

Chatbots

A Few Thoughts

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References

- O'Reilly #BotDay - <http://bit.ly/botday2016>
- Pretty much everything I read and tweet about bots <http://bit.ly/doraionbots>
- Venture Beat - BotBeat
- My Twitter BotLists - <https://twitter.com/dorait/lists/ai-bots?lang=en>
- <https://www.reddit.com/search?q=chatbots>
- Blog.chatbot.com
- Chatbots - What, Why and How?
<http://doraithodla.com/2017/04/17/chatbots-what-why-and-how/>

Chatbots are...

**Conversational Agents
Driven by
Intelligence**

Why Am I Excited? And You Should be Too...

- 1. A chance to make our Apps easier (to use)**
- 2. Learn a lot from interactions**
- 3. Get on to mobile without writing an app**



Microsoft

“Human language is the new UI layer,
bots are the new applications, and digital
assistants are meta apps...intelligence is
infused into all of your interactions ”

Satya Nadella



“Some of the most important software product categories that will evolve in the next couple decades are going to be driven by conversational interfaces powered by AI... to further enhance people’s productivity”

- Stewart Butterfield



“Chat is the new
browser, bots are the
new websites”

- Ted Livingston



A Brief History of Chatbots

A Brief History of Chatbots

1950 • The Turing Test

Alan Turing theorized that a truly intelligent machine would be indistinguishable from a human during a text-only conversation. **Turing's ideas helped lay the groundwork for the chatbot revolution.**



1966 • ELIZA

The world's first chatbot, ELIZA could mimic the responses of a psychotherapist and -- for short spurts -- carry on convincingly human conversations.

1972 • PARRY

In the 1970s, ELIZA met its first (non-human) patient: PARRY, a chatbot that could imitate a person with paranoid schizophrenia.

1988 • Jabberwacky

Developed in the 1980s and released online in 1997, the Jabberwacky chatbot was designed to "simulate natural human chat in an interesting, entertaining and humorous manner."

1995 • ALICE

The "Artificial Linguistic Internet Computer Entity" chatbot served as the inspiration for the 2013 film *Her*, in which a human falls in love with a computer program.

2001 • SmarterChild

The first chatbot to achieve widespread adoption, SmarterChild joined the buddy lists of millions of AIM and MSN Messenger users in the early 2000s.

The SmarterChild approach -- building a chatbot for popular messaging platforms -- is the blueprint that most modern chatbot builders are now following.

Why Chatbots?

Really, Why?

One of my favorite answers from Kik. *Why? Three simple reasons:*

- 1. Messaging has surpassed social media in usage.*
- 2. Consumers don't download new apps.*
- 3. And if chat is the new browser, bots are the new websites.*

The beauty of bots is that you don't have to download new apps. Bots live in your chat app, for which you already have an account. Also, you don't have to learn a new UI, since you already know how to use your chat app.

Types of Bots

Different ways of Looking at Bots

By Intelligence Implementation

Rule Based, NLP Based

By Use

Entertainment, Productivity, Business, Education

By Type of Users

Personal Bot vs Team Bots

Uses of Chatbots

Productivity tools



Birdly



StatusPage.io



Ace

Travel



Roomino



Hyatt



Expedia

Expedia



Skyscanner

HR/Employee Engagement



Growbot
GrowBot



Donut

officevibe

Officevibe



Bonusly

Bonusly



Pep AI

Hired

Hired

breezy

Breezy HR

Conversational Commerce



Conversable



XRC



Magic



Kik Bot



Operator



Converse.ai



Angel.ai



Goodbox

Conversational Customer Service

callerzen

CallerZen



In the Chat

Inthechat

teckst

Teckst



Twyla

Chatlio

Chatlio



Desk.com

Enchant

Enchant



Groove

Groove

Help Scout

Help Scout



INTERCOM

Intercom

re:amaze

Reamaze



Samerom

Slackline

Slackline



SupportKit

SupportKit

Userlike

Userlike

WP SlackSync

WPSlackSync

zendesk

Zendesk

Chatbot Platforms

General AI agents with platforms

Developer access available now or announced



Siri
Apple



Now
Google



Alexa/Echo
Amazon



Cortana
Microsoft



Viv
Viv Labs

Messaging platforms



iMessage
Apple



Messenger
Facebook



WhatsApp
Facebook



Slack



WeChat
Tencent



Kik



Allo
Google



Telegram



Twilio



Line
Naver



Skype
Microsoft

A Chat Bot

Conversation Snippet

Hello. Welcome to Emerging Technology Gadgets Group. My name is Sandy. How may I help you?

Utterances
and intents

Hi Sandy, I want to return my Phone XY?

Sure. That is no problem. May I know why?

Entity

It does not work. I bought in yesterday.

Sorry to hear that. I see that your product comes with full money back guarantee. Here is a link to return instructions.

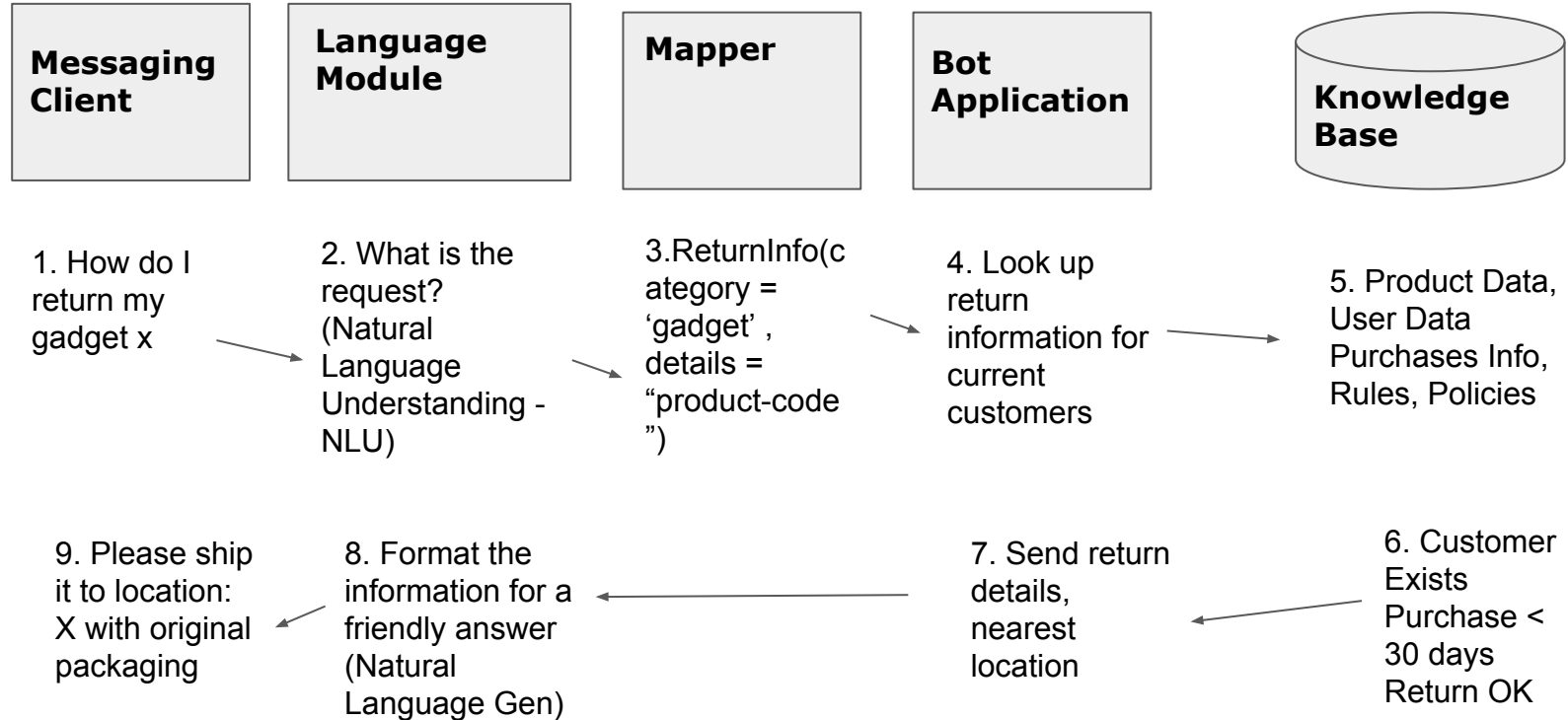
Context

<http://etpg.in/products/returns>

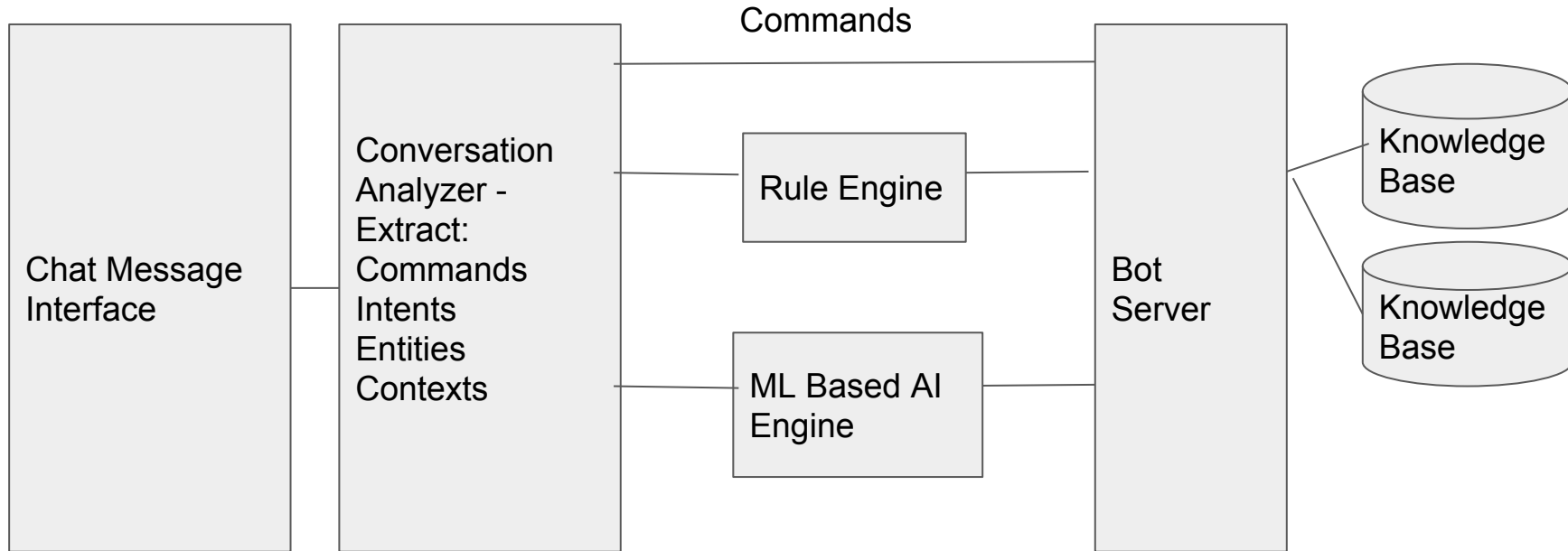
Can I exchange it for another model?

Action/Response

A Simple Request/Response Flow



Flow of messages and Control



Steps to Building a Chatbot

1. Decide on an application area
2. Design conversations (aka interactions)
3. List intents, entities, actions, responses, contexts
4. Select an AI Engine
5. Train the AI Engine
6. Write Code for Actions
7. Create and update Knowledge Base
8. Test scenarios and incrementally improve
9. Log everything
10. Analyze logs and improve learning/knowledge

**If You Want to Build
Your Own AI Engine**

VIDEO 2 OF 7 FROM **BOT DAY 2016 - SAN FRANCISCO, CA**

Introduction to artificial intelligence for bots - Peter Skomoroch (Skipflag)

AI: Build your own?

Pros

- Get a better result on your problem by building a custom solution
- Scales better than calling out to 3rd party services
- Solve complex domain specific problems that API services can't handle
- With open source libraries, you don't need to reinvent the wheel

Cons

- Need to acquire more costly training data
- Risk of building brittle models that overfit narrow use cases
- Risk of building a lot of non-differentiated tech
- Need skilled machine learning engineers to build and maintain systems

A Few Things to Think About

Simple Rule Based Chatbots

- AIML
- ChatScript

AI Based

- Build your own (or reuse) NLP, NLU, NLG
- Conversational Design
- Conversation Analysis - ML (classification, clustering, prediction)
- Entity Extraction (Limited help from NLTK, Topic Extraction/Modeling)
- Knowledge Representation - Frames and Slots, RDF/SPRQL, Lucene/Solr

Skills of AI powered bots

What problems are well suited to AI powered bots?

- Search problems with scale: needle in a large, moving haystack
- Connect dots across large amounts of information quickly
- Learning from user feedback
- Pattern recognition & discovery

#BotDay

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BOTDAY



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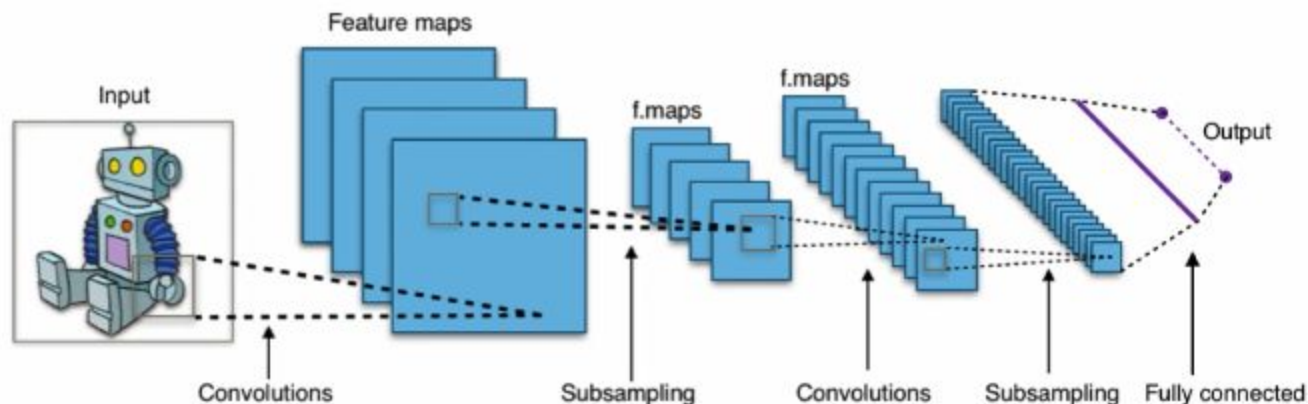
1x



A Few More Things

- Questions Analysis (decomposition, classification)
- Syntax, Semantics and World Knowledge (pragmatics)
- Intent Design
- UI Paradigms - Text, Cards, Buttons
- Handling Slang
- Preserving and Using Context
- Response Selection (select multiple possible responses and score them)
- Content Acquisition, Content Modeling (KR)
- Dialog Analysis
- Log Analysis (Learning from previous conversations)
- Profile Extraction (for context across sessions)

Neural networks are powering bots



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1x



word2vec

Input:
one document

Lorem ipsum dolor
sit amet, consete-
tur sadipscing elitr,
sed diam nonumy
eirmod tempor
invidunt ut labore
et dolore magna
aliquyam erat, sed
diam voluptua. At
vero eos et

word
vectors



Model:



vector space

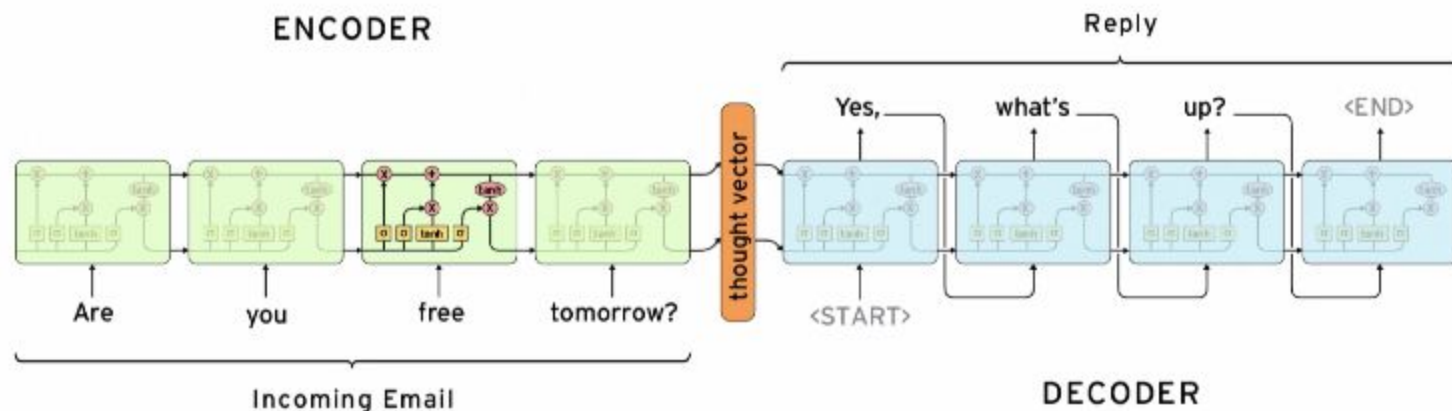
most_similar('france'):

spain	0.678515
belgium	0.665923
netherlands	0.652428
italy	0.633130

highest cosine
distance values
in vector space
of the nearest
words

Seq2Seq, Thought Vectors

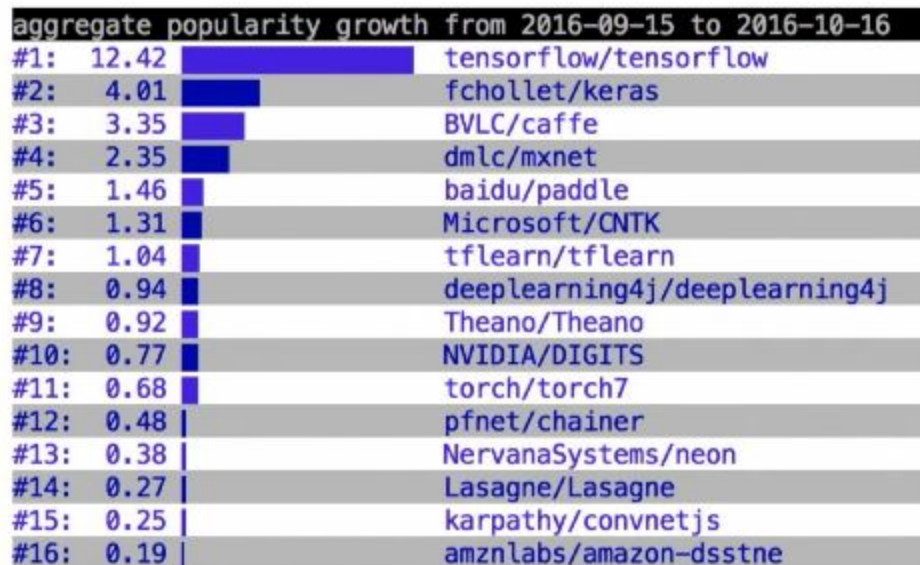
- Smart Reply: Automated Response Suggestion for Email. (Kannan et al 2016)



VIDEO 2 OF 7 FROM BOT DAY 2016 - SAN FRANCISCO, CA

Build: Open source options

- Github popularity of deep learning frameworks (François Chollet – Keras @ Google)



Tips for builders

- Think about the cold-start problem, how do you train your bot before you have user data?
- Tokenization and preprocessing can have a big impact
- Be careful with pre-trained models & 3rd party data, understand their quirks

Places to go next:

- [Deep Learning for Chatbots](#) - WildML
- <https://github.com/ChristosChristofidis/awesome-deep-learning>
- [Question answering on the Facebook bAbi dataset](#) – smerity.com
- [Do-it-yourself NLP for bot developers](#) – Alan Nichol

Human in the loop AI

- Many bots actually have humans somewhere in the response loop
- Examples: Facebook M, x.ai, Sensay, Operator, Tay...
- Other AI powered apps use humans to clean, label, or categorize data
- Examples: Google, Facebook, Netflix, StitchFix
- Some human API services: Mechanical Turk, CrowdFlower

Bits of Trivia/Quotes

- Can you build a good chatbot with AIML/ChatScript? Check out Loebner prizes for the past 10 years
- Messaging is interesting not just as a way of consumption but also as a way of production
- Conversational Language Understanding vs one shot NLU
- Building platforms vs applications
- Conversational AI
- What conversational technology are you bringing to help users?
- What is the expert AI you are going to build for your company? (it has long term value)
- Bots can be part apps, part conversation
- Voice is for private spaces, text is for public spaces
- Voice bots are one shot, command oriented
- Bot sharing (send bot content to others)

They Can Also Be

- The New Apps
- A way to expose software services
- Conversation Miners (or Data Collectors)
- Learning Engines
- Agents of Discovery
- Tools for converting conversations to Knowledge

Questions?

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