

DL Dev Course: Week 07

Conversational Agents

Conversational Agents

- Old style Chatbots - IBM, AIML, Eliza
- Simple Modern Chatbot - Facebook bots, API.ai
- Generative Chatbot - Twitter Bots
- Intelligent Agent - Google Assistant, Kate

Considerations

- Open domain vs. closed domain
- Pre-made vs dynamic responses
- Just chat vs trigger actions
- Access to what information / Web

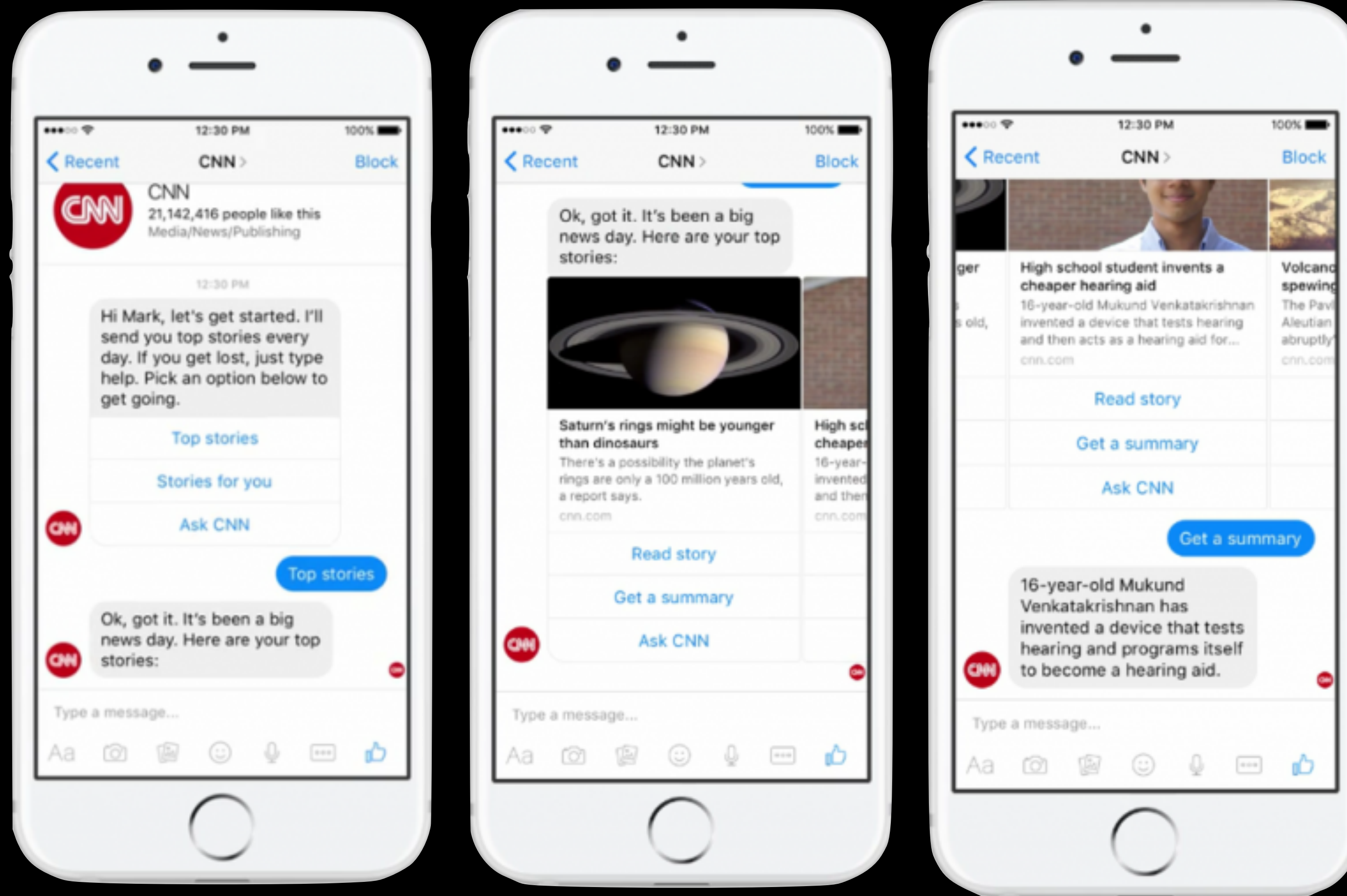
Old Style Chatbots: AIML

- XML
- Eliza / Alice bot
- Pandorabots, Watson
- Regex
- Outdated and very fixed in the way that the work

AIML example

```
</category>
▼<category>
  <pattern>HELLO *</pattern>
  ▼<template>
    Hello there.
    <sr/>
  </template>
</category>
▼<category>
  <pattern>HELLO AGAIN</pattern>
  ▼<template>
    Hi there. I was just wanting to talk to
    <get name="name"/>
    .
  </template>
</category>
▼<category>
  <pattern>HELLO HOW ARE YOU</pattern>
  <template>I am fine thank you how are you?</template>
</category>
▼<category>
  <pattern>HELLO THERE</pattern>
  ▼<template>
    Salutations,
    <get name="name"/>
  </template>
</category>
▼<category>
  <pattern>HELLO</pattern>
  <template>Hi there!</template>
</category>
▼<category>
  <pattern>HELLOW</pattern>
  ▼<template>
    <srai>hello</srai>
  </template>
</category>
▼<category>
  <pattern>HELO</pattern>
```

Simple Modern Chatbot



Simple Modern Chatbot


- Intents and slots/variables

“can i order a pizza”


“can i order a hamburger”

- intent = ‘order’
- item = ‘pizza/hamburger’ - slot variable

DialogFlow (API.AI)

 Dialogflow

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 Search

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You got it!

Use machine learning to understand what

Do it yourself

- Simple Classification
- Needs you to define classes first
- Convert text in pipeline

Logistic Regression

Character CNNs

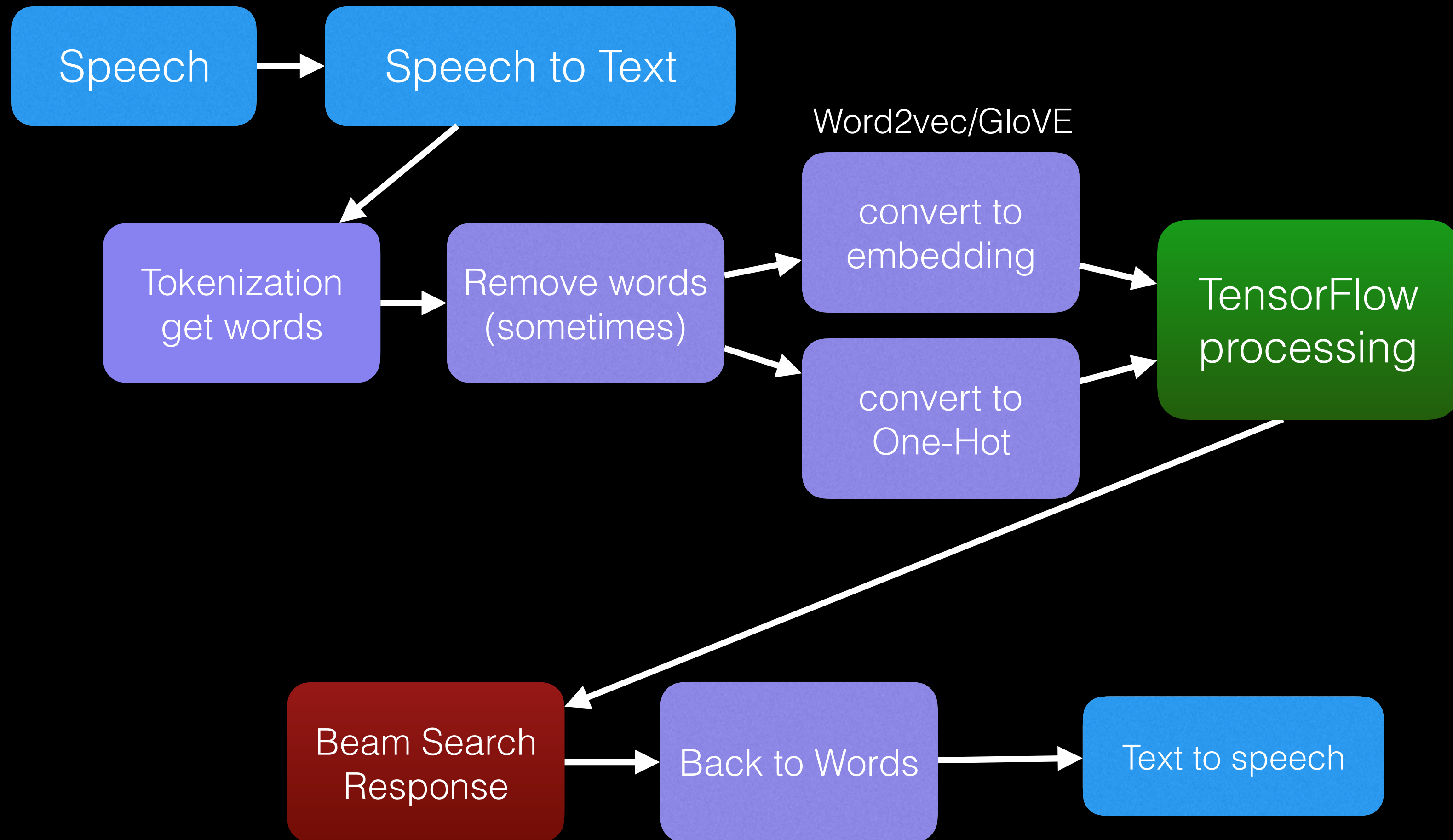
MLPs

RNNs

Pipeline

- Tokenize
- Vectorize words
- Embeddings
- Word2vec / GloVE


Example Text Pipeline




Simple Chatbots

- DialogFlow / Google does these kinds of bots pretty simply
- They only tend to work on a very closed domain
- Good for simple tasks like ordering pizza, booking flights etc

Generative Chatbots





DeepDrumpf
@DeepDrumpf

I'm a Neural Network trained on Trump's transcripts. Priming text in []s. Donate (gofundme.com/deepdrumpf) to interact! Created by @hayesbh.


deepdrumpf2016.com

Joined March 2016

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TWEETS 285 FOLLOWING 7 FOLLOWERS 29.3K LIKES 19

Tweets Tweets & replies Media

 **DeepDrumpf** @DeepDrumpf · Apr 7

When I have to build a hotel, we're bombing the hell out of them. Lots of money. To those suffering, I say vote for Donald. [#SyriaStrikes](#)

3 44 111

 **DeepDrumpf** @DeepDrumpf · Mar 20

Replying to @Thomas1774Paine

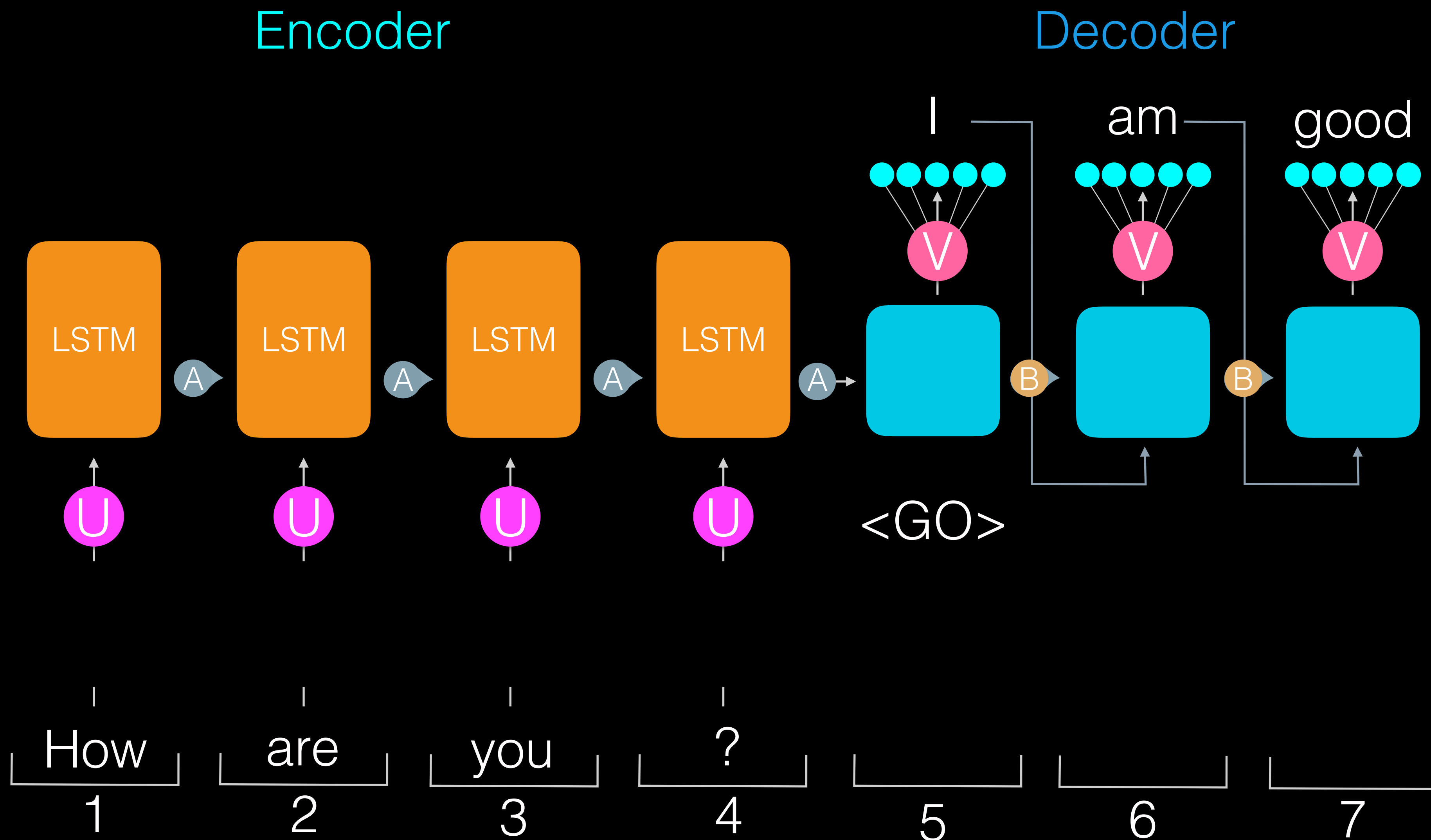
There will be no amnesty. It is going to pass because the people are going to be gone. I'm giving a mandate. [#ComeyHearing](#) @Thomas1774Paine

1 15 24

Generative Chatbot

- Twitter bots made from speeches etc
- LSTMs (char-RNN) or Seq2Seq
- Large amount of training and data needed
- Beam search on the response
- Some token system for variables like names

Seq2Seq



Generative Chatbot

- Great for fun
- Not ideal for business cases unless you have amazing data
- Still a long way to go

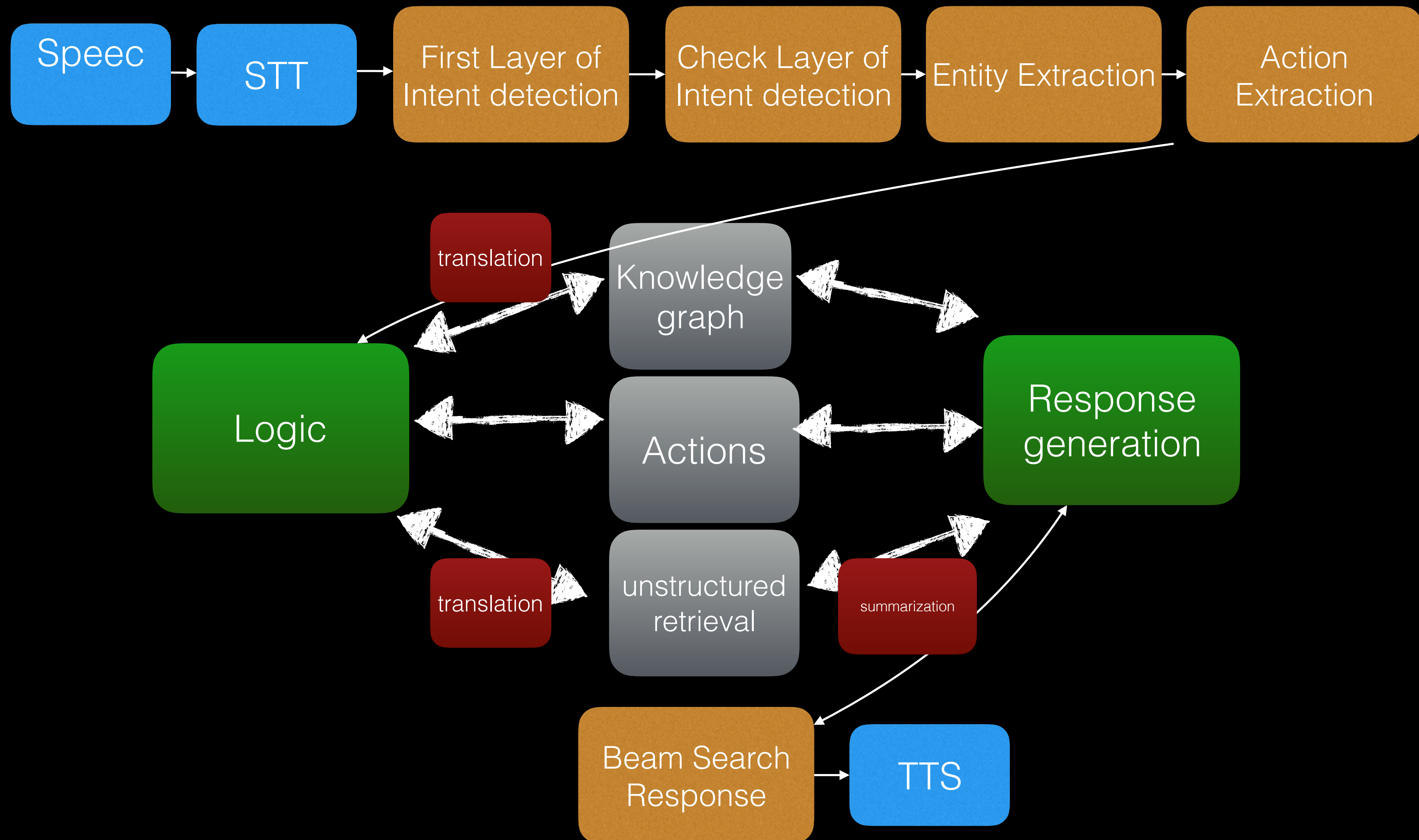
Hybrid Agent

- Speech to Text
- Has the ability to access wider info
- Custom NER, POS for extracting variables (deep learning)
- Graph system - for info and memory

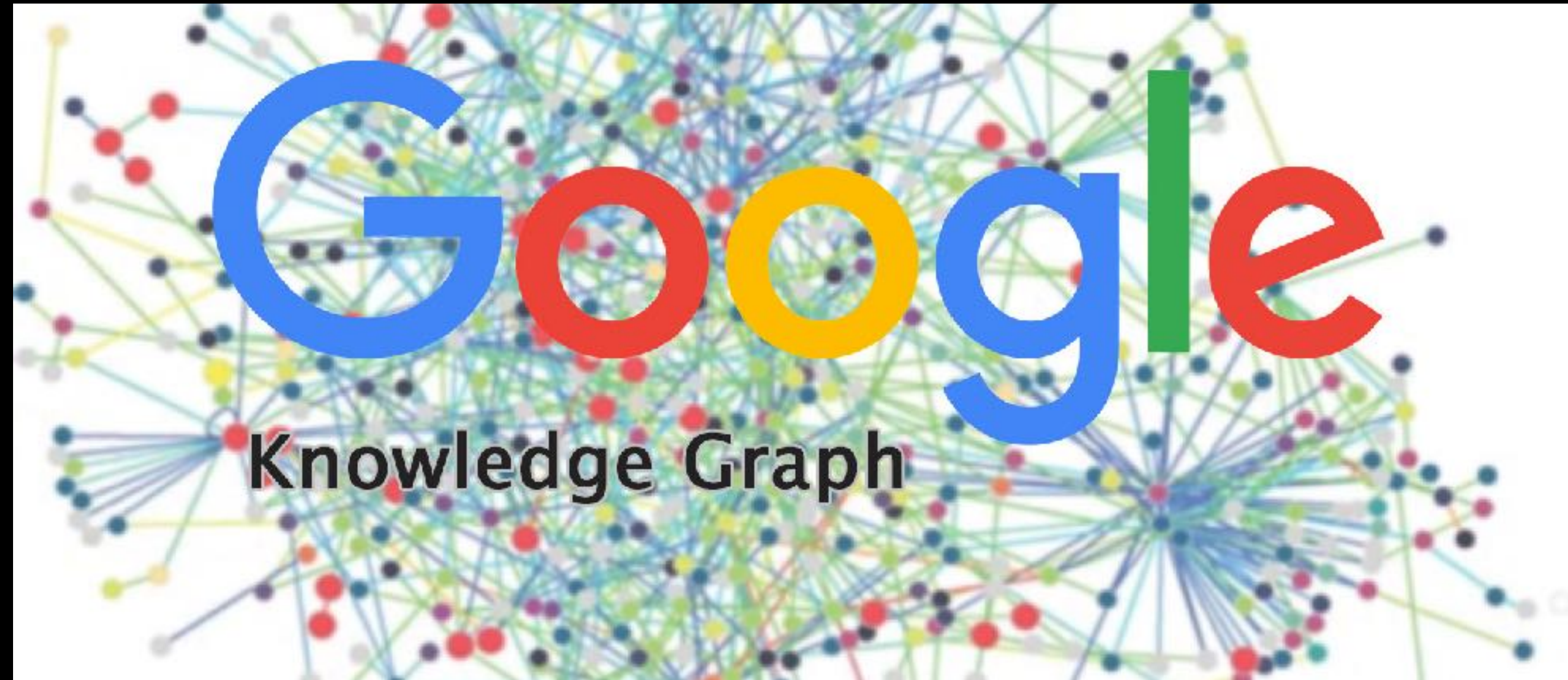
Intent Ensemble

- Ensemble system for classifying the input
- LSTM Classification
- Character CNN Classification
- Bag of words

Intelligent Agent



Knowledge bases




- Get info for returning to user
- Alternative: Freebase, DBpedia

Google Knowledge API

```
{
  "@context": {
    "@vocab": "http://schema.org/",
    "goog": "http://schema.googleapis.com/",
    "resultScore": "goog:resultScore",
    "detailedDescription": "goog:detailedDescription",
    "EntitySearchResult": "goog:EntitySearchResult",
    "kg": "http://g.co/kg"
  },
  "@type": "ItemList",
  "itemListElement": [
    {
      "@type": "EntitySearchResult",
      "result": {
        "@id": "kg:/m/0dl567",
        "name": "Taylor Swift",
        "@type": [
          "Thing",
          "Person"
        ],
        "description": "Singer-songwriter",
        "image": {
          "contentUrl": "https://t1.gstatic.com/images?q=tbn:ANd9GcQmVDAhjhWnN2OWys2ZM03PGAhupp5tN2L",
          "url": "https://en.wikipedia.org/wiki/Taylor_Swift",
          "license": "http://creativecommons.org/licenses/by-sa/2.0"
        },
        "detailedDescription": {
          "articleBody": "Taylor Alison Swift is an American singer-songwriter and actress. Raised in",
          "url": "http://en.wikipedia.org/wiki/Taylor_Swift",
          "license": "https://en.wikipedia.org/wiki/Wikipedia:Text_of_Creative_Commons_Attribution-St"
        },
        "url": "http://taylorswift.com/"
      },
      "resultScore": 896.576599
    }
  ]
}
```

Translation text to query

- Similar to language translation
- “How old is Taylor Swift?”
- Entity: 'taylor swift' , info.age

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having sold more than 40 million albums—including 27.1 million in the U.S.—and 130 million single downloads. Swift has also had supporting roles in feature films including Valentine's Day (2010) and The Giver (2014). In 2015, she became the youngest woman ever to be included on Forbes' "100 Most Powerful Women" list, ranking at number 64. [\(en\)](#)

dbo:activeYearsStartYear	▪ 2004-01-01 <small>(xsd:date)</small>
dbo:background	▪ solo_singer
dbo:birthDate	▪ 1989-12-13 <small>(xsd:date)</small>
dbo:birthPlace	▪ dbr:Reading,_Pennsylvania
dbo:genre	▪ dbr:Country_music ▪ dbr:Pop_music

The harder stuff

- Stateful Conversations (G-Assistant)
- Context
- Detecting different users (G-Home)

Tips

- Try to limit the domain of conversation
- Use Google Cloud for speech
- Make use of off the shelf wherever possible
- Use your own models for anything unique eg. NER, vocab etc.
- Get as many example conversations as possible