Chatbot

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Introduction

Dear Reader,

Chatbots are a clear manifestation that Artificial Intelligence (AI) is moving the hype. We see more and more business applications where chatbots with self-learning capabilities can interact with humans in a more natural way. We can also observe a growing sophistication and accuracy of AI which makes chatbots more robust and suitable for a broader range of applications. At the same time, there are also still challenges to overcome: improvements in natural language understanding or moving towards a more flow-based conversations instead of only "single shot" dialogues are steps that will require more time, investment and research.

In this point of view we want to discuss the latest developments in the chatbot technology domain and provide you with example applications.

We hope you enjoy reading our Chatbot Point of View.
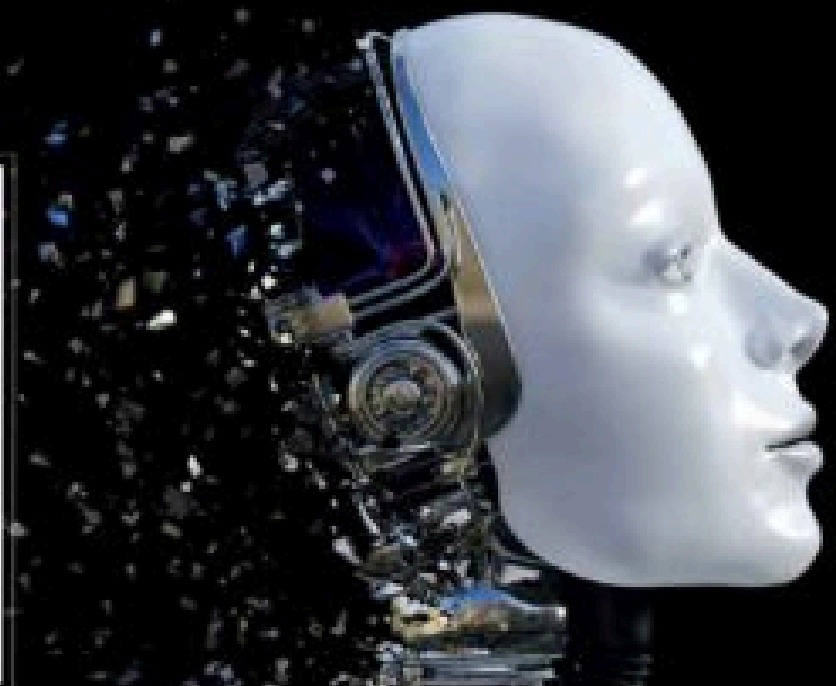
On behalf of Deloitte AI Team,

Naser Bakhshi
Senior Manager Advanced Analytics & AI Lead

"By 2020, the average person will have more conversations a day with bots than they do with their spouse"

L. HEATHER PEMBERTON | GARTNER

Value throughout your organization

Chatbots are key in your organization's digital journey and in delivering next generation intelligent customer service.

Improve customer acquisition

Show your potential customers your **advanced digital capabilities** and experience with cognitive technologies.

Rapidly scale up and down, always being **able to serve new customers.**

Chat interfaces are everywhere; **customers are ready** for the next step: automated chatting.

Reduce churn

24/7 customer support

High degree of **accuracy** and **high-throughput.** Provide high quality support, whenever the customer demands it.

Increase customer satisfaction by effectively solving their issues.

Increase revenue per user

The supporting tasks will be performed by the Chatbot. **Use your people to do what they do best;** sell products and services.

Gather, analyze and act on the customer's preferences and intentions.

Minimize cost to serve

15 – 90% cost reduction opportunity depending upon the characteristics of the functions selected for automation.

Short payback period with low integration costs and **high potential ROI.**
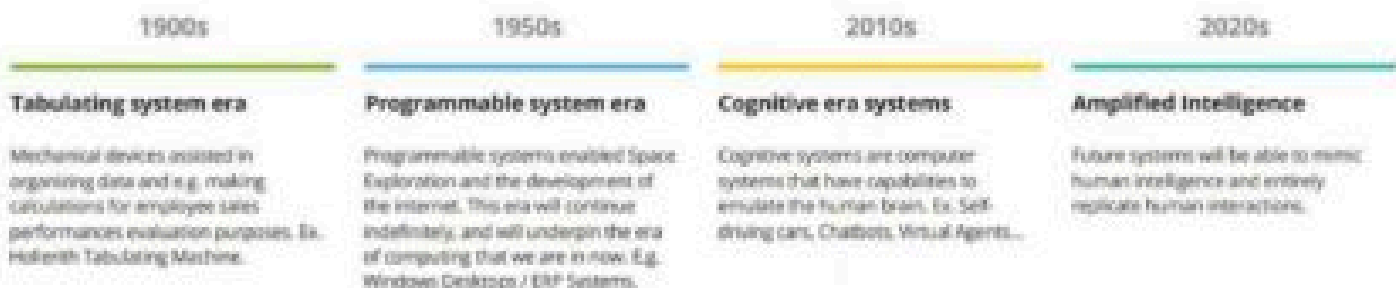
Mitigate security risks

What is a Chatbot?

Chatbots offer a conversational experience using artificial intelligence and natural language processing to mimic conversations with real people.

Intelligent
Advanced software learns from past interactions, improving responses over time

Engaging
Enables human-like interaction delivered through a channel that is easily scalable

Effective
Let users perform tasks efficiently and accurately through conversational self service

Computer power driving Enterprise Intelligence

Systems have evolved from mechanical computation & tabulation devices to intelligent systems that can emulate human cognition.

1900s	1950s	2010s	2020s

Tabulating system era

Mechanical devices assisted in organising data and e.g. making calculations for employee sales performances evaluation purposes. Ex. Hollerith Tabulating Machine.

Programmable system era

Programmable systems enabled Space Exploration and the development of the internet. This era will continue indefinitely, and will underpin the era of computing that we are in now. E.g. Windows Desktops / ERP Systems.

Cognitive era systems

Cognitive systems are computer systems that have capabilities to emulate the human brain. Ex. Self-driving cars, Chatbots, Virtual Agents...

Amplified Intelligence

Future systems will be able to mimic human intelligence and entirely replicate human interactions.

Welcome to the Cognitive Era!

Big data technologies in conjunction with **cognitive computing** enable us to extract insight from data that was previously unused.

Key drivers

- Exponential growth of Data
- Smarter algorithms
- Faster processing speed

Market forces driving Chatbot opportunities

Developments at both the side of supply and demand drive the added value of Chatbot technology.

Demand

Increasing pressure on contact centers

High-turnover rates, increased need for training and the necessity for reducing operating cost are putting pressure on the traditional contact center.

Rising demand for self-service

Customers are demanding self-service. No longer are they prepared to wait weeks, days, hours or even minutes for an employee to help them. They need their problem fixed and they need it fixed now!

The Rise of the Chatbot

Supply

Technological advances in AI and NLP

Chatbots are going beyond keyword matching. Advancements in Natural Language Processing, processing speed, machine learning models and data availability have made this possible.

Chatbot platforms maturing

As Chatbot technology becomes more popular, their development platforms become more mature. They come with easy to grasp drag-and-drop interfaces, allowing business users to build and manage Chatbots themselves.

Chatbot Types

Evolution of Conversational AI

Chatbots are like apps that users interact with in a conversational way, through text or speech. As technology advances, Chatbots are able to better understand both written and spoken text.

A Chatbot may be as **simple as basic pattern matching** with a response, or it may be a sophisticated weaving of **artificial intelligence techniques** with complex conversational state tracking and **integration into existing business services.**

Scripted Chatbots
- Basic and scripted
- Looks for key phrases & give pre-defined responses

Intent Recognizers
- Machine learning capabilities
- Greatly improved understanding of user intent, relationships between words are taken into account to extract meaning from a request

Virtual Agents
- Able to understand what a human is trying to achieve and can hold an end-to-end conversation
- Connects to other systems to leverage user data and insights
- Learns and improves over time

Human-like Advisor
- General AI, also known as human-level AI or strong AI
- The type of Artificial Intelligence that can understand and reason its environment as a human would

Chatbots have different levels of intelligence...

There is no clear separation between Chatbots and Virtual agents, as they operate within a large range of complexity in both dialog and p the spectrum have valuable applications. Below are two examples of applications of different complexity and intelligence.


In a FAQ knowledge base, the question is linked to a standardized answer.

The chatbot provides extra information to improve the customer experience.

The user's intent is recognized.

The entities 'amount', 'recipient' and 'description' are recognized.

The chatbot asks for confirmation based upon the recognized entities.

The chatbot transfers money from the user's checking account using the integrated back-end systems.

Chatbot applications

Chatbots have a broad range of applications, they help users with information requests, reservations or personalised tasks like money transfer.
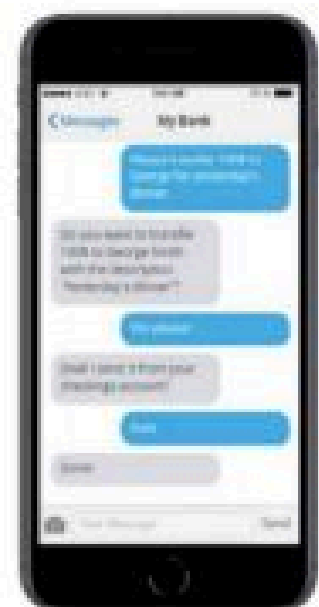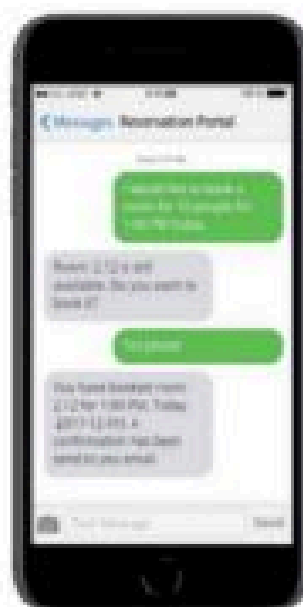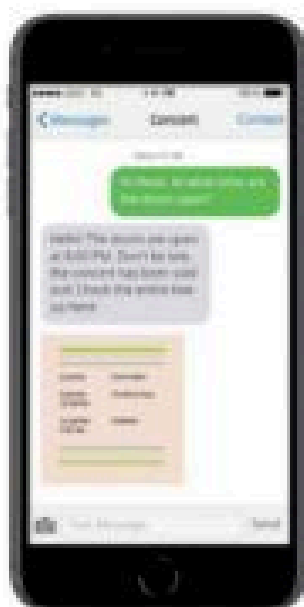
Towards user acceptance

Due to improvements in Natural Language Processing, Chatbots are shifting from command-driven towards more intelligent, conversational-driven 'Virtual Assistants', which are much better at determining context and user intent.
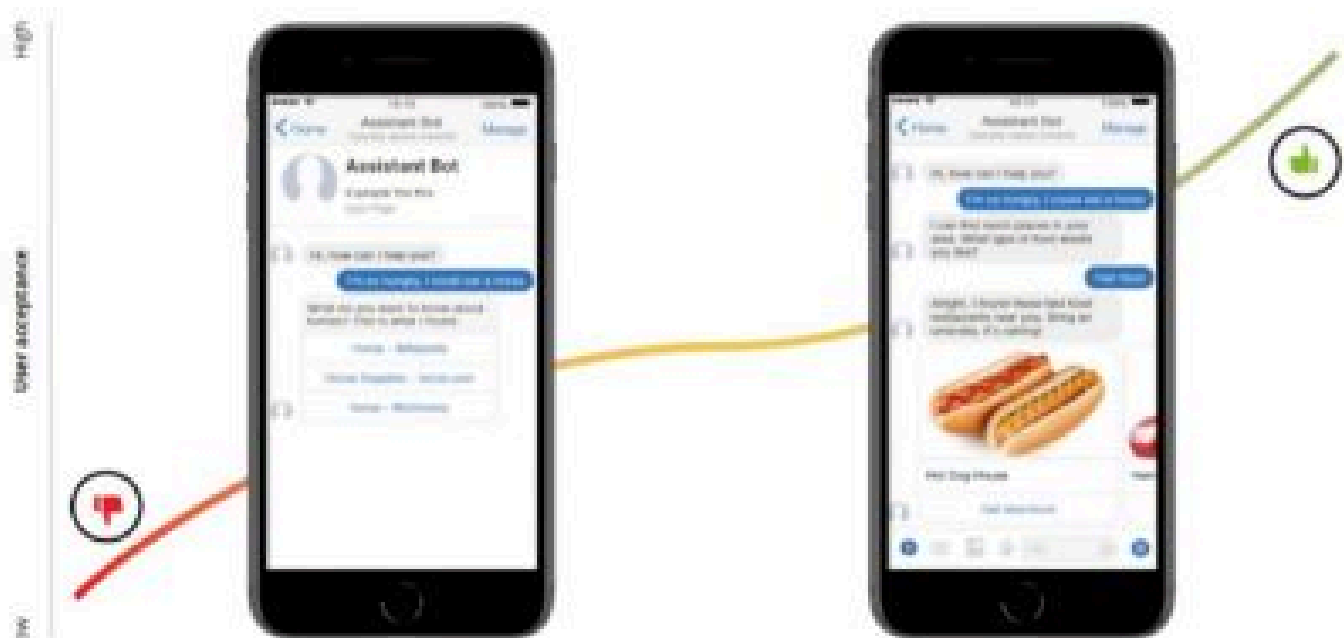
PROBLEMS

Hooray! Deep-learning based chat bots works well with Q&A scenario!

General problems

Inhuman: restricted for model training sets

Cannot "start" conversation

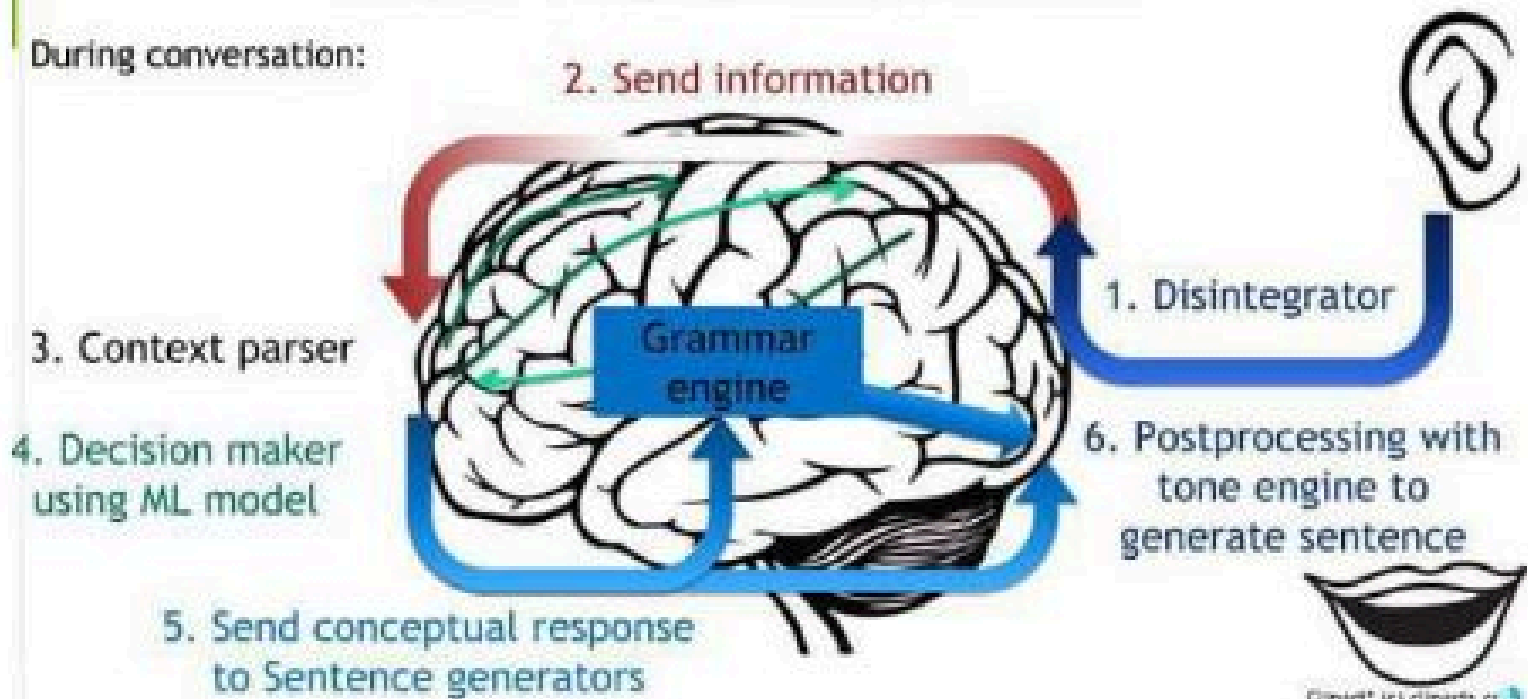Cannot handle continuous conversational context and its changes

Korean-specific problems

Dynamic type-changes

Postpositions / conjunction (Josa hell)

IDEAS FROM STRUCTURE

During conversation:

2. Send information

1. Disintegrator

3. Context parser

Grammar engine

4. Decision maker using ML model

6. Postprocessing with tone engine to generate sentence

5. Send conceptual response to Sentence generators