

WORKSHOP ON CHATBOT DEVELOPMENT WITH RASA

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Before we learn to build a chatbot ...

Lets build a chatbot!!!

Hands-On: Chatbot in 3 files

```
1 mkdir firstbot  
cd firstbot  
3 activate rasa_env  
rasa init --no-prompt
```

- ▶ Creates project structure and dummy files.
- ▶ Good to run and execute
- ▶ You can run as is or add your data to nlu.md, stories.md and domain.yml; retrain and run.

(Ref: How to build awesome Rasa chatbot for a web - Martin Novak)

NLU

- ▶ Your chatbot needs to understand what your users are saying,
- ▶ Give alternative examples to learn from that identify your users intent.
- ▶ For example, you teach your bot that “Hi” and “Hello” represent an intent greeting.
- ▶ Do this in data/nlu.md

```
2 ## intent:greeting
- hi
- hello
```

Dialog

- ▶ Also need to teach your bot how to respond to these intents in varying sequences that in Rasa are called stories
- ▶ Store that in data/stories.md
- ▶ Stars represent intents identified by Natural Language Understanding based on your data/nlu.md
- ▶ Dashes represent responses (called utterances) provided by your chatbot and defined as templates in domain.yml

```
1 ## first story
2 * greeting
3   - utter_greet_back
4 * farewell
5   - utter_farewell
```

Domain

domain.yml is everything that you need for a basic chatbot.

```
1 intents:  
2   - greeting  
3   - farewell  
4 templates:  
5     utter_greet_back  
6       - text: Hi there!  
7     utter_farewell  
8       - text: Hello, it is a pleasure to meet you.  
9 actions:  
10    - utter_greet_back  
11    - utter_farewell
```

Re-train

```
rasa train
```

Run

```
1 rasa shell --quiet --enable-api --log-file out.log --cors *
```

Ask: “Are you a bot?”

Demo: Here is what you are going to build!!!

Introduction

Calling the Call Center

- ▶ Calling to an IVR (Integrated Voice Response)
- ▶ A pre-recorded menu selection.
- ▶ “Please press 1 for Account Details, Please press 2 for . . . ”
- ▶ Till it comes to your option.
- ▶ Else, you are given access to a person to talk to.

Boring? Annoying? But still heavily used . . . , Why?



(Ref: Deep Learning and NLP A-Z - Kirill Eremenko)

Instead, how about typing/saying your query directly and getting the answer right away?

Solution

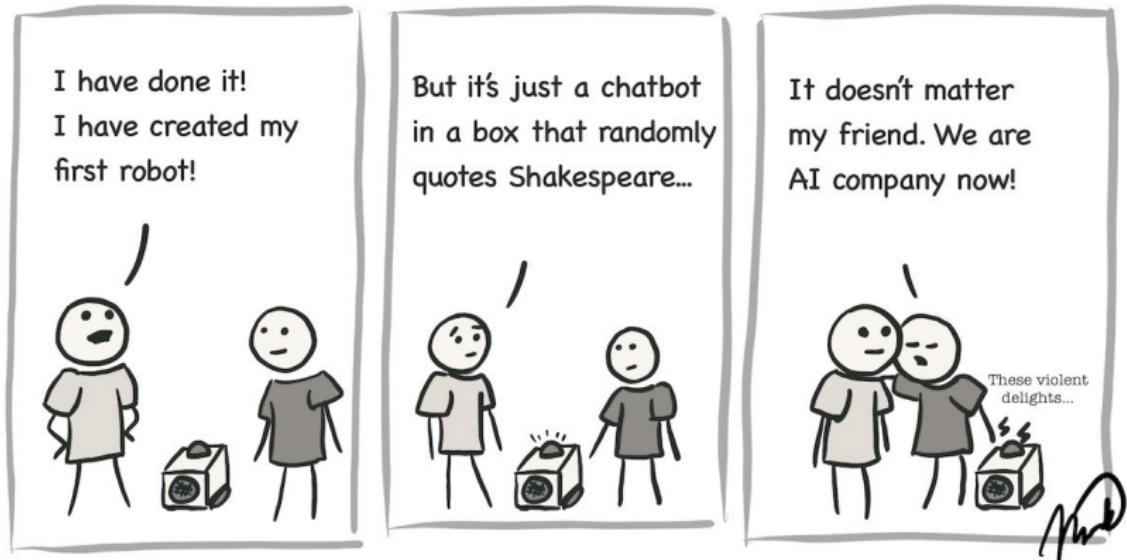
Chatbots!!!

- ▶ Which problem of IVR it is solving?
- ▶ Advantages?
- ▶ Disadvantages?
- ▶ Gaining popularity ...
- ▶ Many platforms
- ▶ Any local chatbot companies/platforms?

Crystal Ball

- ▶ 85% Of customer interactions will be managed without a human by 2020
 - Gartner prediction
- ▶ “The global chatbot market is expected to reach \$1.23 billion by 2025” - Business Insider

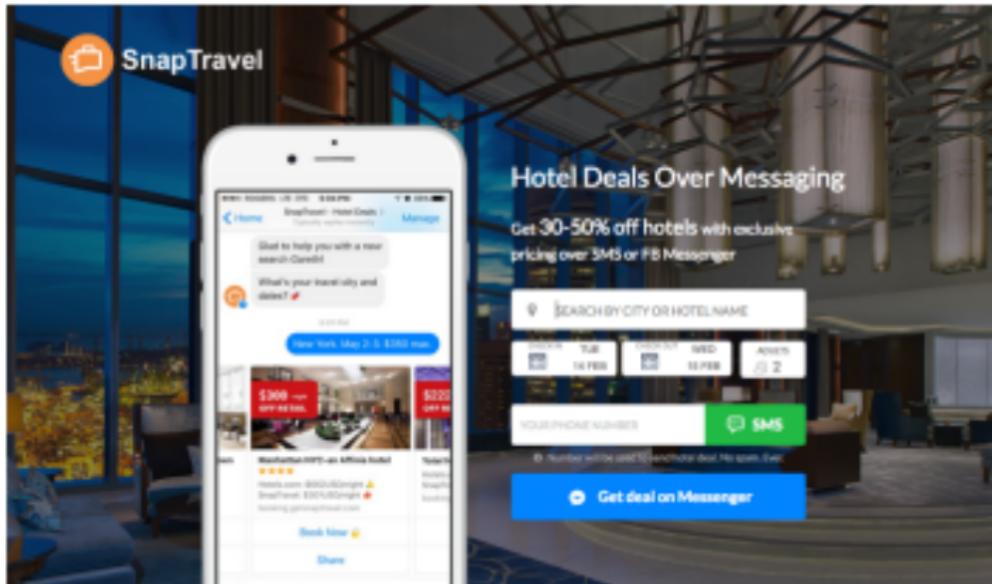
Chatbot == AI



(Ref: How to build awesome Rasa chatbot for a web - Martin Novak)

Sample Application

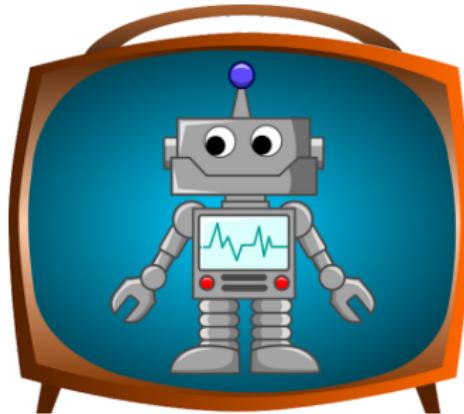
SnapTravel has processed \$1 million in hotel bookings inside Messenger.



(Ref: Innovation in Health - Ritesh Ptael, et al)

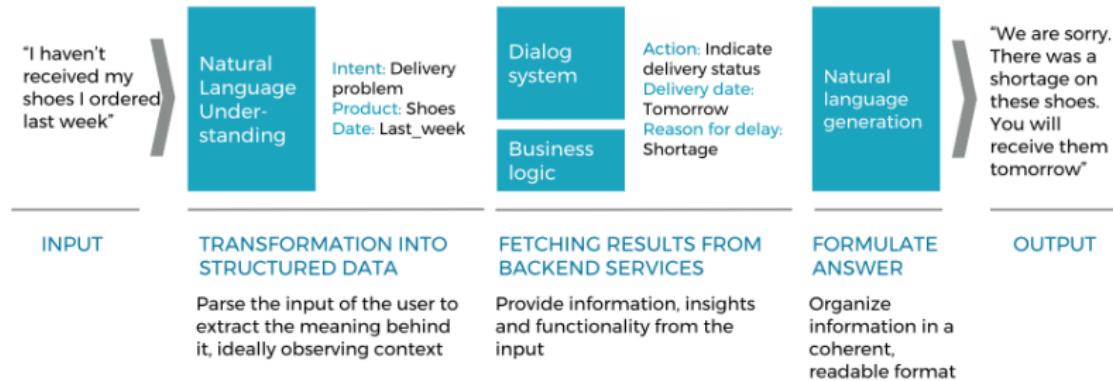
So, What is a Chatbot?

“Chatbots are a form of human-computer dialog system which operates through natural language via text or speech”- Deryugina, 2010; Sansonnet et al., 2006.



(Ref: Rasa - mdd01 course on github)

Anatomy of a Chatbot



(Ref: Chatbots and AI - botfuel)

Why so many chatbot startups?

- ▶ VCs appear excited with this new tool, more services, more opportunities, new battlegrounds for the big players (likely leading to acquisitions).
- ▶ So even without real technological breakthroughs, there is at least some money to be made investing in bot startups.
- ▶ But the real issue is : Truly 'conversational' software is a difficult problem to solve.

(Ref: We don't know how to build conversational software yet (Alan Nichol Apr 2016))

How difficult?

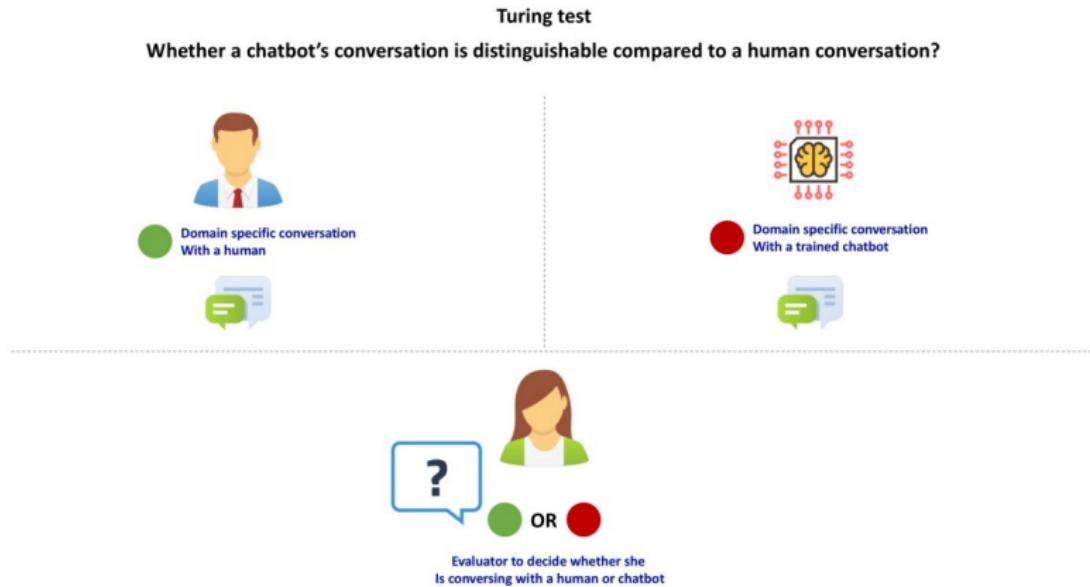


So what tools do developers need to do better than this?

(Ref: A New Approach to Conversational Software - Alan Nichol)

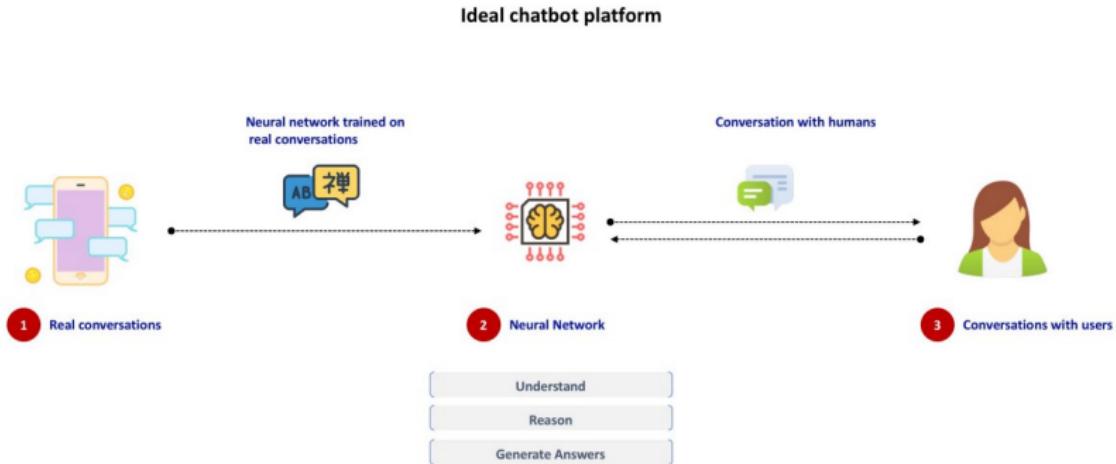
NLU is AI

Understanding Natural Language is Hallmark of Artificial Intelligence!!



(Ref: Conversational AI: Understanding the Basics and Building a Chatbot in Rasa module - Manikandan Jeeva)

NLU is AI



But the current bots are not this generic.

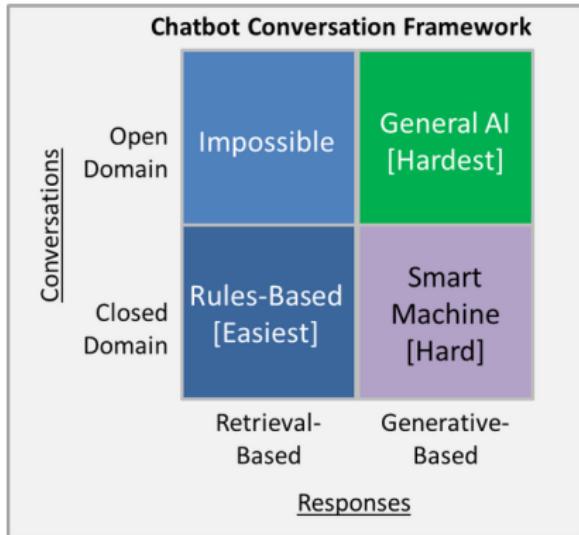
(Ref: Conversational AI: Understanding the Basics and Building a Chatbot in Rasa module - Manikandan Jeeva)

Types of Chatbots

- ▶ Command & response: Stateless bots are essentially a command line app over HTTP
- ▶ Hard-coded conversation flows: navigate a flow chart defined. <http://superscriptjs.com/> allows that. Evi is an intelligent bot built with “knowledge base” technology.
- ▶ Fuzzy/continuous/fluid state: that's the goal. Human conversations don't follow a template

(Ref: We don't know how to build conversational software yet (Alan Nichol Apr 2016))

Classification of Chatbots

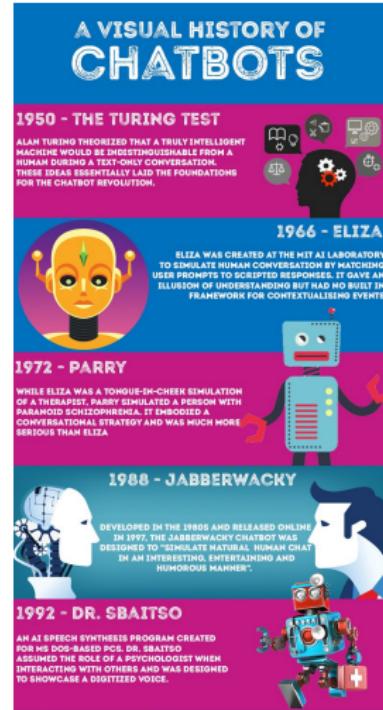


- ▶ Retrieval-based models (easier) use a repository of predefined responses and some kind of heuristic to pick an appropriate response based on the input and context.
- ▶ Generative models (harder) are based on Machine Translation techniques, but instead of translating from one language to another, we “translate” from an input to an output (response).

History

- ▶ Chatbot history: starts in 1960s.
- ▶ Eliza by MIT professor Joseph Weizenbaum: a psychotherapist, Pattern based.
- ▶ ALICE ("Artificial Linguistic Internet Computer Entity"), 1995, Richard Wallace using AIML (artificial intelligence markup language)
- ▶ Then of course, most tech giants

(Ref: Understanding AI Chatbots, Challenges, Opportunities & Beyond - Pramod Chandrayan)



History

1995 - ALICE
THE "ARTIFICIAL LINGUISTIC INTERNET COMPUTER ENTITY" WAS A NATURAL LANGUAGE PROCESSING BOT. SHE COULD APPLY HEURISTIC PATTERN MATCHING RULES TO HUMAN INPUT IN ORDER TO HAVE A CONVERSATION, BUT WAS STILL NOT ABLE TO PASS THE TURING TEST.

2001 - SMARTERCHILD
AN INTELLIGENT BOT WIDELY DISTRIBUTED ACROSS SMS NETWORKS AND BUDDY LISTS OF AOL AND MSN MESSENGERS USERS. IT OFFERED A FUN PERSONALIZED CONVERSATION AND WAS CONSIDERED A PRECURSOR TO APPLE'S SIRI AND SAMSUNG'S VOICE.

2006 - IBM'S WATSON
WATSON WAS ORIGINALLY DESIGNED TO COMPETE ON THE TV SHOW JEOPARDY! IN WHICH HE BEAT TWO OF THE SHOW'S FORMER CHAMPIONS. WATSON HAS SINCE GONE ON TO BIGGER AND BETTER THINGS USING NATURAL LANGUAGE PROCESSING AND MACHINE LEARNING TO REVEAL INSIGHTS FROM LARGE AMOUNTS OF DATA.

2010 - SIRI
SIRI IS AN INTELLIGENT PERSONAL ASSISTANT. IT IS PART OF APPLE'S IOS AND USES A NATURAL LANGUAGE UI TO ANSWER QUESTIONS AND PERFORM VARIOUS REQUESTS. SIRI DID THE GROUNDWORK FOR ALL LATER AI BOTS AND PERSONAL ASSISTANTS.

2012 - GOOGLE NOW
DEVELOPED BY GOOGLE FOR THE GOOGLE SEARCH MOBILE APP, IT EMPLOYS A NATURAL LANGUAGE USER INTERFACE TO ANSWER QUESTIONS, MAKE RECOMMENDATIONS, AND PERFORM ACTIONS BY PASSING ON REQUESTS TO A SET OF WEB SERVICES

2015 - ALEXA
AN INTELLIGENT PERSONAL ASSISTANT THAT INHABITS THE AMAZON ECHO DEVICE. ALEXA'S CAPABLE OF VOICE INTERACTION, USING NATURAL LANGUAGE PROCESSING ALGORITHMS TO RECEIVE, RECOGNIZE, AND RESPOND TO VOICE COMMANDS.

2015 - CORTANA
MICROSOFT'S VERSION OF THE INTELLIGENT ASSISTANT THAT CAN SET REMINDERS AND ANSWER QUESTIONS USING THE BING SEARCH ENGINE. CORTANA RECOGNIZES NATURAL VOICE COMMANDS AND IS AVAILABLE IN A NUMBER OF DIFFERENT LANGUAGES.

2016 - BOTS FOR MESSENGER
IN APRIL, FACEBOOK LAUNCHED A MESSENGER PLATFORM WHICH ALLOWS DEVELOPERS TO CREATE BOTS THAT CAN INTERACT WITH FACEBOOK USERS. AT THE END OF 2016, 34,000 BOTS WERE AVAILABLE COVERING A WIDE RANGE OF USE CASES.

2016 - TAY
TAY WAS A CHATBOT CREATED BY MICROSOFT TO MIMIC THE SPEECH AND HABITS OF A TEENAGE GIRL. IT CAUSED CONTROVERSY WHEN IT BEGAN TO POST OFFENSIVE TWEETS AND BECAME INCREASINGLY PARANOIA. IT EVENTUALLY HAD TO BE SHUT DOWN JUST 16 HOURS AFTER LAUNCH.

SOURCES

[HTTP://WWW.IBM.COM](http://www.ibm.com)
[HTTP://EN.WIKIPEDIA.ORG](http://en.wikipedia.org)
[HTTP://WWW.EVENTUREBEAT.COM](https://www.eventurebeat.com)
[HTTP://WWW.FRESPR.COM](http://www.frespir.com)



WIZU.COM
THE FIRST BOT FOR CUSTOMER FEEDBACK

The Giants are at it ...



(Ref: Deep Learning and NLP A-Z - Kirill Eremenko)

If you want to develop one

- ▶ Chatbots or QA systems, predominantly voice based,
- ▶ Underlying processing is primarily Natural Language Processing (NLP).
- ▶ You can have your own chatbot, specific to you!!
- ▶ NLP is the core skill needed.

Why so much popularity?

Chatbots are:

- ▶ Autonomous and Always Available
- ▶ Drive Conversation
- ▶ Able to handle millions of requests, scalable.

But to have a good Chatbot, at core, we would need expertise in NLP!!

Forecasts

"Chatbots will fundamentally revolutionize how computing is experienced by everybody."
- **Satya Nadella**

"In the next five to 10 years, AI is going to deliver so many improvements in the quality of our lives."
- **Mark Zuckerberg**

"Robots will be able to do everything better than us."
- **Elon Musk**

(Ref: Subro.io)

Through the Bill and Melinda Gates Foundation, Microsoft's co-founder and chairman has invested more than **\$240 million** to date in a developing field known as "personalized learning."



The global Chatbots market was valued at **USD 88.5 Million** in 2015 and is anticipated to witness a substantial compound annual growth rate (**CAGR**) of **35.08%** over the period 2016-2023.



63% of people would consider messaging an online chatbot to communicate with a business or brand.



100,000 Facebook

There are more than 100, 000 chatbots on Facebook Messenger.



Forecasts

1 / 2 More than half of consumers prefer business that use chat apps.



80% of businesses want chatbots by 2020.



By 2020, an average person will have more conversions with chatbots than with his/her spouse.



2022
Chatbots expected to cut business costs by \$8 billion by 2022.



59% of millennials & 60% of Gen Xers have used chatbots on a messaging app.



38% ↗ 62%

38% of enterprises are already using AI technologies and 62% will use AI technologies by 2018.



75% ↗ 90%

The success rates of bot interactions in the healthcare and banking sectors will reach over 75% and 90% respectively.



Healthcare & Banking

providers using chatbots can expect average time savings of just over 4 minutes per enquiry.

Challenges for Chatbot

- ▶ Security: should ensure that only relevant data is being asked and captured as an input and also is being securely transmitted over the Internet.
- ▶ Making Chatbot stick, like-able and functioning
- ▶ Language Modeling: meaning based vectorization, even for vernacular.
- ▶ etc ...

Pros

- ▶ Anytime, day or night
- ▶ Can handle repetitive, boring tasks
- ▶ Scalable
- ▶ Consistent
- ▶ Can gather data

Cons

- ▶ NLU is hard, AI is not GENERAL yet
- ▶ Cant design for ANY interaction
- ▶ Can be Risky
- ▶ Cant trust for sensitive data

Thanks ... yogeshkulkarni@yahoo.com