

AI Challenges in Customer Care Automation

Sameer Yami

Linc Global

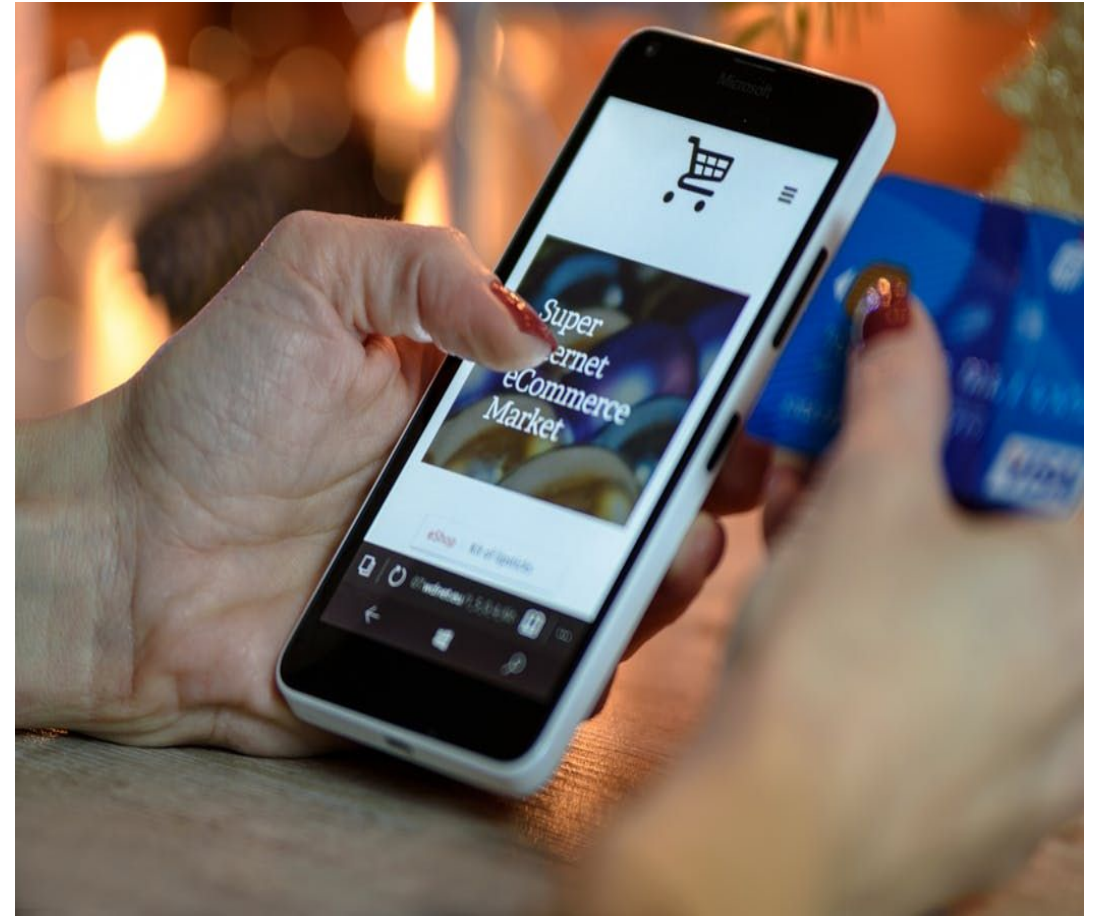



Our expectation from Ecommerce stores ...



Stores where we actually shop are like these

...





‘Customer Care
Automation’ bridges
this gap







Do you have it in navy?

My reward points are gone!

Why am I billed?

Where is my order?

When will you ship my order?

The shoes are great! 👍

It doesn't fit :(

How does the membership work?

I never received it :(

Can I exchange to next size bigger?

I'm a super fan ❤️

Cancel subscription

Can i still return?

Cancel membership

How do I reorder?

What's my reward balance?

Can I return to store?

Change delivery address





The most common customer needs require more than information look-up.





<10%
can be self-served
by having access to a
knowledge-base



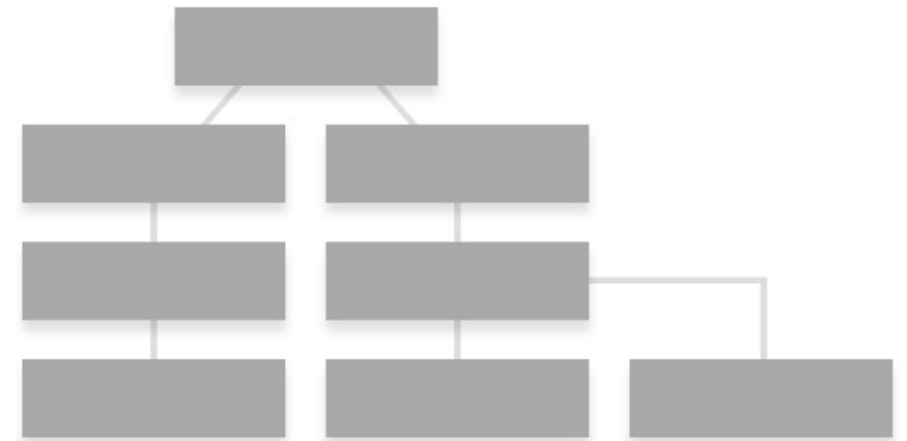
Customer Care Automation involves more!

**Knowledge-base technologies
are inadequate**



**< 10% can be
automated via
Knowledge-base
Technologies**

**Conversation Builders
are inadequate**



**Difficult to scale the number of services
without creating rigid interaction experience.**

Common Use Cases

- Tracking
- Frequently Asked Questions
- Returns
- Reorder

Evolving Use Cases

- Exchange (different size, color etc.)
- Search Products
- Check Product Availability
- Check Nearby Stores
- Product Recommendations
- ...

Customer Care Automation

- Keeping the spirit of the physical store 'Alive'
- Personalization
- Any Service Any Time (Multi Channel)
- Multiple Linked Services

More services → Interconnectivity

Current AI Scenario

- Available algorithms
 - Deep Learning – CNN, LSTM, BiLSTM
 - Standard ML – SVM, Random Forest,
 - Rule Based

Broad Level AI Challenges

- Human-like expectations from Chat channels
 - NLU - Intent Mapping
 - Mixing NLU with relevant User Data
 - Sentiment Analysis
 - Workflow integration
 - Product Understanding and Disambiguation

Follow the Data (to build a better AI)

- Data may not exist in certain categories especially evolving ones
- Expensive data labelling

Data Integration Challenges

- Data Integration and Data Pipeline
 - Multi-channel requires data availability
 - Data exists in silos
 - Real time
- Extensibility and Scalability
- Multiple services requires deep merchant integration
 - How would the Bot know that 'Jennifer' likes blue color and is super eager to receive her items?

Intent Mapping – Multiple Intents

- Humans speak in multiple intents
- Low False-Positive Rate ($< 3\%$)
 - better to have bot do nothing than return the 'cool camera' that you just bought
- Average Accuracy $> 92\%$
 - Standard ML / Deep Learning are not a panacea
 - Deep domain understanding + ML + Deep Learning
- Extensibility + Low False Positive Rate?

Intent Mapping - Nuances

- Human expression is very nuanced
 - "I have not received my shoes yet, and I needed it before Christmas. Can I cancel this order and may be get it in the nearby store"
- Multiple intents
 - Shipment is late – check tracking
 - Check availability in nearby store
 - Cancel current order
 - Notify nearby store
 - What if there is a similar shoe but with a slightly different design? Will the user take it?
 - Send a return label to the user

Intent Mapping – Choice of Algorithms

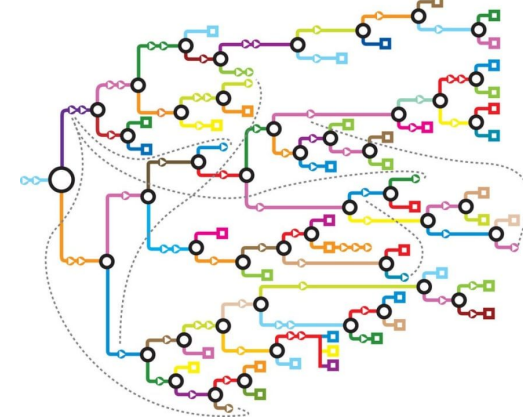
- Machine Learning / Deep Learning Approach
 - Label and standard word2vec
 - False Positive Rate
- Computational Linguistics / NLP
 - Many good libraries but scaling is always a problem

Sentiment Analysis

- Good open source solutions based on CNN, Random Forest etc.
- When to hand over to a human?
 - Super Negative (Was it late?)
 - Trending towards negative (Maybe)
 - Neutral (May not be best)

Conversation Flow Control

- Closed or open conversation?
 - Is the user referring to old conversation or new one?
- Can a Bot understand the best time to 'recommend' a product to the user?
- Identify if the user is asking the same question?



Conversation Flow - Topic Transitions



- Humans are good at it
- Bot needs to detect it - transitioning from one service to another

Retailer Style Mimicking

- Each retailer has their own style which depends on
 - Corporate Philosophy
 - Products that they sell
 - Customers that buy from them
- Can a 'Bot' mimic each retailer's style?
- Can each retailer style be learnt?

Product Disambiguation

- “Has my suit shipped?” –



- “Sure, it has. Your suit will arrive tomorrow”

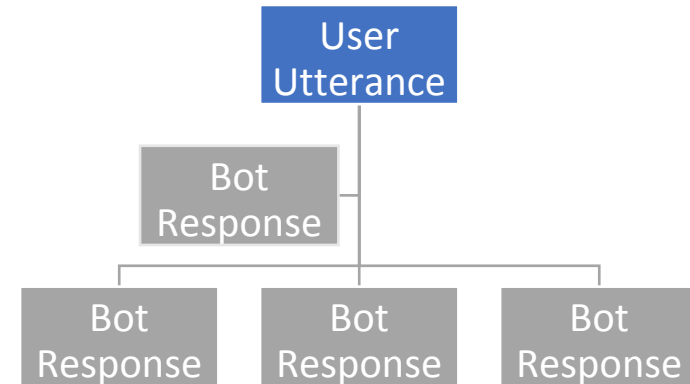


Natural Language Generation (NLG)

- Template-Driven works very well but is not extensible
- Neural Network based methods exist but not sufficient
- A combination might work

Optimizing Workflows

- Retailer workflow integration
- Salient aspects of a workflow
- Workflow rendering using NLG



Remember
the story?



Moral ...Perspective is everything

Bots can talk.
But can they have a perspective?

But what can provide perspective for a Bot?

Context



NLU+NLG

Workflow

Context

Context

- Deep User Knowledge
- Deep Product and Retailer Knowledge
- Ability to mix it with NLU



The Purpose of Context

- Organize data to ...
 - Answer questions
 - User, Franchise and Product Aggregations
 - Batch Vs Real Time Data
 - Raw Vs Derived Data
 - Support Disambiguation
- ... so that a Bot has something analogous to human *Thinking*

Types of Context

- Raw Vs Derived
 - Raw
 - Useful for lookup and slot filling
 - For example, *User Name, Franchise Id, Order Information* etc.
 - Derived
 - Aggregate or processed information
 - Useful for smarter decision making and building better Machine Learning models
 - For example, *Number of Active Orders, Number of Failed Conversations* etc.

Types of Context

- Batch Vs Real time
 - Batch
 - Processed periodically.
 - Real Time
 - Processed in a very short window of time

Some Simple Context Items

- *activeOrderCount* – Number of Active Orders
- *lastMonthPlacedOrderCount* – Number of Orders placed last month
- *lifetimePurchaseValue* – Life Time Purchase Value of User
- *lastConversationDate* – Last Conversation Date

Context Inference

- Identify relevant entities
- Identify in a very short time
- Figure out the best entities or context items that can answer the question

Future

- Workflow Optimization
- Explore integrating services on the fly
- Learning and integrating newer contexts

Thank You!

crocs[™]

GoPro[®]
Be a HERO. ■■■■

SHEPLERS
EST. 1899

JUSTFAB[™]


vineyard vines

 Shop

Neiman Marcus

BOSS
HUGO BOSS

GUESS

carter's
babies and kids

EST. 1896
OSHKOSH
B'gosh