CS7637: Knowledge-Based AI:
Homework2

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1 TOP-DOWN PROCESSING

1.1 Not a soup (24):

Baked Beans, Cereal with Milk, Chicken Pot Pie, Chocolate Pudding, Coconut Milk, Crème Brûlée, Fruit Salad in Syrup, Guacamole, Hot Chocolate with Marshmallows, Hot Tea with Tea Leaves, Ice Cream Sundae, Iced Tea, Macaroni and Cheese, Mashed Potatoes, Massaman Curry, Melted Ice Cream, Milkshake, Oatmeal, Pasta Bolognese, Rice Pudding, Risotto, Spaghetti with Marinara Sauce, Yogurt with Granola, Jambalaya, Chili, Stew

1.2 Soup (16):

Borscht, Chicken Broth, Chicken Noodle Soup, Clam Chowder, Consommé, Corn Chowder, French Onion Soup in a Bread Bowl, Gazpacho, Gumbo, Menudo, Miso Soup, Pho, Tomato Bisque, Vichyssoise

2 BOTTOM-UP PROCESSING

A soup, defined by Wikipedia, is a primarily liquid food, generally served warm or hot that is made by combining ingredients of meat or vegetables with stock, milk, or water. I made my initial model based on this definition. With the definition, my model looks like this:

[Liquid Base] → (contains) → [Primary Ingredients] → (complemented by) → [Seasonings and/or Additional Ingredients]

Here's a breakdown of each component:

- Liquid Base: fundamental characteristic of a soup. The liquid base can be anything from water, broth, or stock to tomato juice or milk.

- Primary Ingredients: solid or semi-solid ingredients that are cooked in the liquid base. They can be vegetables, meats, legumes, grains, or pasta.

- Seasonings and/or Additional Ingredients: These are added to enhance the flavor, texture, or nutritional value of the soup. This can include herbs, spices, creams, or additional meats or vegetables.

Each of the ingredients and the methods by which they are combined and cooked together contribute to the overall character and classification of the dish as a soup.

Example 1 (Positive): Chicken Noodle Soup
No changes to the model are needed as this example fits well within the existing framework.

Example 2 (Positive): Tomato Bisque
No changes to the model are needed as this example also fits well within the existing framework.

Example 3 (Positive): Clam Chowder
No changes to the model are needed as this example aligns with the existing framework.

Example 4 (Negative): Chili
Chili challenges the model due to its thicker consistency and less liquid base compared to traditional soups.

[Significant Liquid Base] → (contains) → [Primary Ingredients] → (complemented by) → [Seasonings and/or Additional Ingredients]

Example 5 (Negative): Jambalaya
Jambalaya further emphasizes the importance of a significant liquid base which distinguishes it from a soup.

Example 6 (Negative): Macaroni and Cheese
Macaroni and Cheese reinforces the necessity of a liquid base to be considered a soup.

1.3 Significant change to the model

Gazpacho:

A cold, vegetable-based soup that could introduce a new dimension regarding temperature, reinforcing that soups can be served cold.

[Significant hot/cold Liquid Base] → (contains) → [Primary Ingredients] → (complemented by) → [Seasonings and/or Additional Ingredients]

3 CLASSIFICATIONS

Parameter	Chicken Noodle Soup	Tomato Bisque	Chili	Jambalaya	Macaroni and Cheese	Ice Cream Sundae

Significant Liquid Base	Y	Y	N	N	N	N
Solid Ingredients Present	Y	Y	Y	Y	Y	Y
Served in a Bowl	Y	Y	Y	Y	N	Y
Eaten with a Spoon	Y	Y	Y	N	N	Y
Temperature (Hot/Cold/Room)	H	H	H	H	H	C

This table showcases a way to classify different dishes based on parameters that are indicative of traditional soups. By comparing different dishes across these parameters, it's easier to determine whether they fit the conventional classification of soup.

- Significant Liquid Base: Indicates if the dish has a substantial amount of liquid as its base.
- Solid Ingredients Present: Indicates if there are solid ingredients in the dish.
- Served in a Bowl: Typically, soups are served in bowls.
- Eaten with a Spoon: Soups are usually eaten with a spoon due to their liquid nature.
- Temperature: Soups can be served hot or cold, this parameter can help differentiate traditional soups from other dishes.

Significant Liquid Base
Yes:
2. Solid Ingredients Present
Yes:
3. Served in a Bowl
Yes:
4. Eaten with a Spoon
Yes:
5. Temperature
Hot or Cold: Classified as Soup
Room Temperature: Not Classified as Soup
No: Not Classified as Soup
No: Not Classified as Soup
No: Not Classified as Soup
No: Not Classified as Soup

Borscht: Soup

Significant liquid base (Yes), solid ingredients present (Yes), served in a bowl (Yes), eaten with a spoon (Yes), temperature (Hot/Cold).

Cereal with Milk: Not Soup
Significant liquid base (No), solid ingredients present (Yes), served in a bowl (Yes), eaten with a spoon (Yes), temperature (Cold).

Chicken Broth: Soup
Significant liquid base (Yes), solid ingredients present (No), served in a bowl (Yes), eaten with a spoon (Yes), temperature (Hot).

Chicken Pot Pie: Not Soup
Significant liquid base (No), solid ingredients present (Yes), served in a bowl (No), eaten with a spoon (No), temperature (Hot).

Chocolate Pudding: Not Soup
Significant liquid base (No), solid ingredients present (No), served in a bowl (Yes), eaten with a spoon (Yes), temperature (Room).

Clam Chowder: Soup
Significant liquid base (Yes), solid ingredients present (Yes), served in a bowl (Yes), eaten with a spoon (Yes), temperature (Hot).

Coconut Milk: Not Soup
Significant liquid base (Yes), solid ingredients present (No), served in a bowl (No), eaten with a spoon (No), temperature (Room).

Consommé: Soup
Significant liquid base (Yes), solid ingredients present (No), served in a bowl (Yes), eaten with a spoon (Yes), temperature (Hot).

Corn Chowder: Soup
Significant liquid base (Yes), solid ingredients present (Yes), served in a bowl (Yes), eaten with a spoon (Yes), temperature (Hot).

Crème Brûlée: Not Soup
Significant liquid base (No), solid ingredients present (No), served in a bowl (Yes), eaten with a spoon (Yes), temperature (Hot).

1. Incremental Concept Learning Model: According to the model developed, a significant characteristic of soup is having a significant liquid base, which grits do not typically have. They are more of a solid or semi-solid dish when prepared. Therefore, from this perspective, grits would not be classified as soup.

2. Classifier (Classification Tree): Following the parameters set in the classification tree: Significant Liquid Base: No (grits have a thicker consistency), Solid Ingredients Present: Yes, served in a Bowl: Usually, yes, Eaten with a Spoon: Yes, Temperature: Hot

According to this classifier, grits fail the first criterion of having a significant liquid base, so they would not be classified as soup.

3. Case-Based Reasoning: In a case-based reasoning approach, we look for a similar case to compare. Grits could be compared to oatmeal or rice pudding, where both are thicker in consistency and not considered soup. Another comparison could be to polenta, which is also not considered a soup. Therefore, by similarity to these cases, grits would not be classified as soup.