“Arrival” Through the Lens of NLP

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Plot:

The movie introduces us to the main characters and Louise Banks is one of them. She is a linguist and her partner is a physicist named Ian Donnelly. Together they work towards deciphering the language used by the heptapod visitors. There are a total of twelve spacecraft that appear around the world, and she is granted access to the heptapods that arrived in Montana. The more that Louise learned about their language, she begins to have visions of the future while being under the impression that they are memories. With the struggles of interpretation, the global opinion shifted negatively which led to conflict. With her glimpses into the future, she is able to settle tensions. After learning the alien's language, she notices that nonlinear time perception is tied to the understanding of it.

Challenges that mimic NLP Challenges

- Ambiguity was displayed in the scene where the heptapods answered “offer weapon” whenever they were asked what their purpose was on Earth. The humans perceived this as a threat, and was the wrong way of taking it. This happens in NLP systems whenever there is lack of context and semantics.
- The scene above can be used to demonstrate idiomatic expressions that NLP struggle with due to the density of layered meaning in the heptapods language.
- Throughout the film, it becomes evident that there is a gap in tone understanding between the humans and heptapods. Heptapods do not have emotional cues to help in understanding the intent of what is being said. This mimics NLP’s difficulties with sarcasm/tone understanding.
- Regional and cultural variations were troubled throughout the scene with the heptapods mentioning weapons. The different cultural backgrounds of countries led to some thinking threats were being made, while others assumed they wanted to help humankind. This occurs in NLP systems whenever they do not account for the cultural bias and political context of information being shared.

Communication Methods

- ★ Louise and Ian work together to communicate with heptapods. They study the logograms of the heptapods to see if any patterns or semantics can be understood. This approach resembles rule-based NLP and is time consuming due to there not being a predefined dictionary for the logograms found.
- ★ While identifying recurring logograms and filling in meanings for them, it mimics models such as TF-IDF. This is more statistical NLP.
- ★ Due to the depth of understanding that Louise has, her cognitive abilities mirror deep NLP.
- ★ When the aliens define some symbols through their interactions, they mimic semi-supervised learning.
- ★ Neural embeddings were represented when symbols became understood in different contextual situations.

Reflection:

The language used by the heptapods definitely challenges current NLP understanding. Their language was more of a form of cognition rather than communication. Their language holds the beginning, middle, and end all in one concept. Currently in NLP, language is sequential and compositional, but the heptapods do not follow this. Their language expands the idea that NLP can move past the sequenced-based models. It poses the question on if NLP models can be built to reason rather than just predict.

Source:

Villeneuve, Denis. *Arrival*. Paramount Pictures, 2016