

Bachelor Thesis Defense:

Conversational Information Retrieval For Instructional Content

A Modeling Framework and an
Implementation for Recipe Search

29 August 2018

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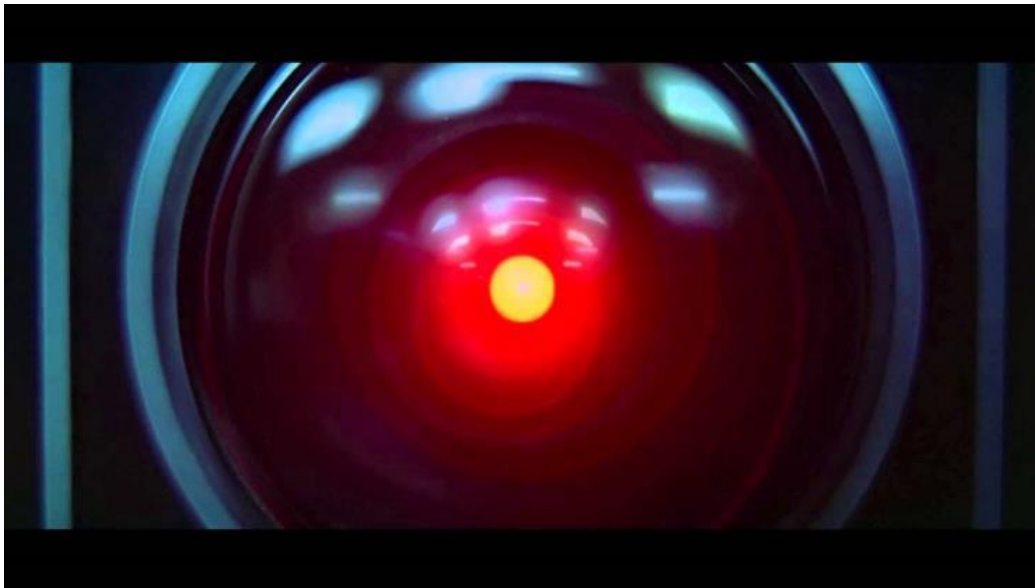
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Motivation



Expectation

"
*Sorry, I don't know
about that.*

"

-- *Alexa*

Reality

Motivation



Research Questions

1. How to present results using audio?
2. How should a new information seeking model look like?

Contribution

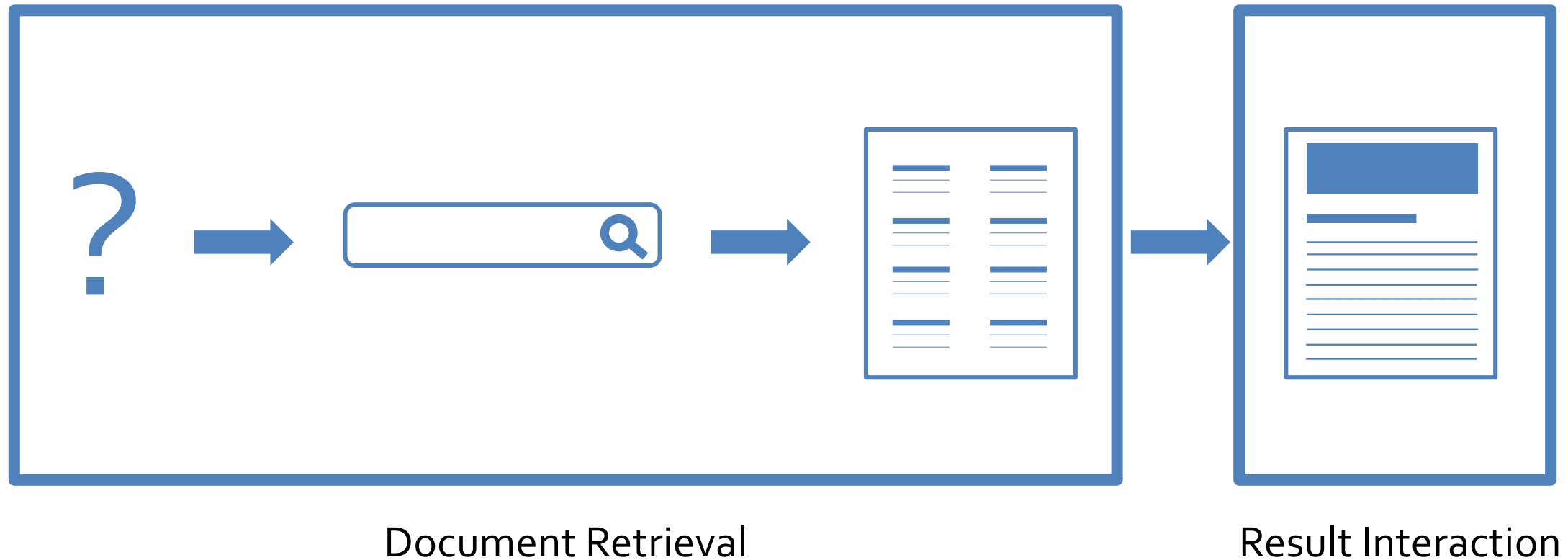
1. Conversational information retrieval model

RQ1: How to present results using audio?

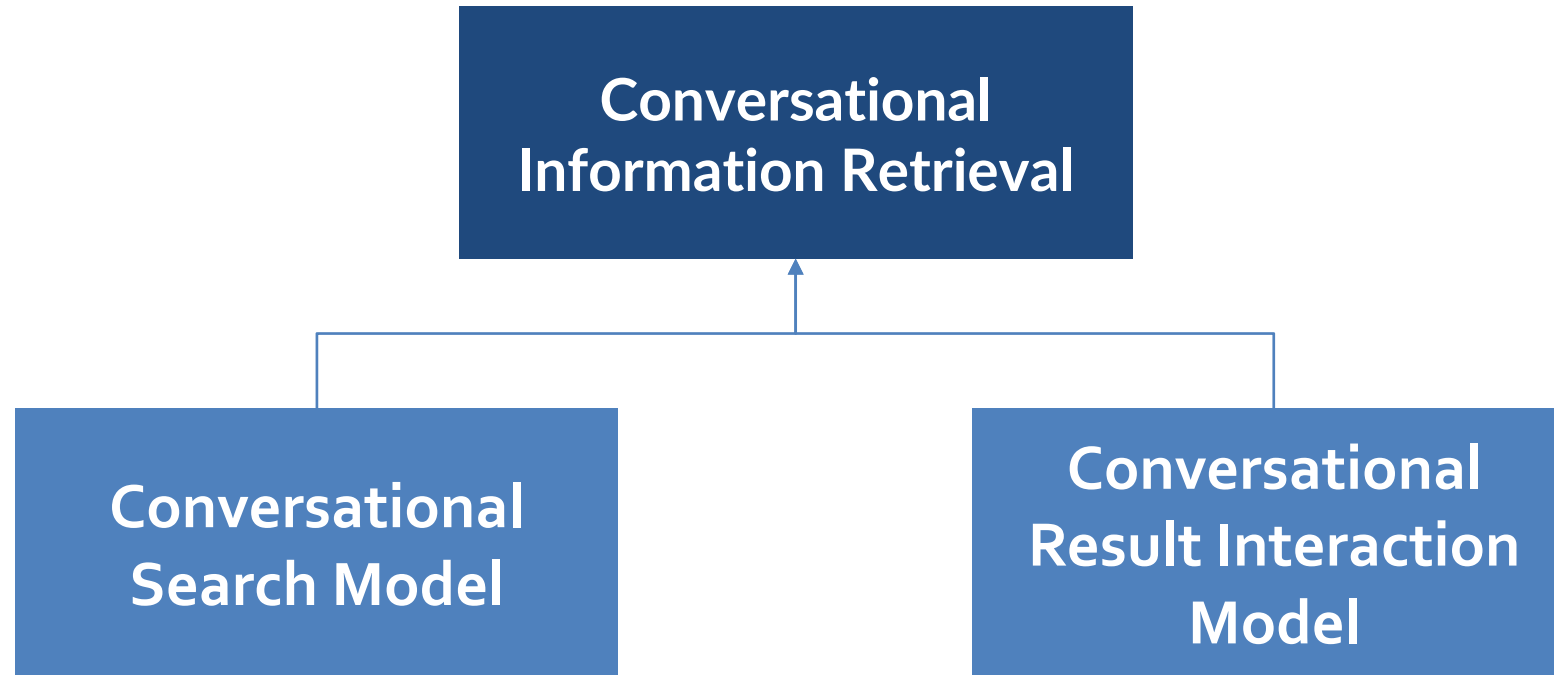
RQ2: How should a new information seeking model look like?

2. Prototype of conversational recipe search

Screen-based search



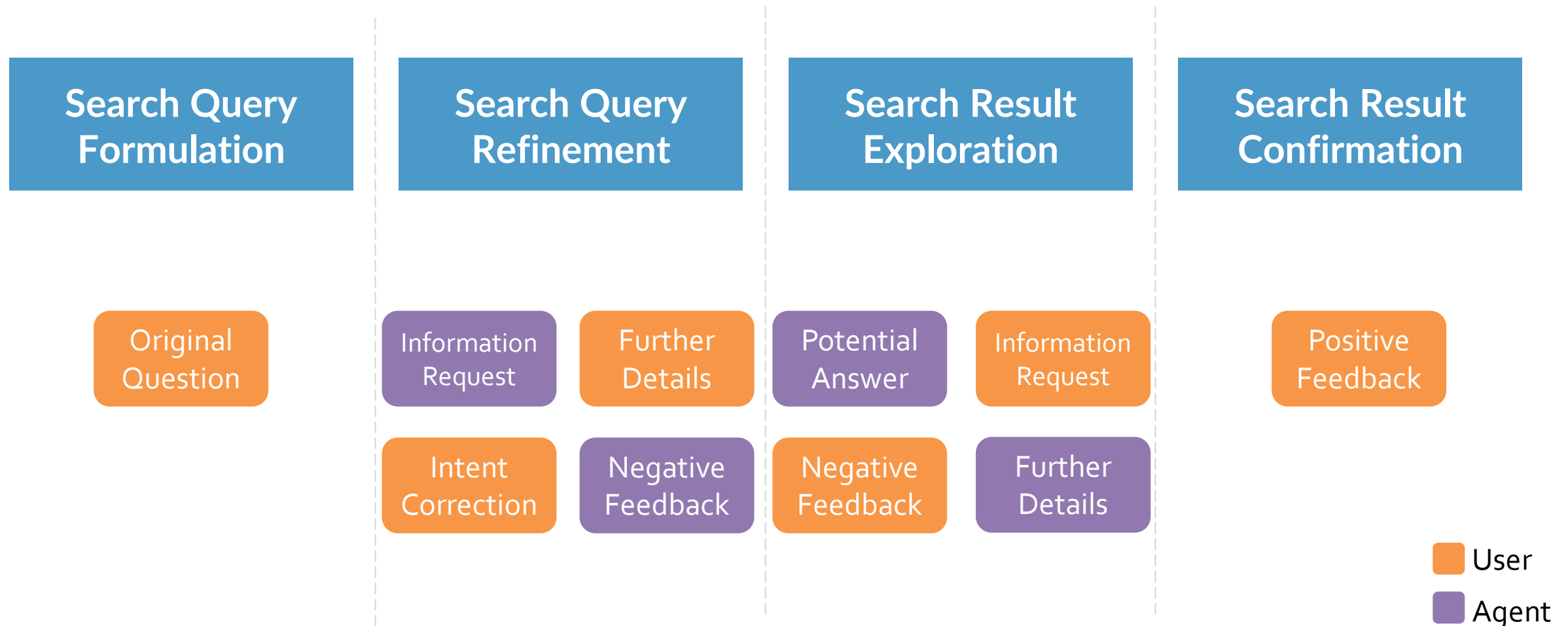
Conversational Information Retrieval Model



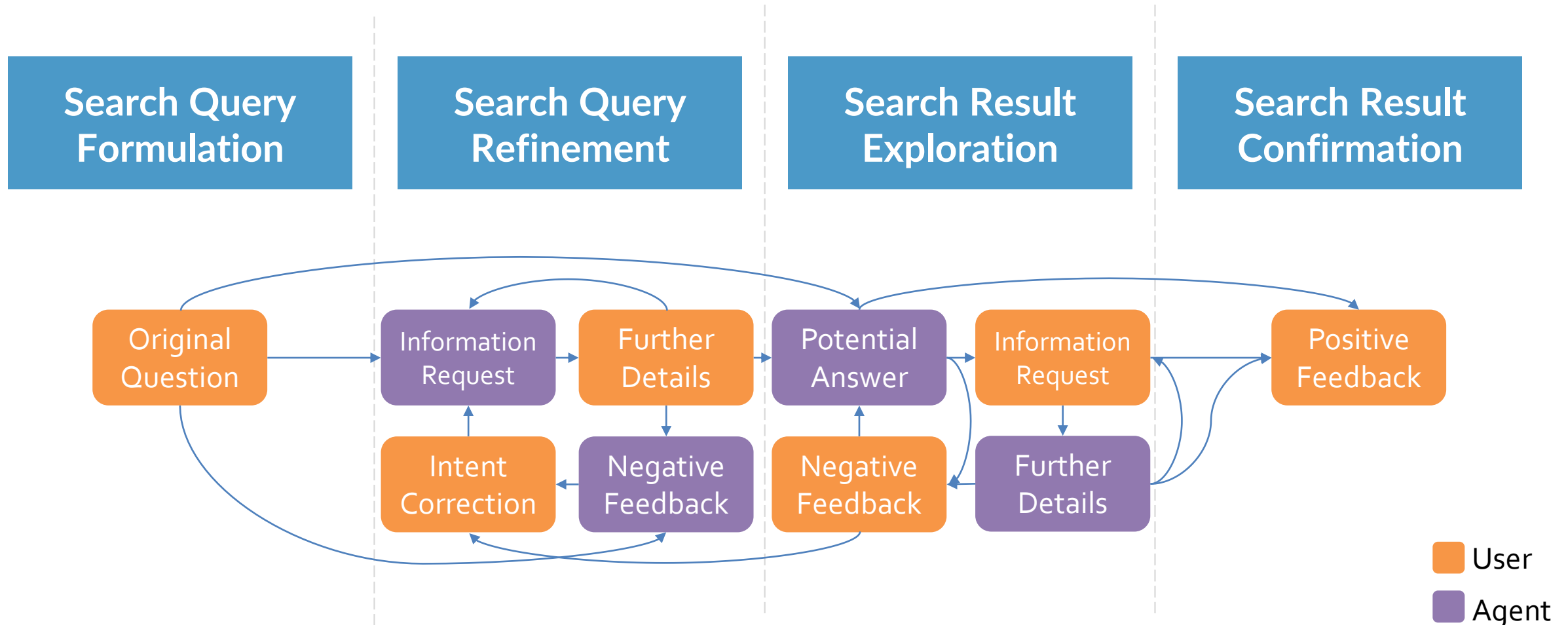
Conversational Information Retrieval Model

Intent Classes	
Original Question	Potential Answer
Information Request	Negative Feedback
Further Details	Positive Feedback
Intent Correction	Navigating Directive

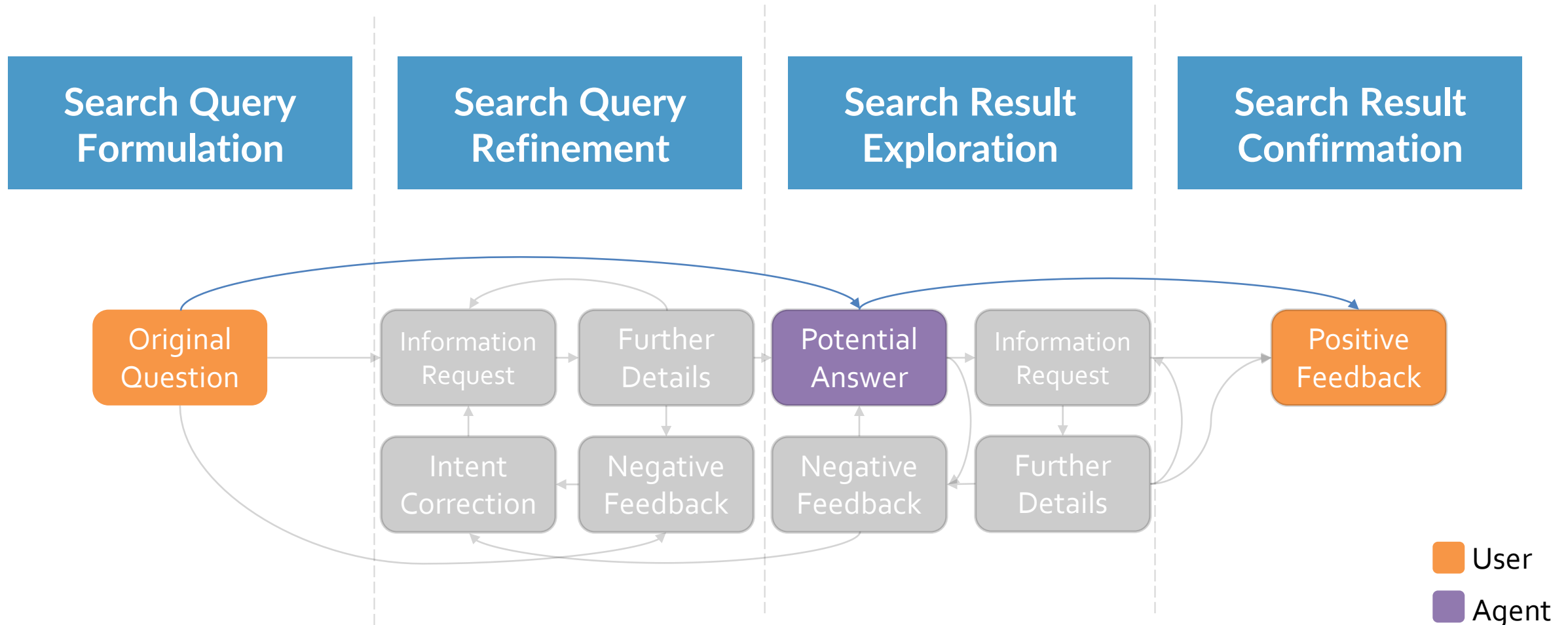
Conversational Search Model



Conversational Search Model

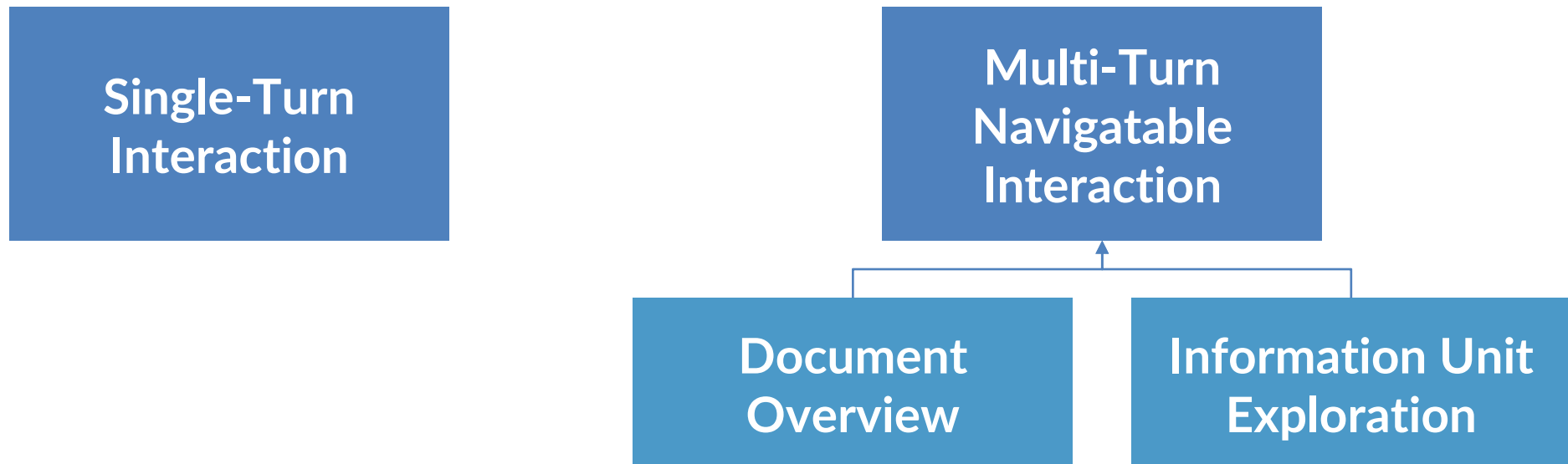


Conversational Search Model

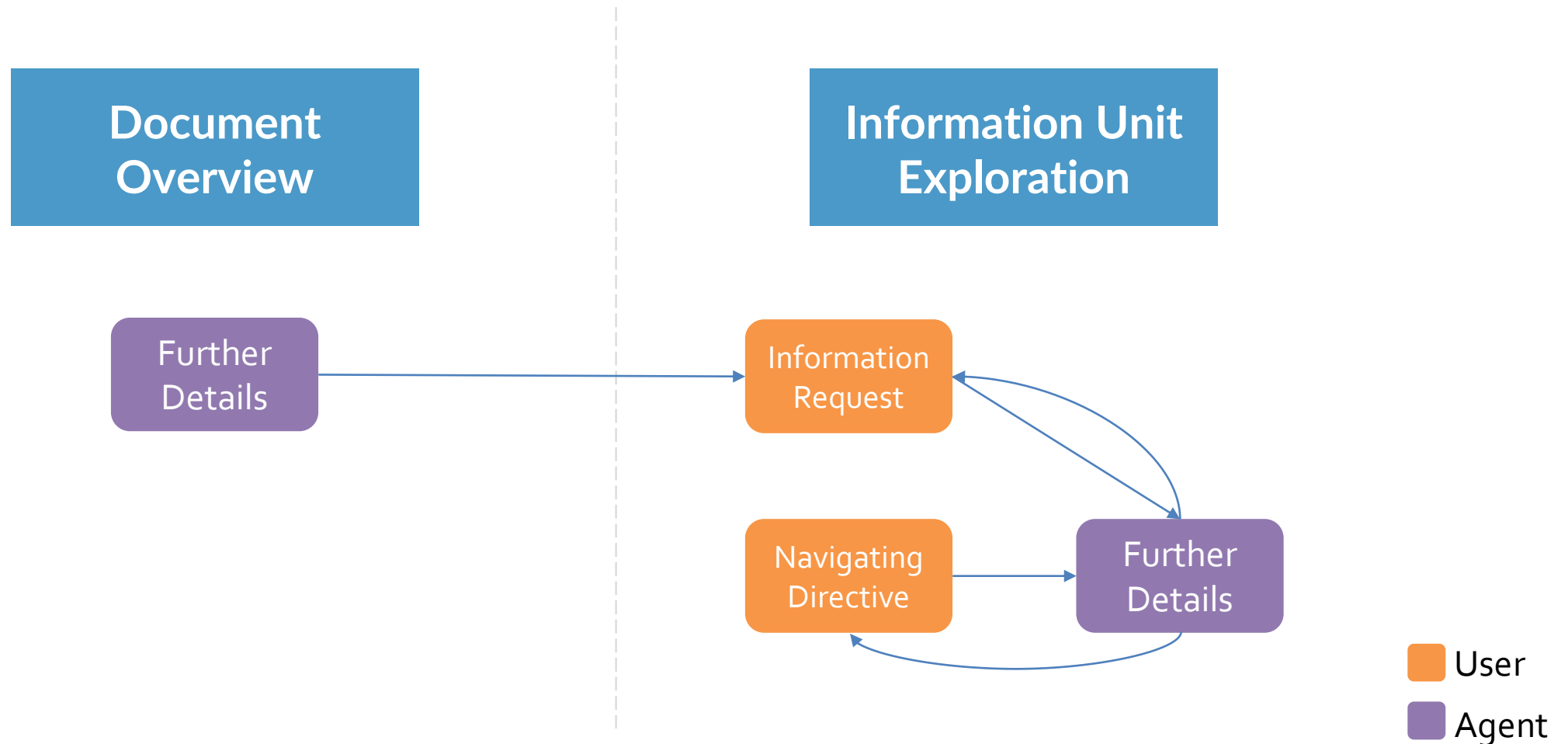


Conversational Result Interaction Model

Required information under the threshold of cognitive overload → Single-Turn
Otherwise → Multi-Turn



Conversational Result Interaction Model



Conversational Recipe Search Prototype

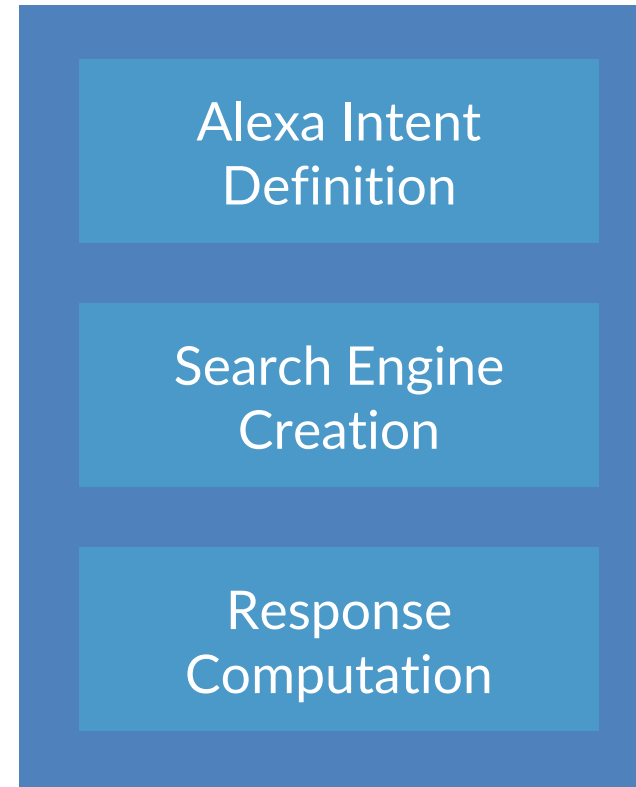
- Prototype developed as an Alexa Skill
- Corresponds with the two parts of the proposed model
 - Recipe search: Document search
 - Cooking instruction: Result interaction

Conversational Recipe Search Prototype

Data
Collection

Alexa Skill
Development

Conversational Recipe Search Prototype



Conversational Recipe Search Prototype



- Crawling of 8,302 eHow and 9,751 wikiHow HTML pages
- 17,307 JSON documents

Conversational Recipe Search Prototype



- Corpus document structure:

```
title: string
articleID: string
intro: string
category: [string]
related: [string]
tips-warnings: [string]
ingredients-thingsneeded: [{
  part-ingredients: [string]
  list-name: string}]
parts: [{
  part: string
  steps: [{
    step: string
    sub-steps: [sub-step: string]
    tips: [string]}]}}
```

- Three levels of abstraction of instructions

Conversational Recipe Search Prototype

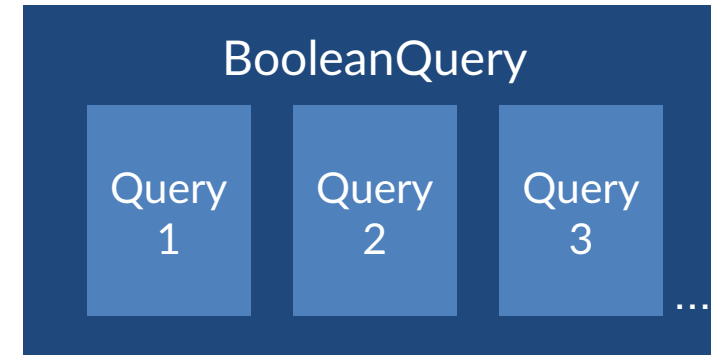


- Five index fields: title, id, ingredients, categories and file path

Recipe Search

Users are able to search according to:

- Title
- Category
- Ingredient



If users don't know what to cook at all and need recommendation:

- The system asks users questions to discover their needs
- History logs helps with identifying users' preferred items

Recipe Search

- Results are presented one at a time
- Denied recipes won't appear again in the current session
- Users may request information about the results' ingredients to help with decision
- Experimental cooking ontology for searching

Cooking Instruction

Document overview:

- If the recipe consists of multiple parts or methods, read method names
- Otherwise, or when a method is chosen, read summarized ingredients

Instruction:

- Assistance for ingredients preparation
- Step-by-Step cooking instruction with two levels of detail

Cooking Instruction

Retrieval of parts/methods or ingredient lists:

- Retrieval by index
- Similarity computation
 - Levenstein's algorithm
 - Longest common substring

Machine Comprehension API

- Allow users to asks about cooking time or ingredients' quantity

"..Method 9, Microwaved Scrambled Eggs..."
"Microwaved"

Future Work

- Cooking duration prediction
- Evaluation study

Improve:

- Integration of cooking ontology
- Customization of system properties
- User question handling
- User preference learning

Conclusion

1. Conversational information retrieval model

RQ1: How to present results using audio?

RQ2: How should a new information seeking model look like?

2. Prototype of conversational recipe search

Thank you for your attention!

Question Time