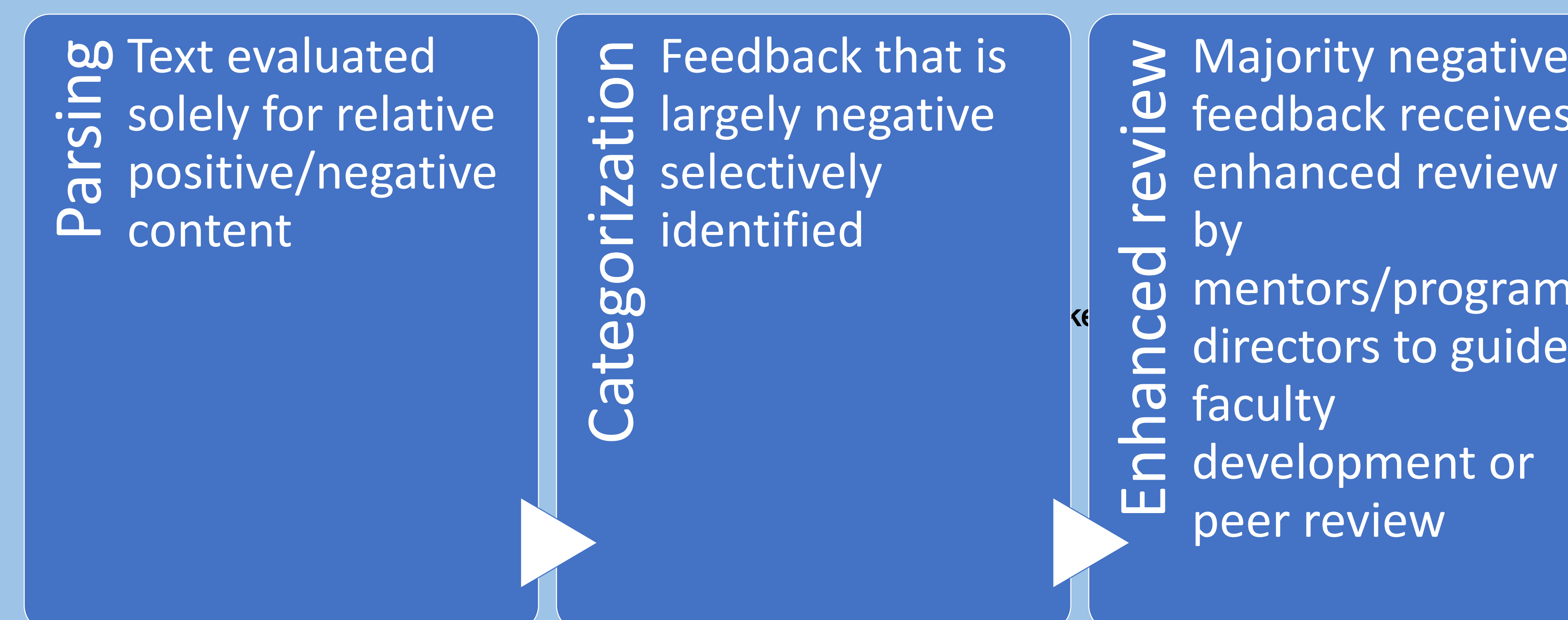
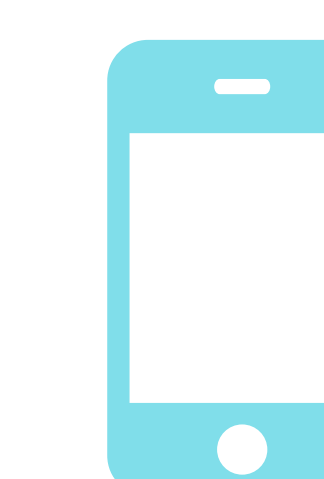


Figure 2. Streamlined positive/negative parsing for basic program director guidance



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