Chatbots for Next-Generation Residential Care

Chatbot Interfaces

CHATBOT TECHNOLOGY

Recent years have witnessed a significant increase in Chatbot technology for automated, conversational interaction with key applications. TeraCrunch provides an end-to-end Chatbot development solution for applications.

HOME AUTOMATION CHATBOTs

TeraCrunch has developed customized Chatbot solutions, pwered by AI, for practical and large-scale home (residential complex) automation.

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The Client

The client is a company pioneering home automation technologies for individual homes as well as for residential complexes and communities of multiple homes. The client is pioneering the use of artificial intelligence (AI) technologies in this regard, particularly for better communication with tenants, managing payments and maintenance requests, and also controlling smart devices such as locks, lights, thermostats and other.

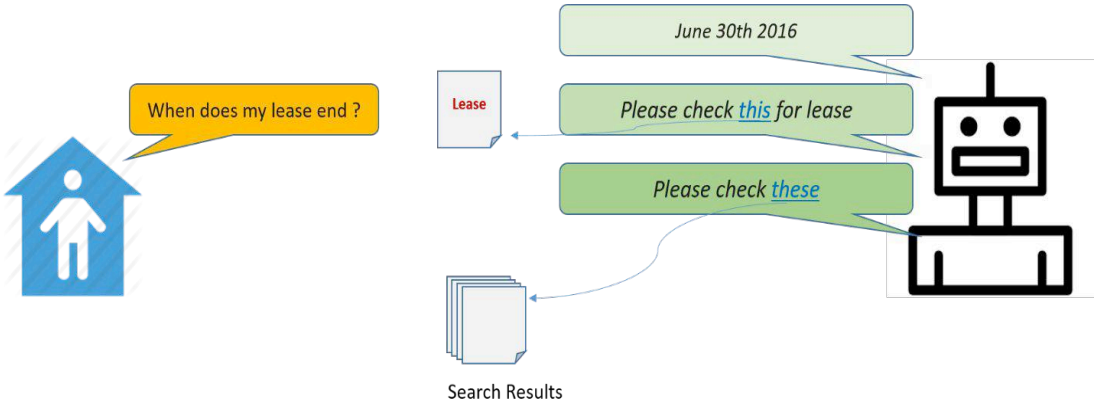

Figure 1. Home Management Chatbot: With Multi-level Response

The Requirement: A Home Management Chatbot

The client wanted TeraCrunch to innovate and develop a first of a kind Home Management Chatbot for providing significantly more streamlined service to residents in apartment complexes and other integrated communities.

Such a Chatbot would serve two kinds of users:

1) Individual Residents / Tenants, who would use the Chatbot to make queries to the residential complex management, issue service requests etc.,
2) The Residential Complex Management, who would use the Chatbot for their queries and information.

The goal is that the Chatbot would be as effective as a dedicated human providing such information and response. The overall expected benefits include:

- Making information available to residents in a faster fashion and with higher anytime availability.
- Streamlining and optimizing the complex maintenance for the management.
- Overall optimality, in terms of better and faster information awareness for residents and management as well as better and faster issue resolution.

Levels

Figure 1 provides a schematic illustration of the home management Chatbot. A unique feature that we have introduced, to maximize user utility, in that of multiple levels of Chatbot response. General speaking, automated natural language understanding is a hard AI problem. However, our objective is to provide a utility that addresses user needs most of the time.

We have developed a *three-level* Chatbot response, defined as follows:

Level 1: **An exact answer to a user query.** So in the current example the response is the (exact) information of "June 30th 2016".

Level 2: **A pointer to specific information.** In this example it is a pointer to the specific user's lease agreement.

Level 3: **Relevant documents that may be helpful.** A keyword search is performed over documents, in this case the documents relevant to key concepts such as 'lease' are likely to be returned.

TeraCrunch Platform

TEXT ANALYTICS ENGINE

Transform data into meaningfully defined topics and associations: events, numbers, things, people, places and the patterns & correlations between them

INSIGHTZ™ MODULE

Pre-built algorithemic models designed to pinpoint associations and propensities in the data, predict change over time, identify instabilities, variation ranges and anomalies

DATA EXTRACTION

Enables comprehensive and rapid collection of data from Customer Data Sources, Internet, Social-Media and other sources and prepare the data for further synthesis

TECHNOLOGY

Machine Learning Algorithms, Natural Language Processing, Knowledge Engineering, Statistical & Computational Models, R, WEKA, MongoDB

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Chatbot Architecture

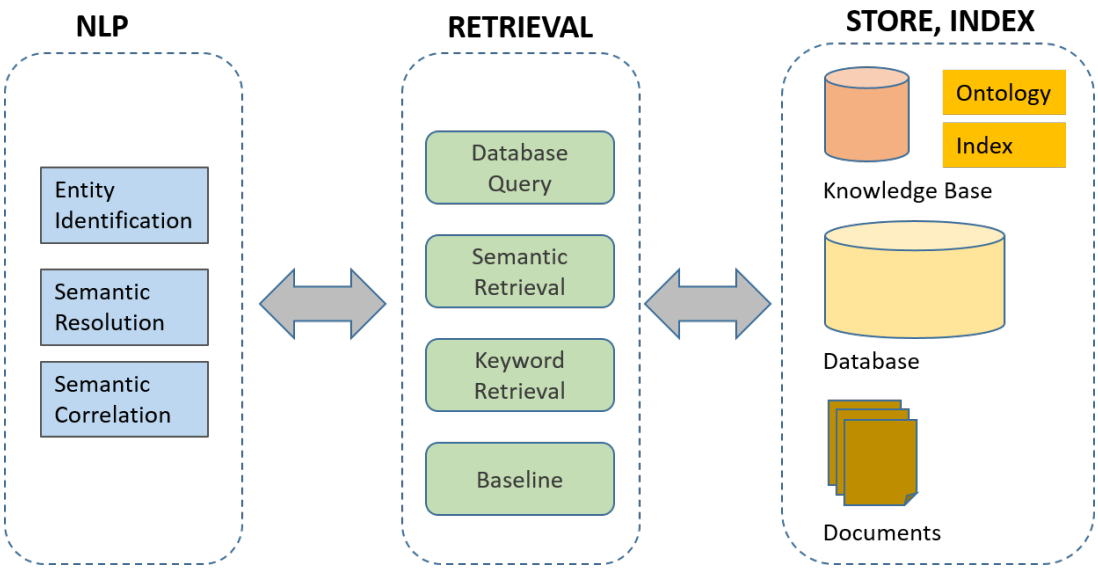

Figure 2. TeraCrunch Chatbot Architecture

The architecture, as illustrated in Figure 2 comprises of three key components:

1) **Natural Language Processing (NLP)** This the core capability for "understanding" the user intent with the message. We employ a combination of NLP technologies such as entity recognition for one, to recognize significant entities in the message – for instance 'lease' or 'swimming pool' etc., We also perform semantic resolution, for instance 'pool' could also be referred to as 'swimming pool', 'swim area' etc.,
2) **Retrieval** This is the core capability for acting upon the message, once the user intent is understood.
3) **Store and Index** This is where the Chatbot information resides. This is a combination of structured data (databases), as well as unstructured information (as in documents). This can be considered as the knowledge base of Chatbot i.e., the data and information it taps into for providing responses.

Why Use Chatbots?

There are many benefits that Chatbots can bring to business applications overall.

- Many Web applications, such as e-commerce sites, travel reservation sites and others have some Chatbot component to them.
- Any technology application is provided with a *human face*, which builds trust and empathy as a result.
- They provide an alternate way of accessing the information. The Chatbot can take plain language queries, give plain language responses, and show users the relevant parts of the web page – a true virtual assistant.
- They can help reduce costs and optimize service. Chatbots are significantly more scalable and cost effective than manual teams and are a means for an organization to provide better, faster, more scalable service and with a cheaper operations cost.