Homework 2

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1 SANDWICH DEBATE

1.1 Sandwich Identification

Sandwiches

- BLT on white bread
- cheese quesadilla
- chip butty
- egg & cheese biscuit
- grilled cheese
- hamburger
- ice cream sandwich
- patty melt
- sloppy joe
- tuna salad on brioche
- turkey and swiss on potato roll
- vada pav
- veggie burger

Other

- burrito
- buttered biscuit
- calzone
- chicken wrap
- gyro
- ice cream taco
- Klondike bar
- meatball sub
- sushi rolls
- toast
- toaster strudel
- turkey hero

1.2 Incremental Sandwich Learning

1.2.1 *Initial Variabilization*

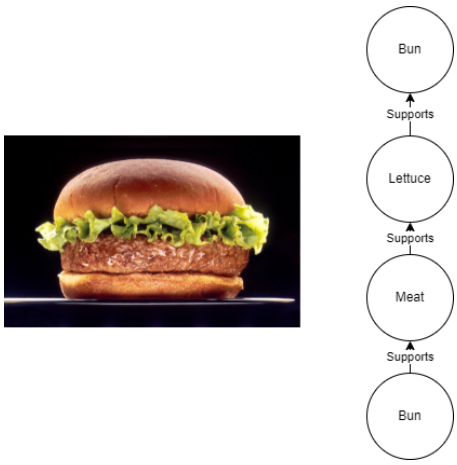

Figure 1—Initial variabilization using the concept model of a hamburger–a positive example of a sandwich.

1.2.2 *Incremental Learning*

From the initial sandwich concept, the agent learns from a positive example of an ice cream sandwich, Figure 2.

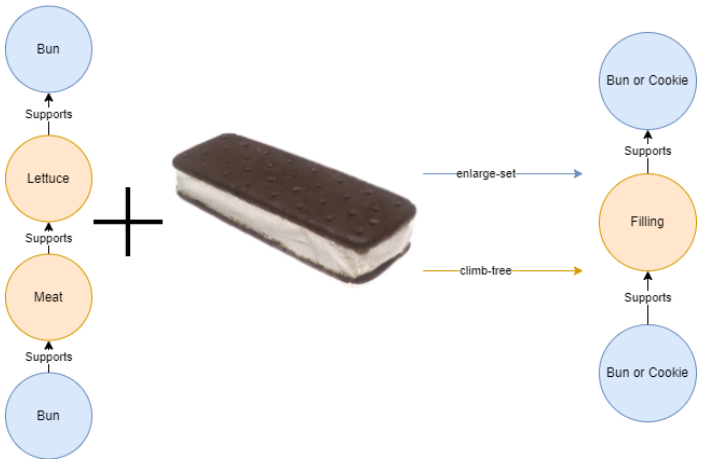

Figure 2—Agent revising concept using a positive example of a sandwich. The agent would generalize using *expand-set* to combine Bun and Cookie. Meat, Lettuce, & Ice Cream may be abstracted to *Filling*, though this would most likely require more background knowledge (see Appendix 3.7) to use *climb-tree*, or less detailed modeling. Concept model for Ice Cream Sandwich found in Appendix 3.3

Figure 3—Agent revising concept using a negative example. The agent would specialize using *forbid-link* to represent that the two pieces of Bun or Cookie must not touch. Concept model for Chicken Wrap found in Appendix 3.4

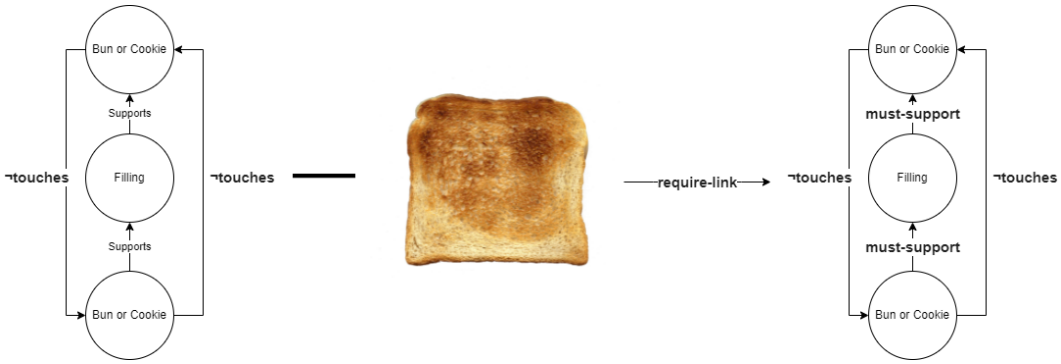

Figure 4—Agent revising concept using a negative example. The agent would specialize using *require-link* to represent that a piece of Bun or Cookie must-support the filling, and the Filling must-support a separate Bun or Cookie. Concept Model for Toast found in Appendix 3.2

1.2.3 *Honorable Mentions*

There are couple of other dishes that would have added significant changes to the concept model. One of these is the Klondike bar, which would most likely result in further specializing the surrounding shell of the dishes. That is, it would require that the outer two pieces of a sandwich be specifically of a grain type, or to not be chocolate. Additionally it would result in a require-link heuristic for the Filling , whereby it must-support a separate outer layer.

1.3 Sandwich Classification

Table 1—Classification Table for Sandwich

Attribute	Klondike Bar	Vada Pav	Buttered Biscuit	Calzone	Toast	Hamburger
Made from layered ingredients?	Yes	Yes	Yes	Yes	No	Yes
Has a filling?	Yes	Yes	No	Yes	No	Yes
Outer layer made of grain?	No	Yes	No (partially)	Yes	Yes	Yes
Has contiguous outer layer?	Yes	Yes	No	Yes	Yes	No
At least one side exposes filling?	No	Yes	N/A (No)	No	N/A (No)	Yes
Displayed on plate with filling plane parallel to plate? (visual in Appendix 3.8)	N/A (No)	Yes	N/A (No)	N/A (No)	N/A (No)	Yes

1.4 Sandwich Conclusion

From the incremental learning model, a hotdog **would** be classified as sandwich. Although the hotdog lacks two distinct outer layers of grain, the concept model for a hotdog would resemble that of the Vada Pav sandwich. Specifically, it would have a single outer Grain layer supporting the filling.

Utilizing Classification, a hotdog would **not** be classified as sandwich. This is due to the fact that a hotdog's *intended* display results in the filling being orthogonal to the plate. Otherwise a hotdog covers each of the other attributes that would otherwise be required to be classified as sandwich.

From the perspective of case-based reasoning, the sandwich that would be most similar to a hotdog would most likely be the vada pav. From my understanding of this dish, it seems to resemble a hot-dog with the bun being sliced almost completely into halves, and some sort of filling placed inside. Unlike a hot-dog, I classify it as a sandwich due to the manner in which the vada pav is presented

horizontally (see Appendix 5), resembling a burger slider. This may infer that case-based reasoning **would** identify a hotdog as a sandwich.

In conclusion, I would claim that a hot-dog is a sandwich based on the arguments presented above. By way of majority voting, two out of the three techniques **would** identify a hotdog as a sandwich.

2 MURDER MYSTERY: LANGUAGE IS HARD

2.1 Understanding Emphasis

When constructing an AI Agent to solve this murder, the agent would understand the sentence "She wasn't there" by parsing the sentence into it's thematic role using semantic analysis and top-down reasoning. This would be represented like this:

- Thematic Role
  agent: She
  verb: is
  location: there
  qualifier: not

With the sentence lacking any emphasis, the AI agent would understand that a female person was not at a physical location sometime in the past.

Therefore the AI agent would understand that *She* refers to either of the three suspect women. It would understand that *Was* along with the qualifier *Not* would represent *She* did not exist sometime in the past. Finally, *There* would most likely be understood as a physical location, although it could also represent the agent's (*She*) mental status.

From this representation, however, there is a great deal of ambiguity. Firstly, the agent would not know to whom *She* specifically refers to (i.e., inability to infer). It may be able to tell that *She* refers to either Mrs. Swettenham, Mrs. Easterbrook, or Julia Simmons, but not the exact identity.

For the different emphases the AI agent may interpret the meaning of each sentence variation differently. In the case of "*She* wasn't there", the AI agent may infer that the sentence refers to a specific person not being present in some location. The frame representation may look like the following:

- *She* wasn't there: meaning that the speaker has a very specific person in mind. Not that we the reader nor the AI agent would have enough information to decipher whom the speaker is specifically referring to. This would be similar to "She was not there, but a second lady was there". A compound sentence in this case, but necessary to gain full context.
- Clause 1

  agent: She

  verb: is

  location: there

  qualifier: not
- Clause 2

  agent: a second lady

  verb: is

  location: there
- She *wasn't* there: meaning here would be that the speaker is confirming a suspicion they held towards whomever *she* is. This could also imply that *Wasn't* has a more metaphorical meaning in the sense that the target lost mental capacity. A third meaning is that the speaker was unable to find the person *She* in a location that the speaker searched for this person. This would similar to *I did not find her there.*

  agent: the speaker

  verb: find

  coagent: her

  qualifier: not

  location: there
- She wasn't *there*: this could imply that the speaker is thinking of a different location that the agent of the sentence was existing in. In the sense of being confounded, similar to "She was not there, she was elsewhere".

  agent: She

  verb: is

  location: there

  qualifier: not

  destination: elsewhere

To account for these different meanings and retain the benefits of top-down processing and context, the AI agent could consider all the possible meanings until more context is given. This could have a similar explosion problem as in *Classifi-*

cation, where with the increase in the number of words would further increase the number of different emphasis variations that it would need to consider. Another possibility is for the AI agent to process the most likely emphasis of the sentence based on past interactions or past experiences that it (the AI agent) has trained on. This would cause similar errors that we saw in Agatha Cristie's novel, but would save significantly on processing power needed.

3 APPENDICES

3.1 Vada Pav

Figure 5—Image of a vada pav used in case-based reasoning to classify a hot-dog.

3.2 Toast

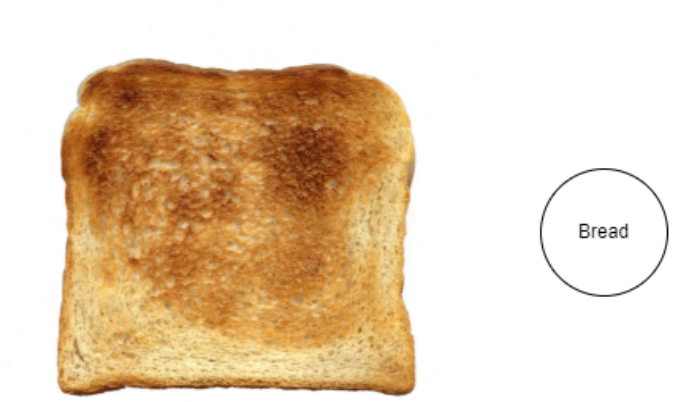

Figure 6—Toast Concept Model

3.3 Ice Cream Sandwich

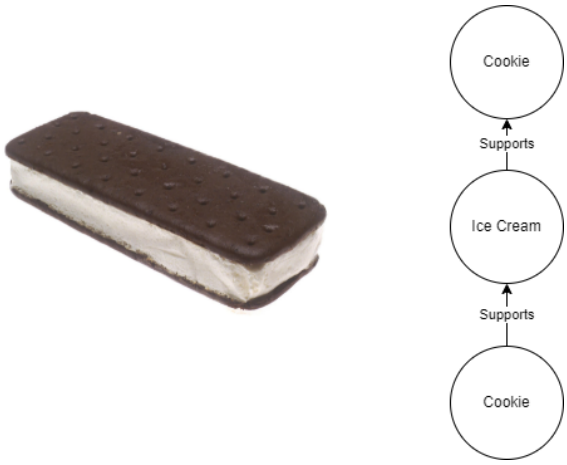

Figure 7—Ice Cream Concept Model

3.4 Chicken Wrap

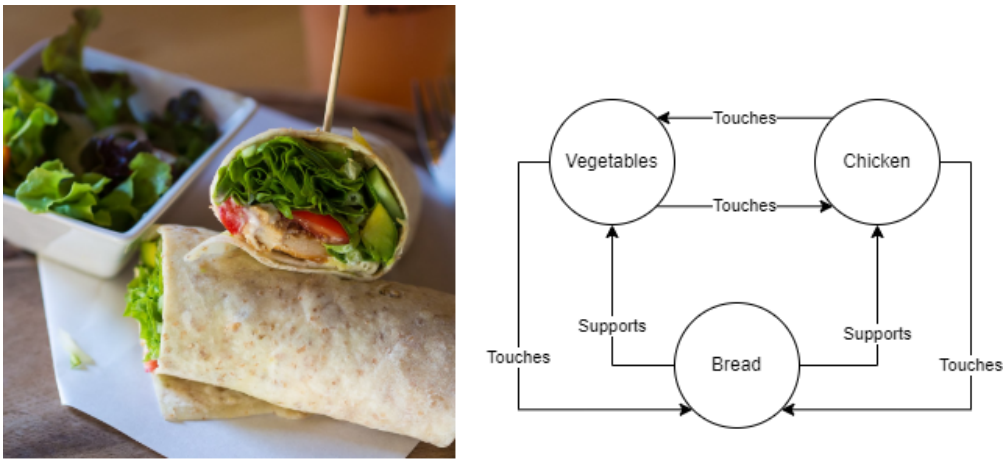

Figure 8—Chicken Wrap Concept Model

3.5 Sushi Roll

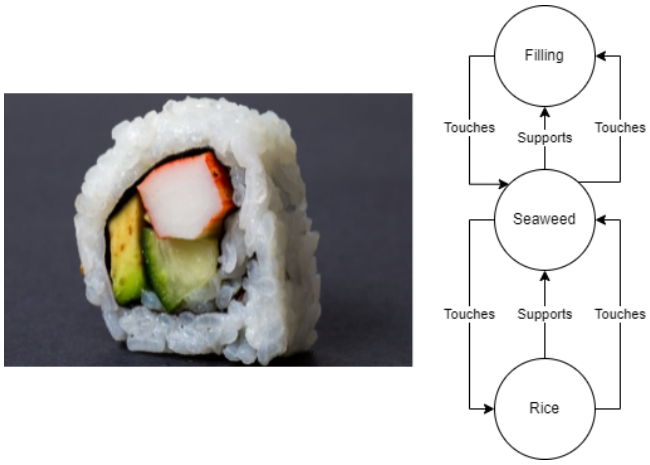

Figure 9—Sushi Roll Concept Model

3.6 Grain Background Knowledge

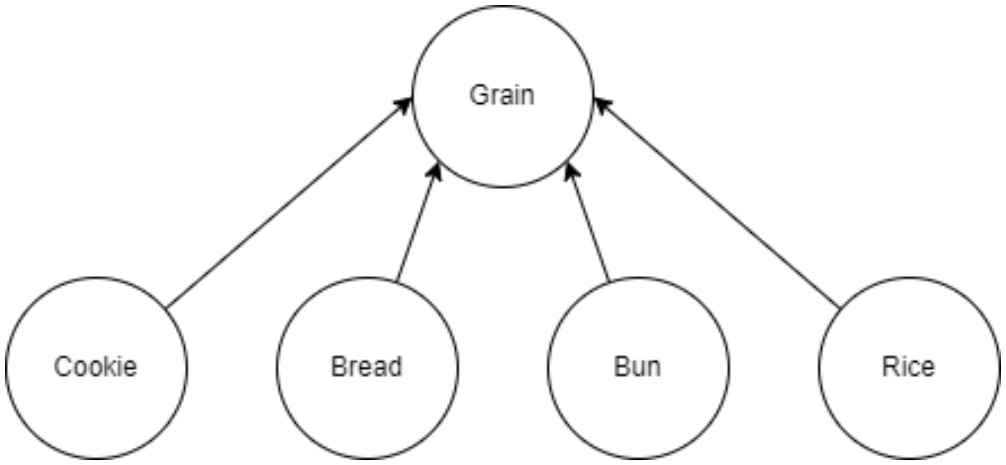

Figure 10—Background knowledge about Grains required for AI agent

3.7 Filling Background Knowledge

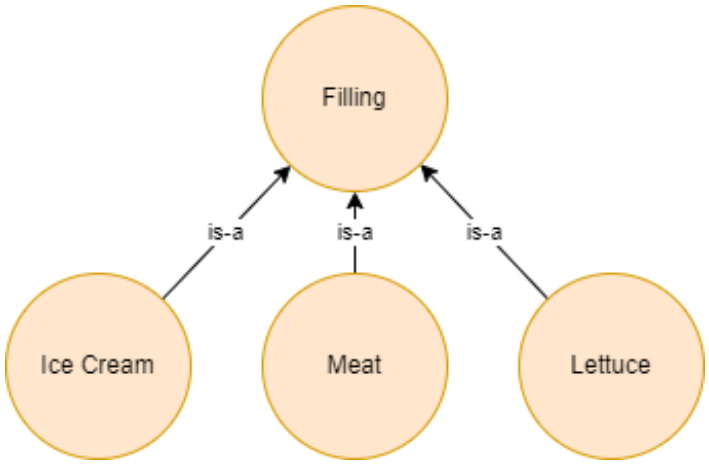

Figure 11—Background knowledge about Fillings required for AI agent

3.8 Plate Orientation

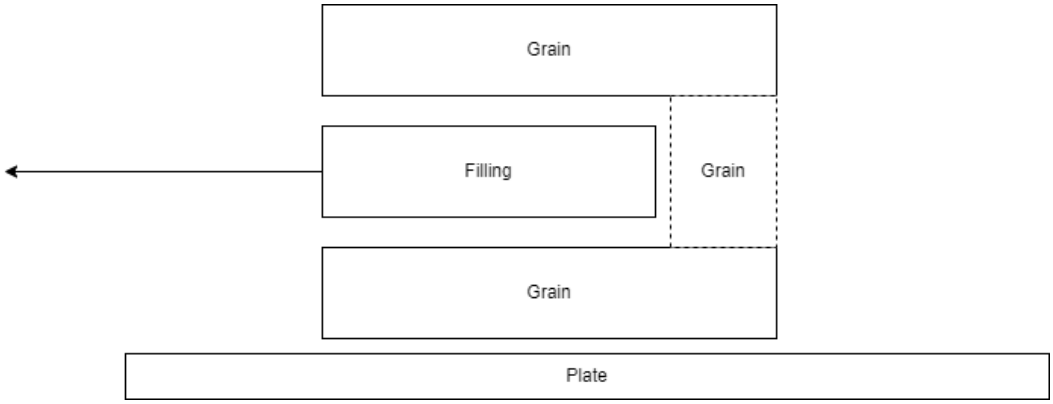

Figure 12—Diagram depicting dish and plate planes in parallel.

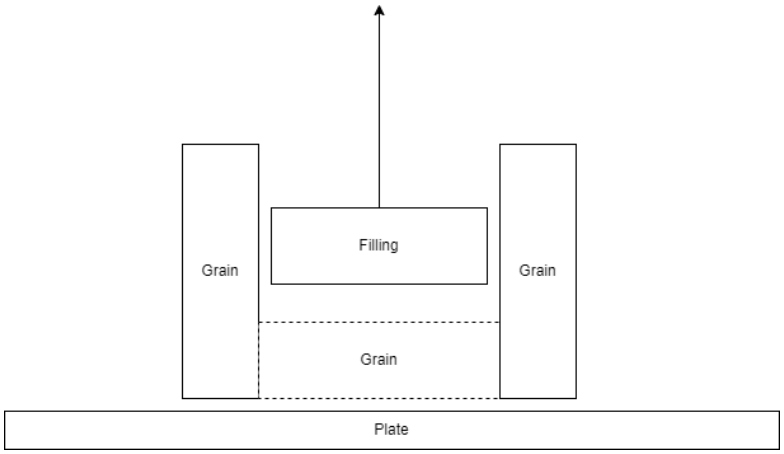

Figure 13—Diagram depicting dish and plate intersection.