

# Chatbot Cognitive & Enhancement Project



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## PROBLEM STATEMENT

- Most chatbots don't display friendliness well during human interactions, resulting in a poor user experience.
- Chatbots often lack the ability to understand a wide range of user input.

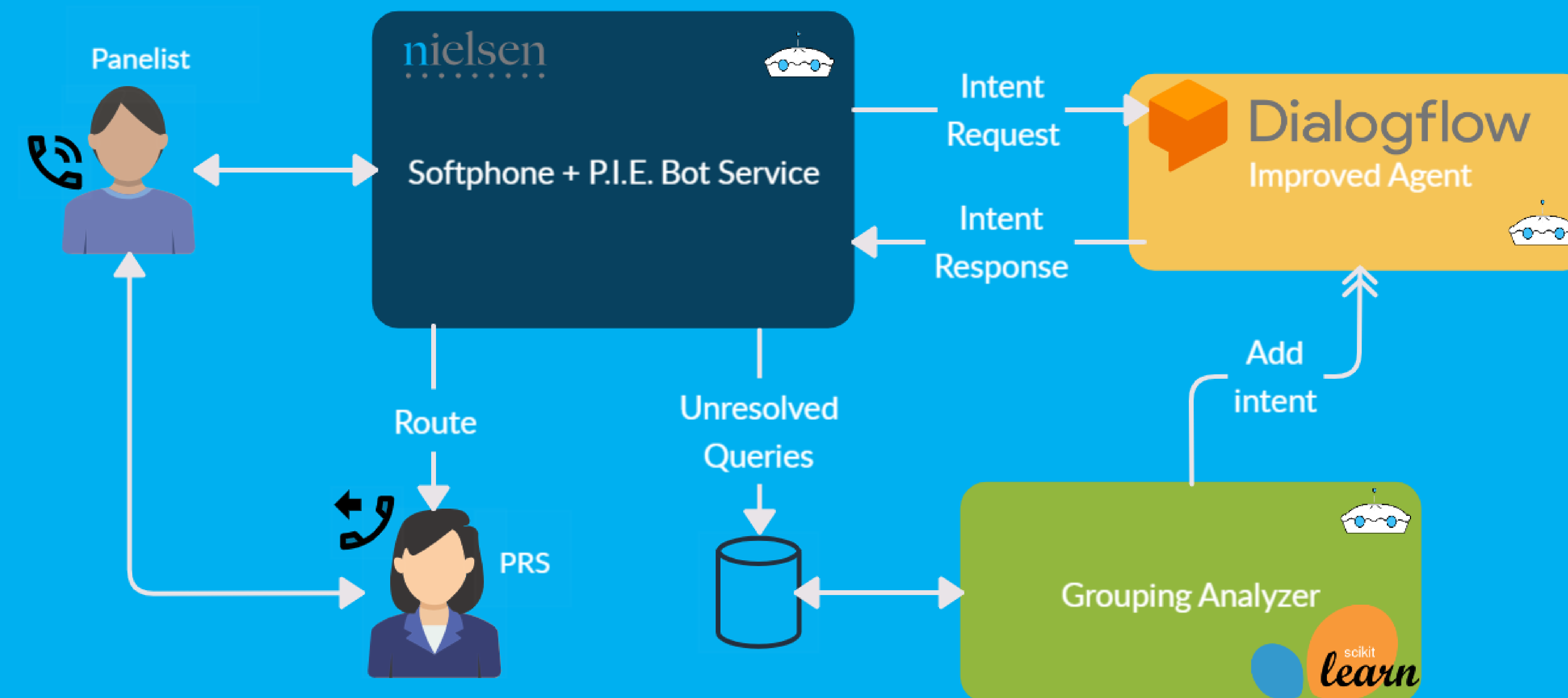
## METHODS

- Improve the chatbot's **conversational ability** by providing features in addition to Dialogflow's built-in capabilities:
  - Filler word automation** provides human-like filler words for more natural sounding conversations.
  - Sentiment analysis** detects user frustration and routes to an operator for better assistance.
  - A **fallback threshold** routes users to a representative if the bot consistently fails to understand the user.
  - Transfer personalization** provides the user comfort by acknowledging the issue right before transferring.
- Identify **new user intentions** by using **machine learning** to group unresolved queries.

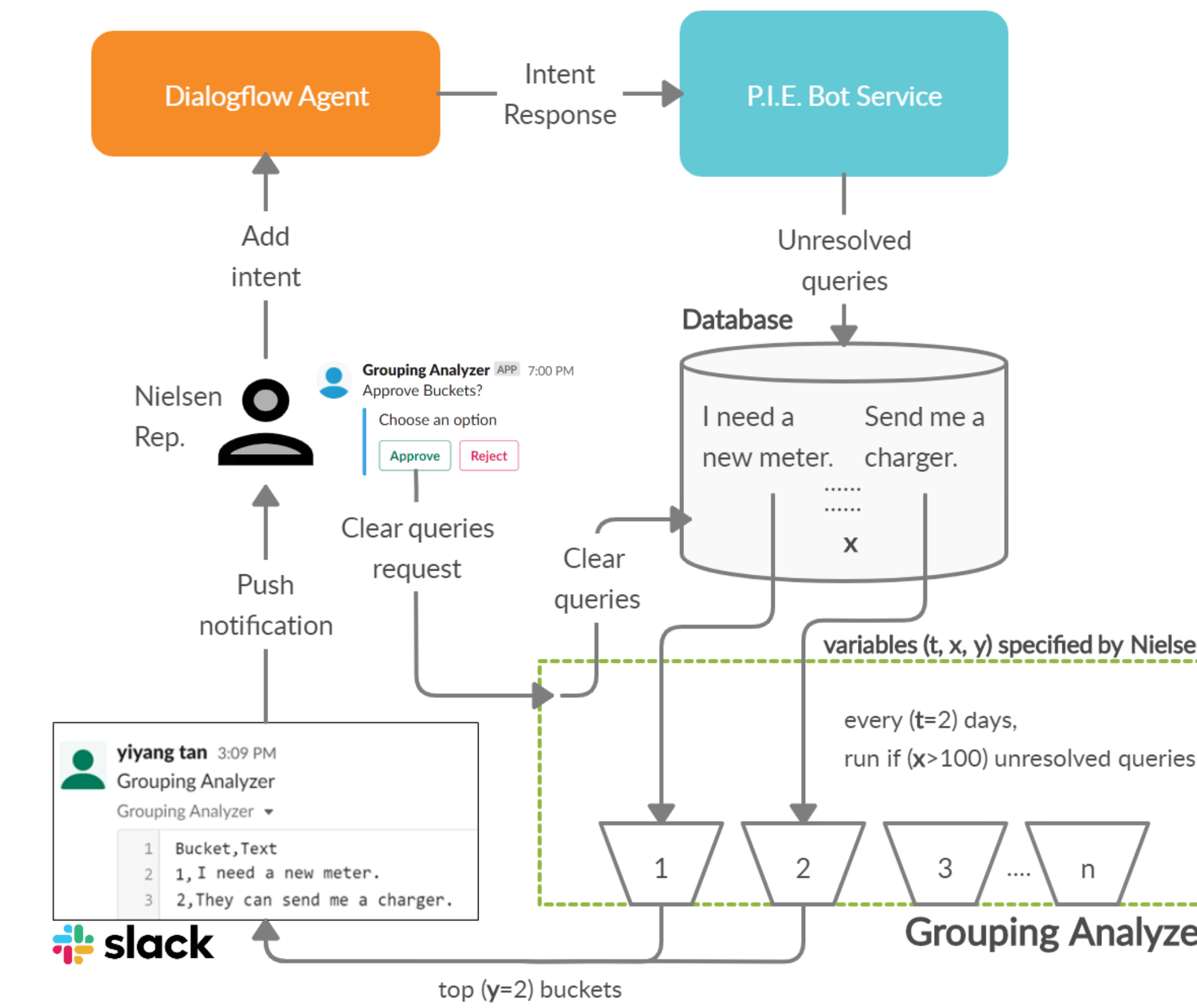
## RESULTS

- User testing compared the existing and improved system through a one-sided blind test. Survey results showed higher satisfaction for the improved system.
- Classification performance (accuracy, precision, recall) increased from redesigning intent structure.
- Cluster analysis (purity, NMI, FMI) favored an affinity propagation approach for intent identification.
- Existing lexicon-based sentiment analysis methods outperformed current MLaaS solutions.

By emulating human speech and introducing **self-learning**, chatbots can provide a **better user experience**.



## Slack Integration:



## Technical Performance Measures:

Technical Performance Measure (TPM)	Target	Final
Average Chatbot Response Length	<= 10 sec	4.24*
Accuracy	>= 90%	93.43*
Precision	>= 98%	95.20*
Recall	>= 90%	93.43*
Purity	>= 65%	68.12
NMI	>= 50%	53.75
FMI	>= 20%	26.45

Codes: unacceptable (red), in trouble (yellow), met (green), 10% (blue) \*internal testing results conducted by team

## Benefits:

- Increased panelist retention.
- Decreased need for human representatives.
- Less manual work required to identify new user intentions.



REMOVE  
REPLACE  
QR CODE

## OLD CHATBOT:

**Chatbot:** Hi. I am an automated system that can handle complete sentences, so tell me, how can I help you today?

Filler Word Automation

**Panelist:** This chatbot sucks.

**Chatbot:** Sorry I didn't get that. Can you please repeat?

Sentiment Analysis  
-MLaaS vs Lexicon-

**Panelist:** I'd like to update my household information.

**Chatbot:** Please hold while I transfer you to a Panel Relations Specialist

Transfer Personalization

**Panelist:** "unintelligible"

**Chatbot:** Sorry I didn't get that. Can you please repeat?

Fallback Threshold

## NEW CHATBOT:

**P.I.E. Bot:** Good afternoon! I'm Mia, a chatbot that can handle complete sentences. How can I help you today?  
**P.I.E. Bot:** Alright, I hope you were satisfied with the call. Have a great day!

**Panelist:** This chatbot sucks.

**P.I.E. Bot:** I am sorry, I see that you're frustrated. Please hold while I find a representative who can better assist you.

**Panelist:** I'd like to update my household information.

**P.I.E. Bot:** Sure, I see you are having an issue with **household information**, please hold while I find the right person to help you with that.

**Panelist:** "unintelligible"

**P.I.E. Bot:** Sorry, I seem to be having trouble understanding you, please hold while I transfer you to a representative.

