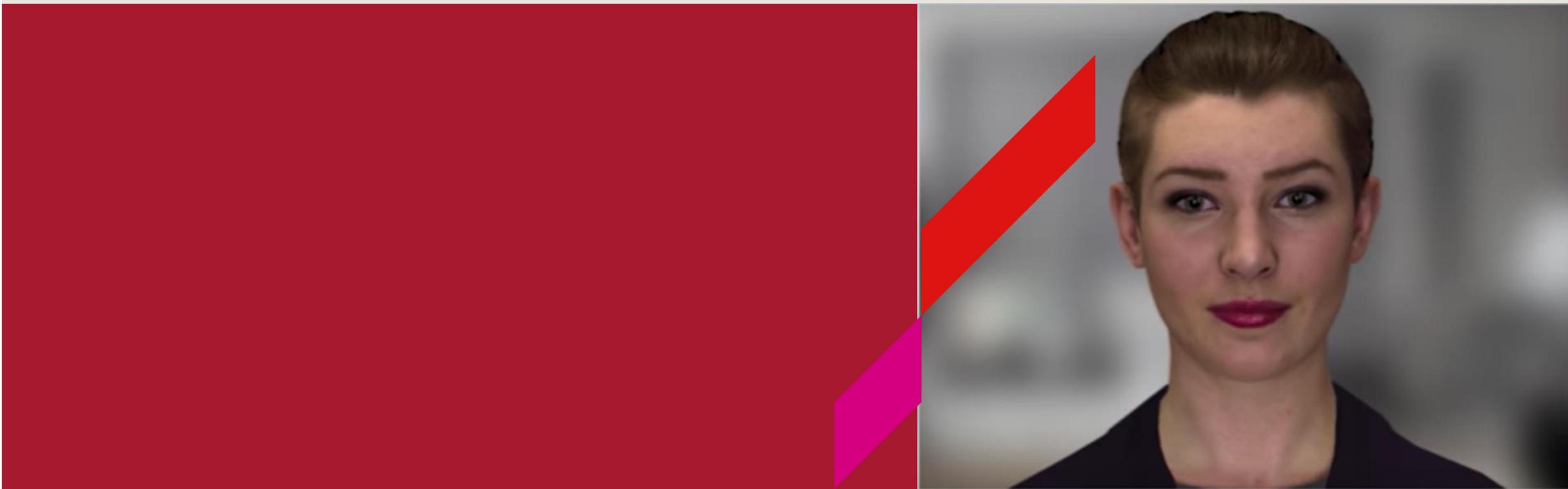
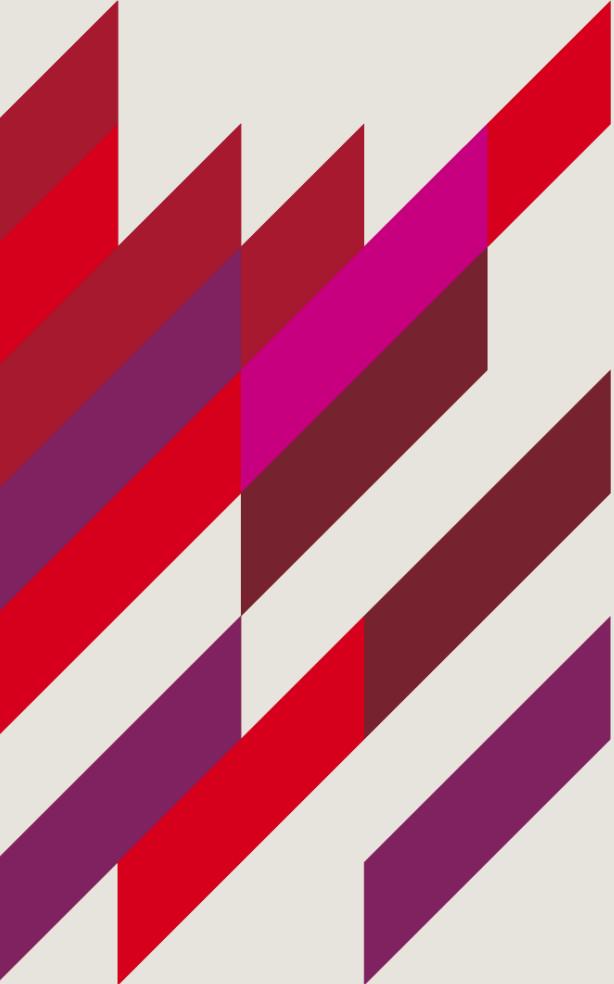


# Chatbots

A HANDS-ON SESSION



# The Plan



1. A Whirlwind History
2. Exploring Some Chatbots
3. Pandorabots
4. Building Your Own

# The Idea of Artificially Intelligent Life ...

## FICTION



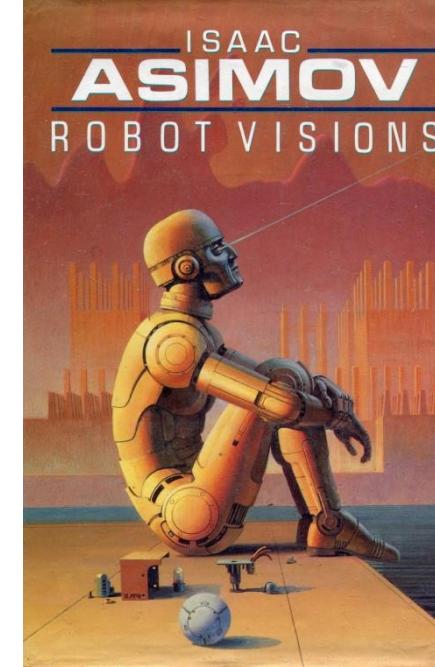
Greek myth:

Pygmalion and  
Galatea



Gothic novel:

Frankenstein and Frankenstein's  
monster



Scifi:

Asimov's robots

# Human-like Automata

## EARLY ATTEMPTS

---

- Ismail al-Jazari's drink-serving waitress
  - 12<sup>th</sup> century Turkey
  - a waitress that could serve water, tea or drinks.
    - “The drink was stored in a tank with a reservoir from where the drink drips into a bucket and, after seven minutes, into a cup, after which the waitress appears out of an automatic door serving the drink.”
- Wolfgang von Kempelen's Mechanical Turk
  - 18<sup>th</sup> century Austria
  - an “automaton” that played chess
  - revealed to be a hoax: actually a human chess master hiding inside to operate the machine



# The Beginnings of AI

## ALAN TURING

---

- Alan Turing: a key figure in the history of computing
- WWII: codebreaker at Bletchley Park
  - helped crack the German Enigma machine codes
- Turing Machine
  - the theoretical device that defines the limits of computation
  - e.g. Halting Problem
- Turing Test
  - proposed in 1950
  - asked the question about what it meant for a computational device to be intelligent



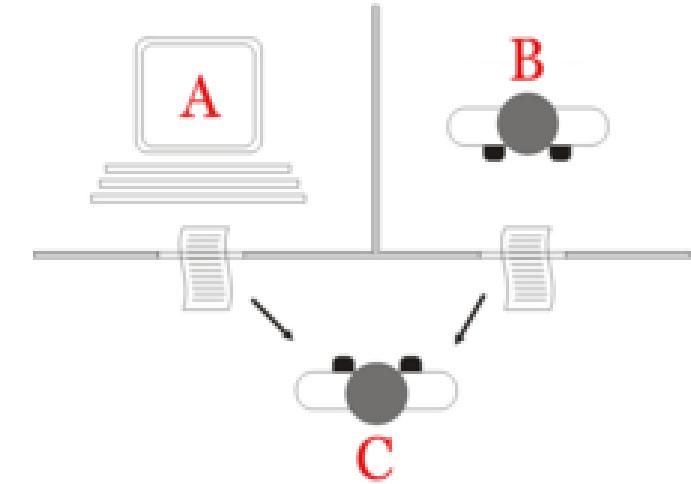
[www.AlanTuring.NET](http://www.AlanTuring.NET)

# The Turing Test

## THE IMITATION GAME

---

- How best to ask whether machines can think?
- Frame questions as: "Can machines do what we (as thinking entities) can do?"
- Inspired by a party game called The Imitation Game
  - a man and a woman go into separate rooms
  - guests try to tell them apart by writing a series of questions and reading the typewritten answers sent back
  - both the man and the woman aim to convince the guests that they are the other
- The computational version has a computer and a human instead of a man and a woman



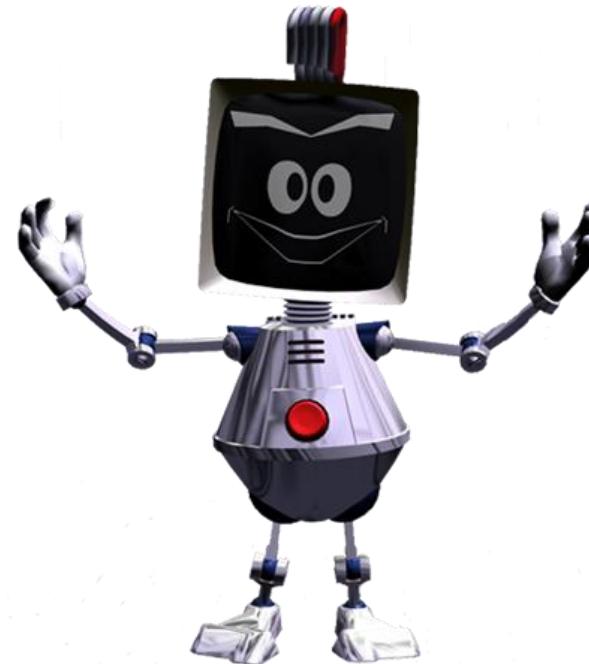
Philosophy of Mind: nature of intelligence in general still debated

# One Strand: The Loebner Prize

## A CHATBOT CONTEST

---

- Inspired by the Turing Test
  - concrete programs with a panel of human judges
- Started in 1991, underwritten by Hugh Loebner
- Two one-time prizes
  - \$100K for the first program to fool judges with textual, visual and auditory input
  - \$25K for the first program to fool judges just based on text
- Annual competitions
  - typical prize ~\$3K
  - best result in 2008 fooled 5/12 judges



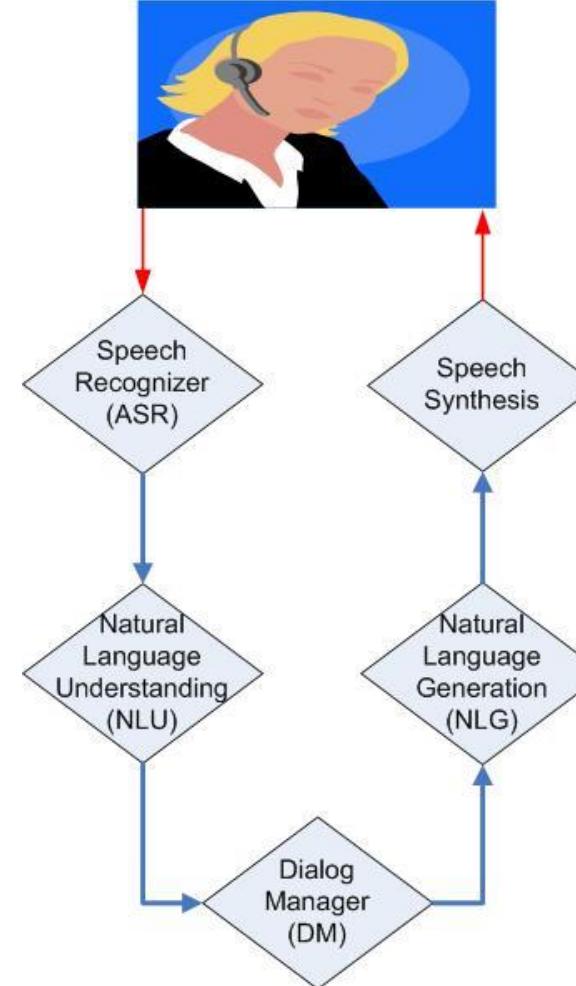
Academic view: seen as a bit of a gimmick

# Another Strand: Natural Language Processing

## A FIELD OF RESEARCH

---

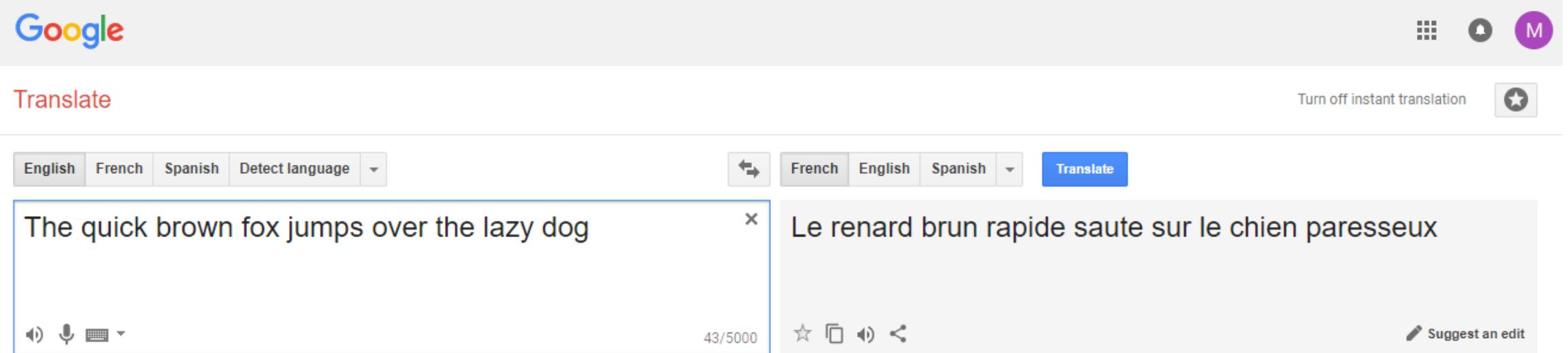
- Started just after WWII, with idea of Machine Translation
- Lots of other problems now tackled:
  - question answering
  - summarisation
  - sentiment analysis
  - dialogue systems
  - ...
- Lots of industry interest
  - Google, Microsoft, IBM, ...
- Dialogue systems: research and deployment
  - current examples: Apple Siri (2010), Android Google Now (2013), Windows Cortana (2014), Amazon Echo home assistant (2014)
  - mostly for specific purposes, rather than for chatting



# Two Approaches

BOTH FOR CHATBOTS AND NLP

- Rule-based
  - can be quite complex
  - narrow coverage
  - fairly brittle
  - can produce decent quality output
- Statistical / machine learning-based
  - broader coverage
  - robust
  - output quality may be variable

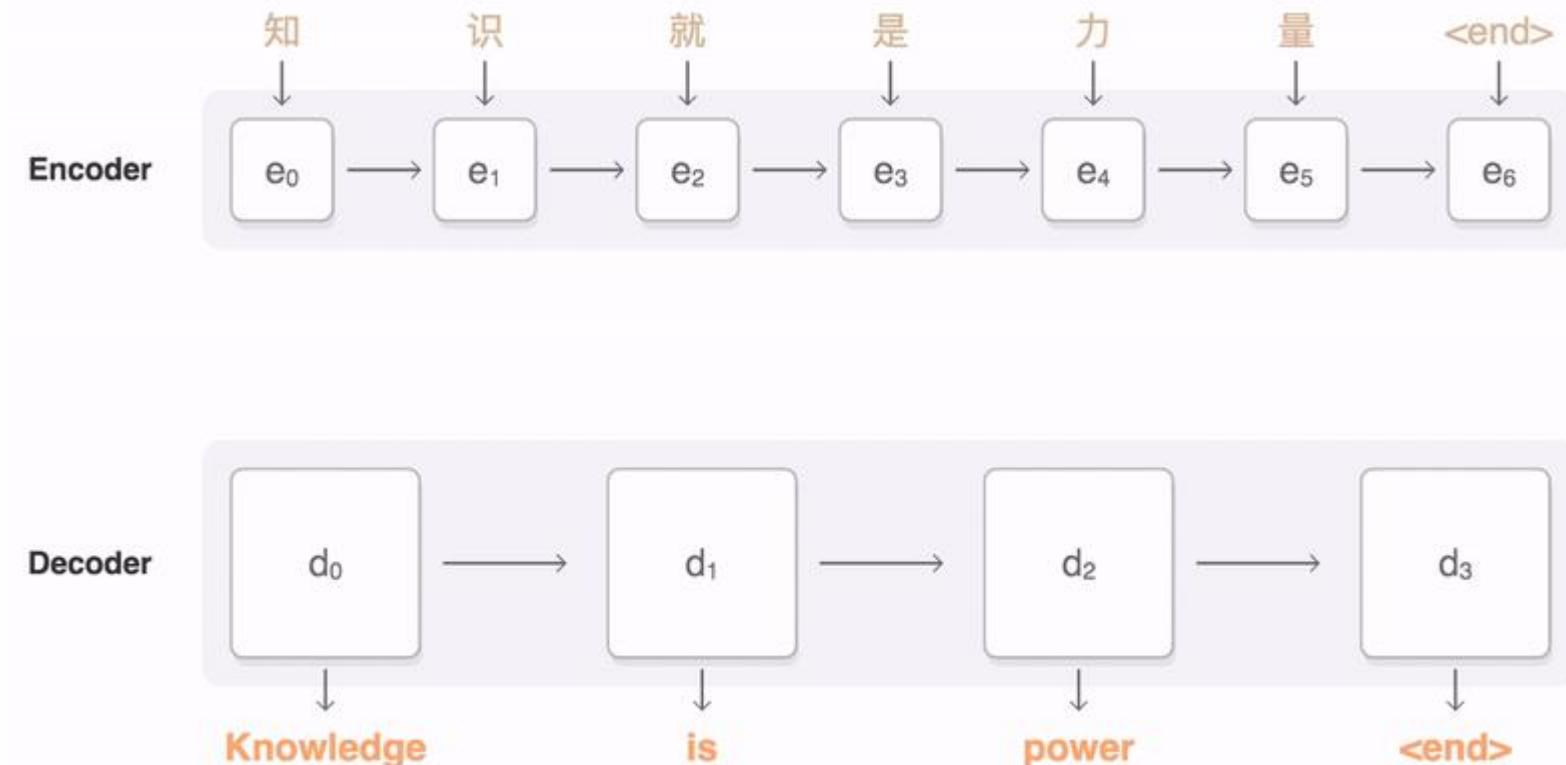


The screenshot shows the Google Translate interface. At the top, there is a navigation bar with the Google logo, a grid icon, a bell icon, and a user profile icon. Below the navigation bar, the word "Translate" is displayed in red, along with a "Turn off instant translation" link and a star icon. The main interface consists of two text input fields. The left field contains the English sentence "The quick brown fox jumps over the lazy dog" and has a character count of "43/5000". The right field contains the French translation "Le renard brun rapide saute sur le chien paresseux". Between the two fields are language selection dropdowns: "English", "French", "Spanish", and "Detect language" on the left, and "French", "English", "Spanish" on the right. A "Translate" button is located between the two language dropdowns. At the bottom of the interface, there are several small icons: a microphone, a keyboard, a star, a square, a triangle, and a share symbol. A "Suggest an edit" link is also present.

# Two Approaches

## CHATBOTS AND NLP

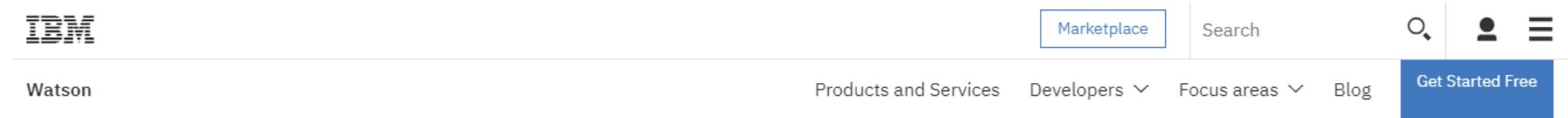
- Deep learning
  - the latest machine learning approach
  - dialogue systems treated like Machine Translation
  - still early days



## CHATBOTS AND NLP

---

- Strands seem to have merged to some extent, leading to a boom
  - researchers and industry interested in conversational agents
  - large companies working on frameworks (Microsoft, IBM, ...)
  - lots of startups too (motion.ai, hu:toma, ...)



Learn how you can  
build a chatbot with  
Watson

Build a chatbot in ten minutes  
with Watson

[Read the blog post](#)

Introducing Watson Virtual  
Agent

[Watch the video \(02:18\)](#)

Watson Virtual Agent  
whitepaper

[Read the whitepaper](#)

Chatbots 101: A primer for app  
developers

[Read the blog post](#)

# Some Examples

## CHATBOTS AND NLP

---

- Rule-based (“retrieval-based”)
  - [Mitsuku](#)
  - [Rose](#)
  - [Rosie](#)
  - [Chomskybot](#)
  - [Cleverbot](#) [[video](#)]
  - [Elbot](#)
  - Woebot
  - Insomnobot
  - lots listed at [chatbots.org](#)
- Machine learning-based (“generative”)
  - [Neuralconvo](#)
  - [IBM Watson Conversation](#)
  - Microsoft’s Tay [[Wikipedia](#)]
  - Nadia



## WRITING RULES: AIML MARKUP

- An environment for building rule-based bots
  - Evolved from an early Loebner prize-winning bot (ALICE)
  - Now Rosie is available
- Rules are described using a special mark-up language, AIML
  - XML-compliant
- Consists of three key parts
  - <category>: the tag that marks a "unit of knowledge" in a bot's knowledge base
  - <pattern>: used to contain a simple pattern that matches what a user may say or type to a bot
  - <template>: contains the response to a user input

Tell Rosie:

Powered by [Pandorabots](#).

Human: Are you written in AIML?

Rosie: My programming language is Java. The chat robot script is AIML.

Human: What is your name?

Rosie: My name is Rosie.

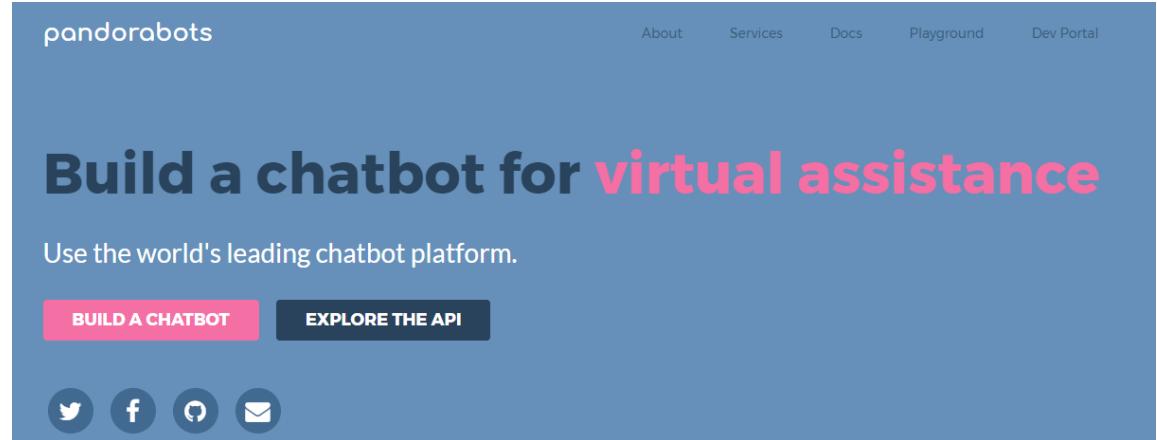
```
<category>
  <pattern>WHAT ARE YOU</pattern>
  <template>
    <think><set name="topic">Me</set></think>
    I am the latest result in artificial intelligence,
    which can reproduce the capabilities of the human brain
    with greater speed and accuracy.
  </template>
</category>
```

## THINGS TO DO

---

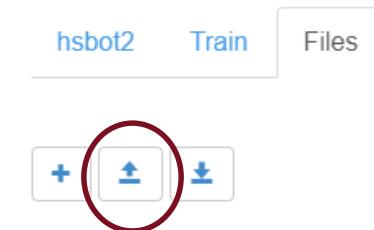
### START

- Register with [pandorabots](#)
  - You'll need a Facebook, Twitter, Google+ or Yahoo account
- Go through [Quick Start](#)
- Try adding the ability to tell a [knock knock joke](#) (at end of article)



### INSTALL ROSIE IN PANDORABOTS

- Go to [github repository](#)
- Click on [Clone or download ▾](#); choose “Download ZIP”
- Unzip the zipfile
- Create a new bot and go to the `Files` tab
- Upload the files in the zipfile’s `lib/` directory to pandorabots

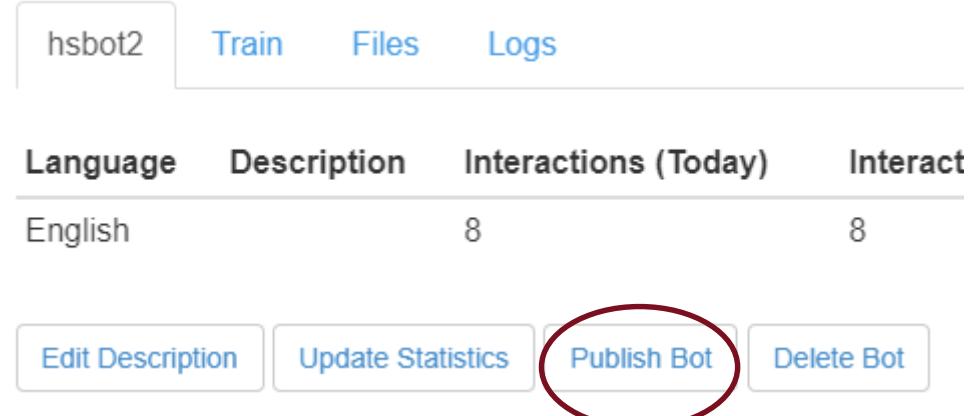


## THINGS TO DO

---

### MODIFY ROSIE

- Try out the bot in a conversational environment
  - click Publish Bot
  - go to the [Playground Clubhouse](#)
- Change the bot's name and other properties
  - in file **SYSTEM** > properties
  - search for property name
- Glance through the [tutorial](#) for details on the various tags (very long, so don't read all of it)
  - useful ones: <random>, <star/>, <set>, <srai>, <that>, <topic>
- Add your own chat topics
- **Challenge:** try adding the knock knock joke to this chatbot
- Publish your final bot so you can try out each other's.



Language	Description	Interactions (Today)	Interact
English		8	8

[Edit Description](#) [Update Statistics](#) [Publish Bot](#) [Delete Bot](#)