Homework Two

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1 Is a Hotdog a Sandwich?

This section discusses incremental learning and classification to infer whether a hot dog is a sandwich.

1.1 Variabilization

To set up the incremental learning model, the AI needs to variablize the key components of a sandwich and other dishes. From general knowledge, there are two key concepts to represent dishes in this exercise space: casing and filling. A casing is made of various products like wheat or corn and may be in multiple shapes rolls, taco shells, buns etc. This assumes no-one eats un-toasted white bread or buns with their sandwiches as this is simply blasphemy. Filling may be meat products (including mystery meat like hot dogs), vegetables, toppings, or anything that can fit between two pieces of the defined "bread" variable.

1.2 That's a sandwich

Table 1 shows a list of dishes categorized into sandwiches or not sandwiches. Several dishes from this set train the model to delineate what is and is not a sandwich.

Table 1 — Categorization of Sandwiches.

Category	**List of Applicable Entries**
Sandwich	BLT on *toast*, hamburger, turkey and swiss on potato roll, meatball sub, tuna salad on brioche, chip butty, ice cream sandwich, grilled cheese, turkey hero, vada pav, veggie burger, egg & cheese biscuit, patty melt, and sloppy joe.
Not a Sandwich	Chicken wrap, burrito, ice cream taco, toast, cheese quesadilla, toaster strudel, klondike bar, gyro, sushi rolls, buttered biscuit, and calzone.

1.3 Training the Model

The AI agent uses the BLT with Toast to initialize the current concept of a sandwich. As shown in Figure 1, the first incremental learning step shows a comparison with the current model to Toast. The model through the Require-Link heuristic learns that Toast must be above and below the filling. By expanding the current definition of the casing from Toast to also include Biscuit in step two, the model generalizes a new set of current objects within the casing variable called Bread. Comparing an Ice Cream Taco to the current concept, the model specializes using the Forbid-Link heuristic. This adds two aspects to the new concept: 1) the casing variable cannot include a Taco shell and 2) the casing cannot cover both sides of the filling. The last step generalizes again to expand the set of current objects to include Hamburger Buns.

However, the Meatball sub was omitted from the model during construction. While technically a sandwich, many pictures online show the sandwich as an open-face sandwich. Inclusion of this may have caused an overgeneralization error as bread would not need to be on top of the filling and would have implied that tacos are sandwiches. Tacos as sandwiches violates the categorization in table 1.

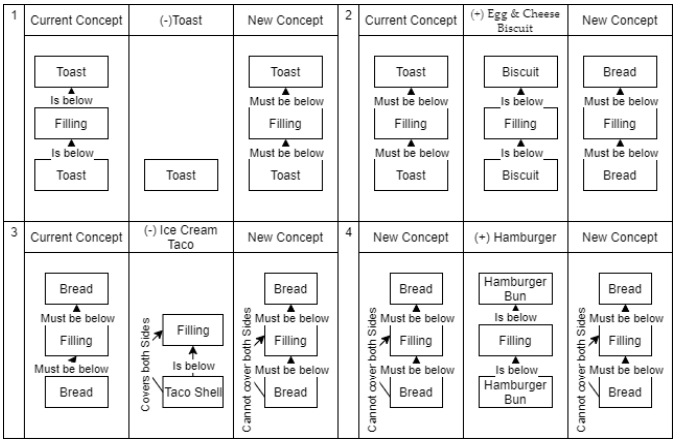


Figure 1— A depiction of the incremental learning algorithm starting with BLT on toast.

1.4 Classification

Considering the values identified in Figure 2, there several indications of what is a sandwich. Considering the valueA sandwich is dependent on the type of Bread. For example, white bread, potato rolls, and biscuits are considered sandwiches while pizza crust, tortillas, and pastries are not. Further, if the fillings are encased by the bread, this is a clear indication that it is not a sandwich like in the calzone and toaster strudel examples.

(+) Grilled Cheese	(+)Turkey & swiss on potato roll	(+) Egg & Cheese Biscuit
• **Meat**: None • **Toppings**: Cheese • **Bread:** White Bread • **Encased**: N • **Prepared**: Grilled	• **Meat**: Turkey • **Toppings**: Swiss Cheese • **Bread:** Potato Roll • **Encased**: N • **Prepared**: Toasted	• **Meat**: None • **Toppings**: Egg, Cheese • **Bread:** Biscuit • **Encased**: N • **Prepared**: Baked
(-)Calzone	(-)Cheese Quesadilla	(-)Toaster Strudel
• **Meat**: Pepperoni • **Toppings**: Cheese • **Bread:** Pizza Crust • **Encased**: Y • **Prepared**: Baked	• **Meat**: None • **Toppings**: Cheese • **Bread:** Tortilla • **Encased**: N • **Prepared**: Pan-fried	• **Meat**: None • **Toppings**: Jam • **Bread:** Pastry • **Encased**: Y • **Prepared**: Baked

Figure 2— A picture of the different classification attributes of a sandwich applied to six examples.

1.5 Decision

A hot dog is not a sandwich if we use the incremental learning model. Within the model, a sandwich cannot have bread covering both sides of the filling. However, if we use the classification or case-based reasoning approach, a hot-dog is a sandwich. A hotdog uses white bread (shaped as a hotdog bun) that does not encase its filling. Further, the most similar dish to a hot dog is the meatball sub or an open faced sandwich. Two out of three models say it's a sandwich; it's a sandwich.

2 IT WASN'T MARIA

The sentence "Maria didn't say I kicked the can" posits multiple meanings and interpretations. This section discusses how an agent may dissect the meaning from this sentence.

2.1 Principles of Understanding

To make sense of the phrase, the agent should consider the verb "say". There are five possible meanings of the verb as shown in Figure 3 (Merriam-Webster). Each has various objects to indicate whether a specific meaning applies. Some meanings do not make sense in the given context. The phrase does not use "how do you" or propose a language to indicate the subject is requesting a translation or pronunciation. It does not use the form "let's say" and an assumption. However, the sentence does follow the structure such that the subject states an opinion or declaration. Therefore, thematic representation could look like Figure 4.

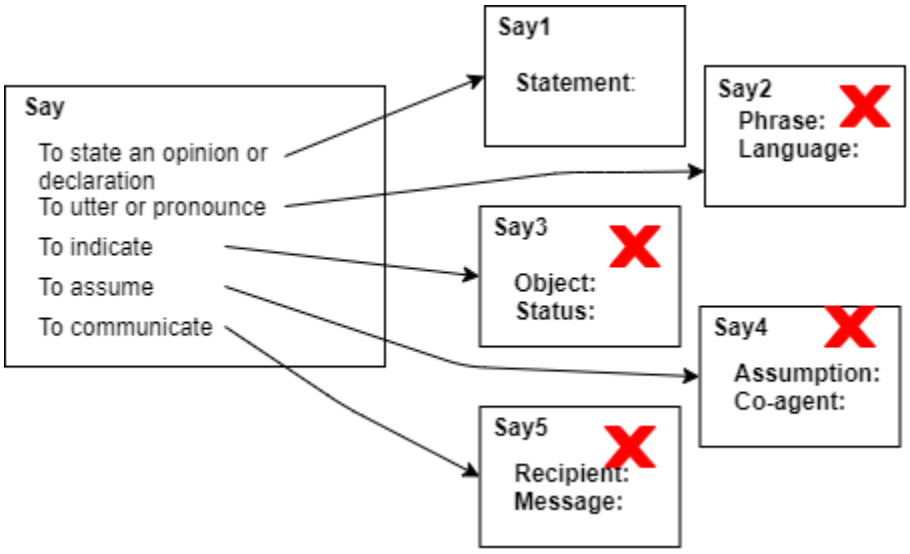


Figure 3— A thematic role representation of the explored sentence.

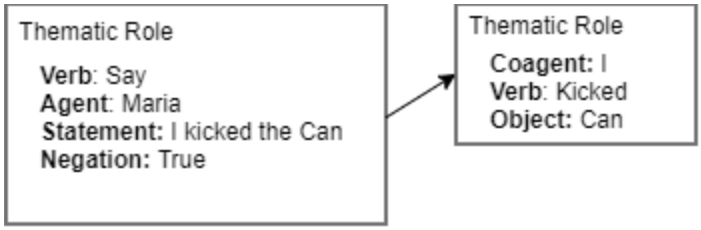


Figure 4— A thematic role representation of the explored sentence.

2.2 EmPHAsis on the Wrong SyLLAble

The AI agent's interpretation of the sentence in the prior section is dependent on the appropriate emphasis. The agent must track the emphasis and corresponding objects affected by it. For instance, if the emphasis is placed on the negation of the verb, then the negation of the verb is in question. Thus, the opposite interpretation should be considered. If emphasis is placed on "didn't" in the sentence then this negates that Maria did not state this; meaning, she did. Figure 5 shows the frame associated with this.

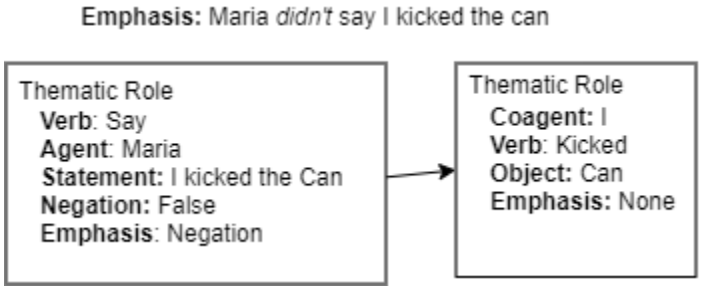


Figure 5— A thematic role representation of emphasis on negation.

Also, if emphasis is placed on the coagent then this implies that someone else must have kicked the can. This is shown in Figure 6. Generally, the emphasis negates the validity of the stated value in the object and the opposite set should be considered.

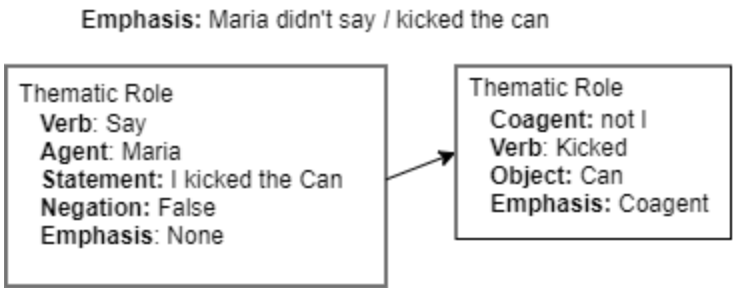


Figure 6— A thematic role representation of emphasis on the coagent.

2.3 Literally Figurative

An AI Agent may be able to infer the literal or figurative meaning of a sentence given access to a database of idioms and given more context to the situation. If the AI agent can recognize specific instances of idioms then this would indicate whether the phrase is literal or figurative. For instance, the phrase kicked the can is a known idiom specifically under the circumstances that the verb Kick is in past tense and uses the object, can. When this combination of tenses and objects is used, the AI agent should flag the sentence as figurative. However, there could be room for a literal interpretation and context could help.

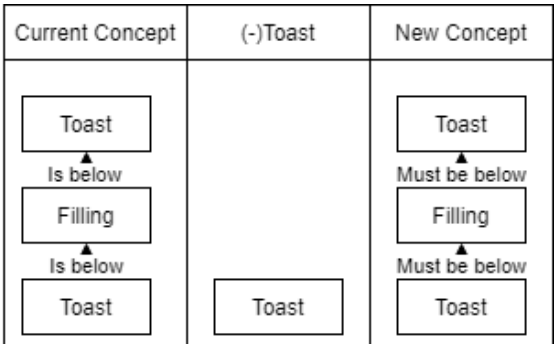
Context could allow the agent to study the repeated use of objects within the thematic roles. For example, if the name of a dog is Rocket and this has been mentioned previously in memory, the Agent could infer that the phrase "Rocket blasts off to the moon after breakfast" pertains to a dog and should be taken figuratively.

3 References

1. Dictionary by Merriam-Webster: America's most-trusted online dictionary. (n.d.). Retrieved March 08, 2021, from https://www.merriam-webster.com/dictionary/

4 APPENDIX: INCREMENTAL LEARNING STEPS - ENLARGED

1



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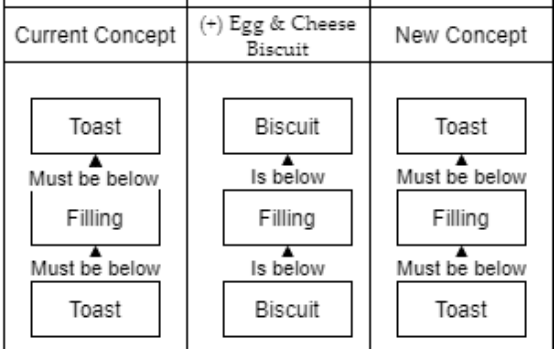

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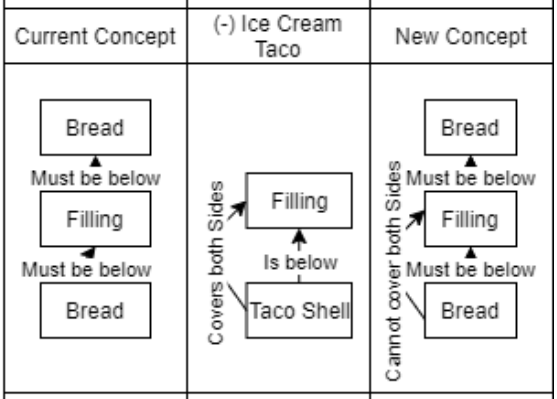

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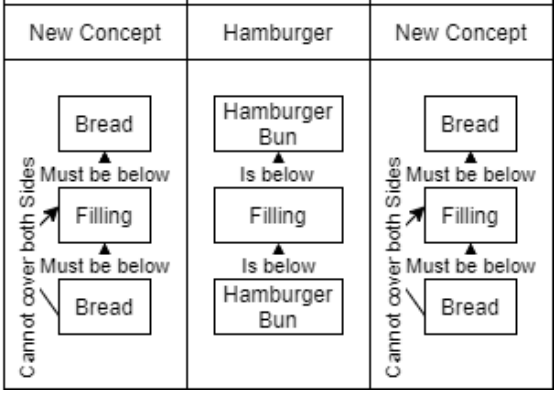

5 Appendix: Meatball Sub - First Image on Google