



Building a Voice Assistant for Enterprise



Manju Vijayakumar
Lead Software Engineer, Salesforce

@vmanju
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Agenda



- Why Voice?
- Demo of Einstein Voice Assistant
- Conversational AI
 - Ecosystem
 - Natural Language Understanding (NLU)
- Challenges
- Future
 - Considerations
 - What's next for NLP and AI



Voice Recognition - A Story in 3 pictures



**VOICE RECOGNITION IS GOING
TO BE PRETTY MUCH STANDARD**

**ON ANY COMPUTER
YOU BUY.**



SO YOU CAN BE LIKE,
"WASH MY CAR," "CLEAN MY ROOM."



Computing is Evolving

From programmatic to natural interactions



Voice



Touch



Point & Click



Command Line



Deliver an intelligent assistant that leverages Voice and NLU capabilities to understand, and support users in accomplishing their goals



Pilot

salesforce

EINSTEIN VOICE DEMO



Meet Amy,
a busy salesperson

**Amy needs to
update Salesforce**





Einstein Analysis

Met with **Chris Hopkins** from Acme Corporation we had a great meeting and closed a deal for purchasing merchandise

- Follow up with Chris next week
- Change the deal amount to \$1 million
- Set the closing date to November 15

CHOOSE YOUR CONTACT



Chris Hopkins

Name: Chris Hopkins - Account Name: Acme - Phone: (212) 555-5555 - Email: ch...



Do not relate to any contact



[Search Manually](#)

Previous

Next

salesforce

How did Voice Assistant help Amy?



Unstructured data -> Structured data

- Productive
- No system expertise



Accuracy & timeliness of data capture



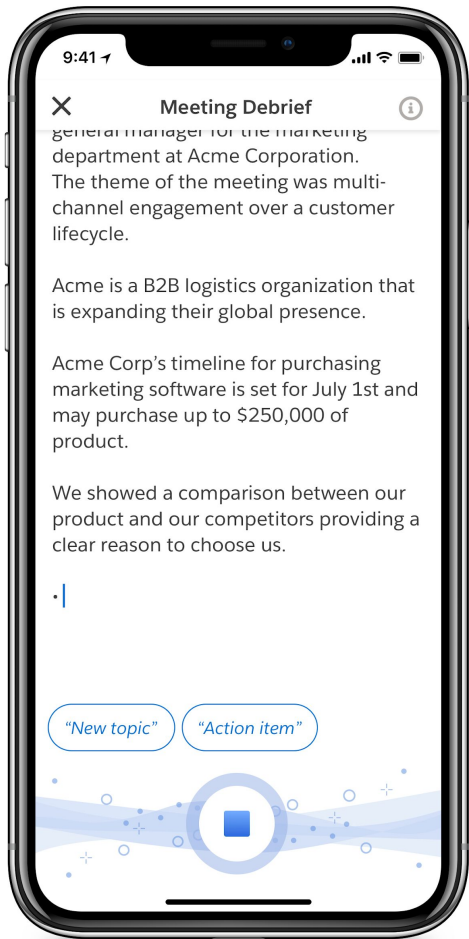
Visible to the team



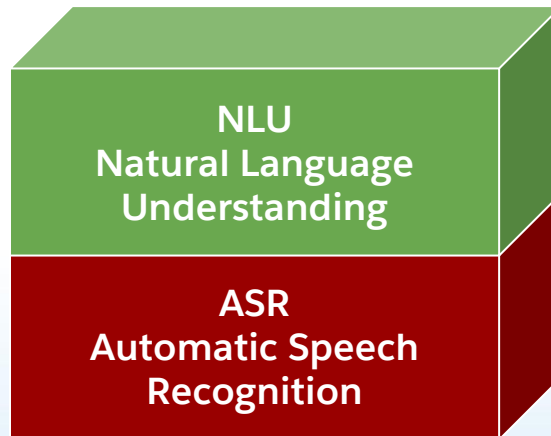
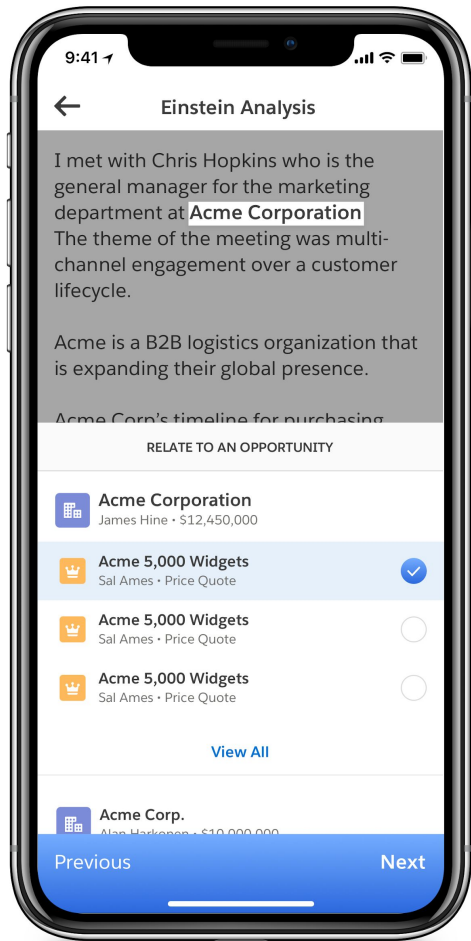


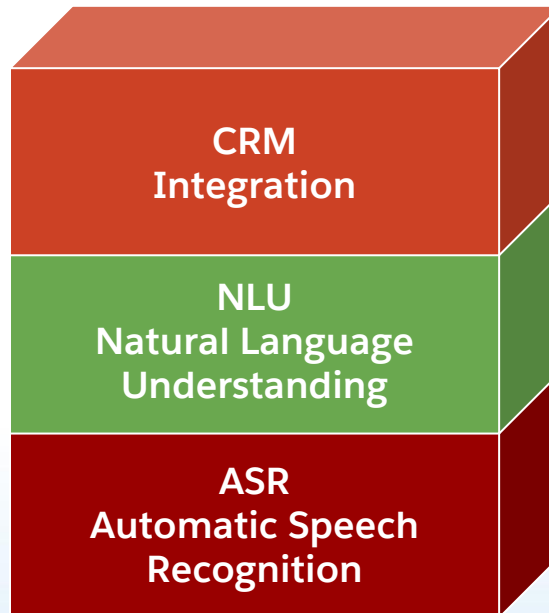
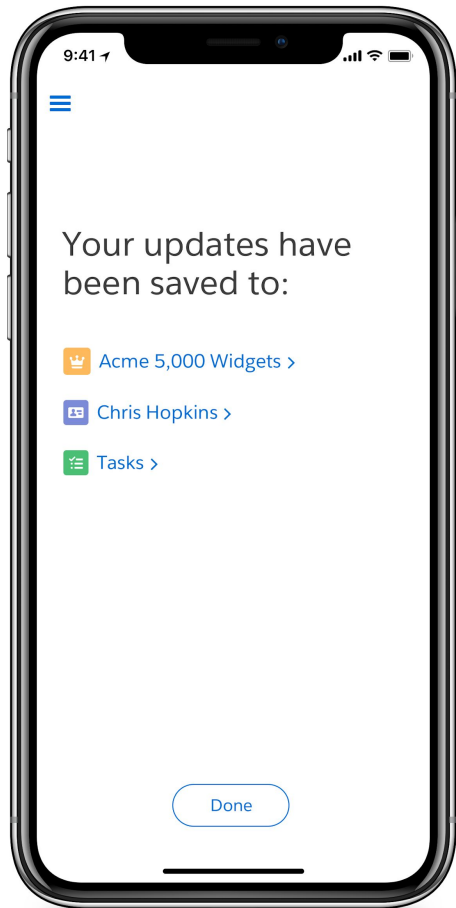
Building Blocks of Voice Assistant





ASR
Automatic Speech
Recognition







Conversational AI Ecosystem



Conversational AI Ecosystem



Einstein Platform

Automatic Speech
Recognition
Models

Natural Language
Understanding
Models

Salesforce
CRM Metadata



Conversational AI Ecosystem



Conversational API

Named Entity
Recognition

Entity
Resolution

Context
Management

Text
Classification

Slot Filling

Einstein Platform

Automatic Speech
Recognition
Models

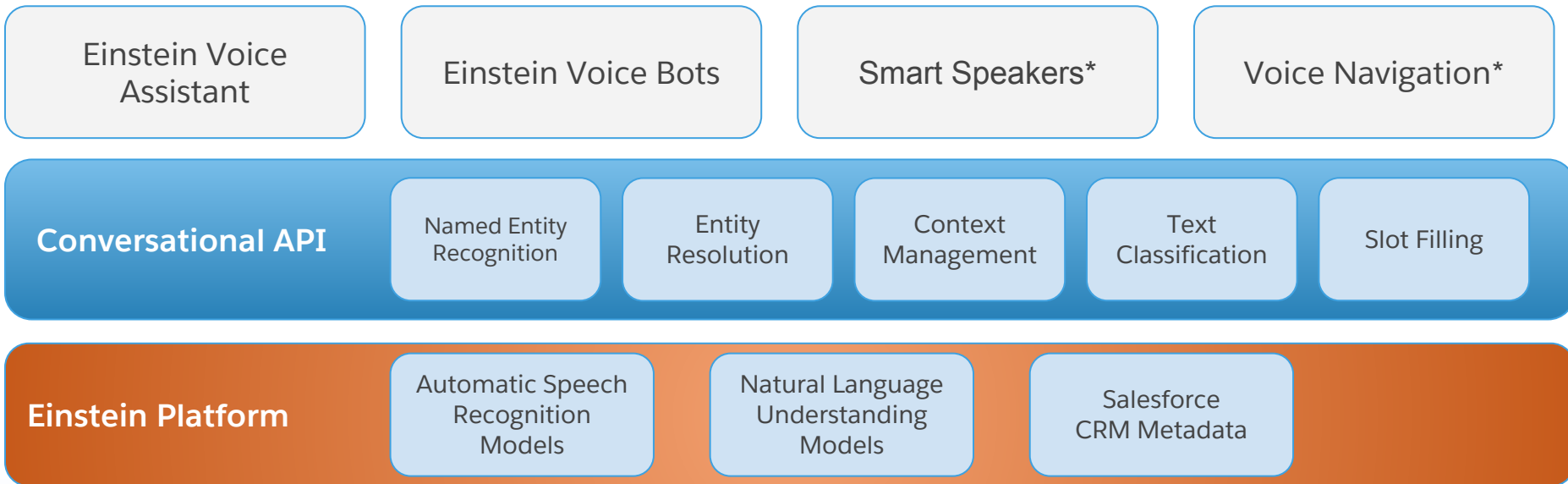
Natural Language
Understanding
Models

Salesforce
CRM Metadata





Conversational AI Ecosystem



Conversational AI Service



Conversational API

Named Entity
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Conversational AI Service



Conversational API

**Named Entity
Recognition**

Entity
Resolution

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Slot Filling



Named Entity Recognition (NER)

The committee of 30 government and university scientists and engineers, led by McCleese, was asked to recommend to the space agency by the end of this month a rationale and strategy for precursor flights and the sample-return missions.



The	'O'
committee	'O'
of	'O'
...	'O'
McCleese	'PER'
the	'DATE'
end	'DATE'
of	'DATE'
this	'DATE'
month	'DATE'



*CoNLL format

Named Entity Recognition (NER)

The committee of 30 government and university scientists and engineers, led by McCleese, was asked to recommend to the space agency by the end of this month a rationale and strategy for precursor flights and the sample-return missions.

NER7 model recognizes 7 entities:
Person, Organization, Location, Date, Time, Money, Percentage



The	'O'
committee	'O'
of	'O'
...	'O'
McCleese	'PER'
the	'DATE'
end	'DATE'
of	'DATE'
this	'DATE'
month	'DATE'



*CoNLL format

What are the entities in the text ?



I met with **Chris Hopkins** who is the general manager for the marketing department at **Acme Corporation**

PERSON

ORGANIZATION

The theme of the meeting was multi-channel engagement over a customer lifecycle.

Acme Corp's timeline for purchasing marketing software is set for **July 1st** and may purchase up to **\$250,000** of product.

DATE

MONEY

Follow up call with Chris in **two weeks**

DATE

(two weeks is normalized to 2018/07/15)



Conversational AI Service



Conversational API

Named Entity
Recognition

**Entity
Resolution**

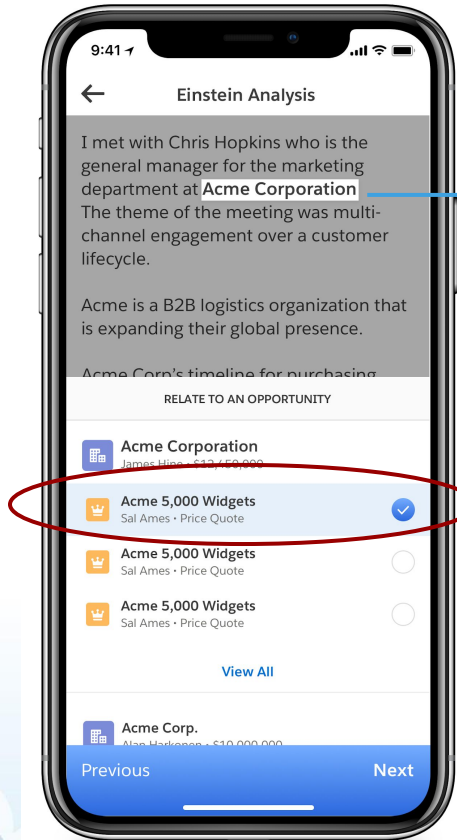
Context
Management

Text
Classification

Slot Filling



Entity Resolution - Is this entity in my CRM ?



Salesforce CRM DB



Records matched for 'Acme'

Send records to user to disambiguate

Conversational AI Service



Conversational API

Named Entity
Recognition

Entity
Resolution

**Context
Management**

Text
Classification

Slot Filling



Context Management - What data do we have so far ?



- Acme Corporation**
James Hine • \$12,450,000
- Acme 5,000 Widgets**
Sal Ames • Price Quote
- Acme 5,000 Widgets**
Sal Ames • Price Quote
- Acme 5,000 Widgets**
Sal Ames • Price Quote



```
{  
  "context": {  
    "Organization": {  
      "id": "001XXXX",  
      "name": "Acme Corp"  
    },  
  },  
  ...  
}
```



I met with **Chris Hopkins** who is the general manager for the marketing department at Acme Corporation.



Do we have organization in the context?



- Chris Hopkins**
Sr. Marketing Specialist
- Sam Quintana**
Marketing Associate



Conversational AI Service



Conversational API

Named Entity
Recognition

Entity
Resolution

Context
Management

**Text
Classification**

Slot Filling

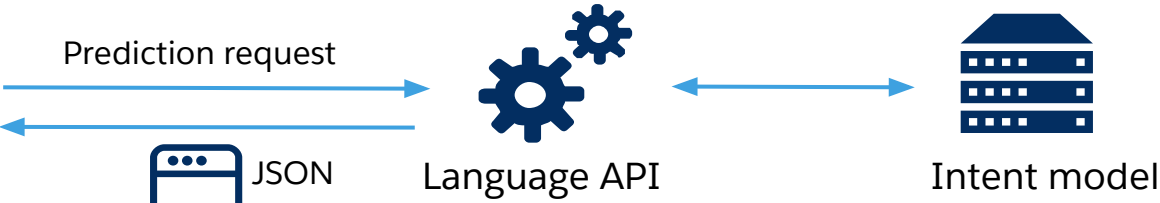


Text Classification - What are the intents ?



Acme Corp's timeline for purchasing Marketing software is set for July 1st and may purchase up to \$250K of product

Follow up call with Chris in two weeks



```
{  
  "probabilities": [  
    {  
      "label": "CREATE",  
      "probability": 0.9904295  
    },  
    {  
      "label": "UPDATE",  
      "probability": 0.009345241  
    },  
    ...  
  ]  
}
```



Conversational AI Service



Conversational API

Named Entity
Recognition

Entity
Resolution

State
Management

Text
Classification

Slot Filling



Slot Filling - What are the slots for each action item ?



UPDATES	
Close Date	July 1st, 2018 from Oct 12, 2019
Amount	\$250,000 from \$200,000
TASKS	
Due Date: 10/7/18	Follow up call with Chris in 2 weeks

Fill in the **date** and **money** slots for Update action

Fill in the **date** slot and **person** slot for Create Task action.

Here, date is **normalized**:
In 2 weeks => 10/7/18





Challenges





Data challenges

How do you make it work for every customer schema ?



Heterogenous database

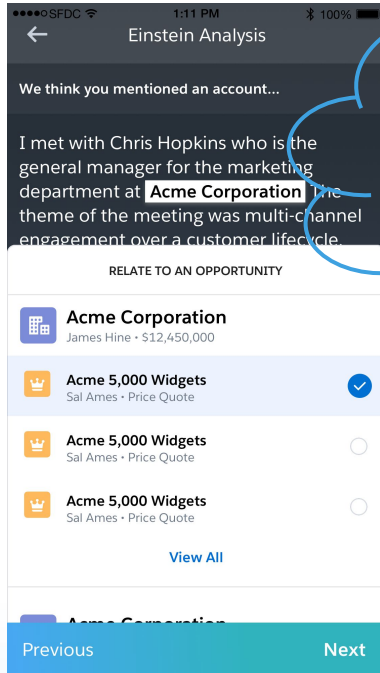
AccountID	Name	Phone

AccountID	Name	Phone	Bank Account

- Customers can define custom schemas
- Schemas are not consistent



Data challenges



Which Acme Corp.
did you mean ?

- Lots of duplicates
- Identify the most relevant 'Acme'
- Affects user experience

Inconsistent
data



Automatic Speech Recognition is not perfect



**DOMAIN SPECIFIC
JARGON**

**AUDIO
ENVIRONMENT**

**ACCENTS &
LINGUISTIC PROFILES**





Named Entity Recognition is not perfect



Named Entity Recognition is easy for humans but hard for machines





Named Entity Recognition is not perfect



Today, **JP Morgan** and I spoke about...



Is **JP Morgan** a company or a person ?

..the **san juan** center is led by a team of scientists..



Cannot identify **san juan** as a location due to case sensitivity

..**Man joy** and I met today at Starbucks to discuss..



“Manju” misspelled as “Man Joy”. Misspelled pronouns are hard to catch





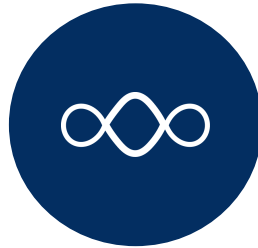
Future Considerations





Optimized Models

- Configurable
- Normalized



Feedback

- Capture Feedback
- Retrain Models

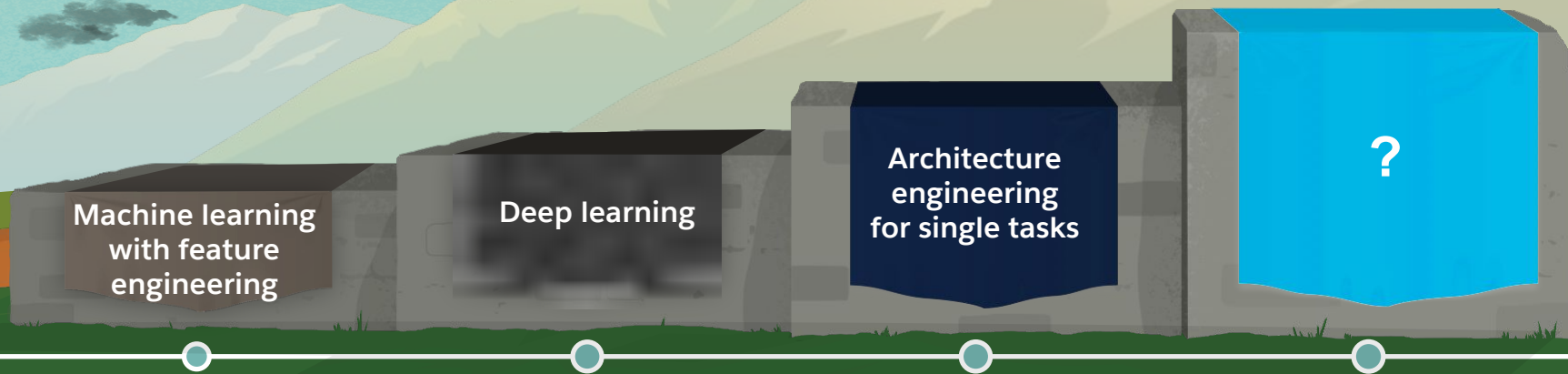


Voice

- Guided user experience
- Multi channel



What's next for NLP and AI?



What's next for NLP and AI?

To learn more: decaNLP.com

Machine learning
with feature
engineering

Deep learning

Architecture
engineering
for single tasks


Single multitask
model



Voice Recognition - A Story in 3 pictures

A man in a dark suit and a woman in a dark coat are standing in a hallway. The man is speaking and gesturing with his hands.

VOICE RECOGNITION IS GOING
TO BE PRETTY MUCH STANDARD

A man in a dark suit and a woman in a dark coat are standing in a hallway. The man is speaking and gesturing with his hands.

ON ANY COMPUTER
YOU BUY.

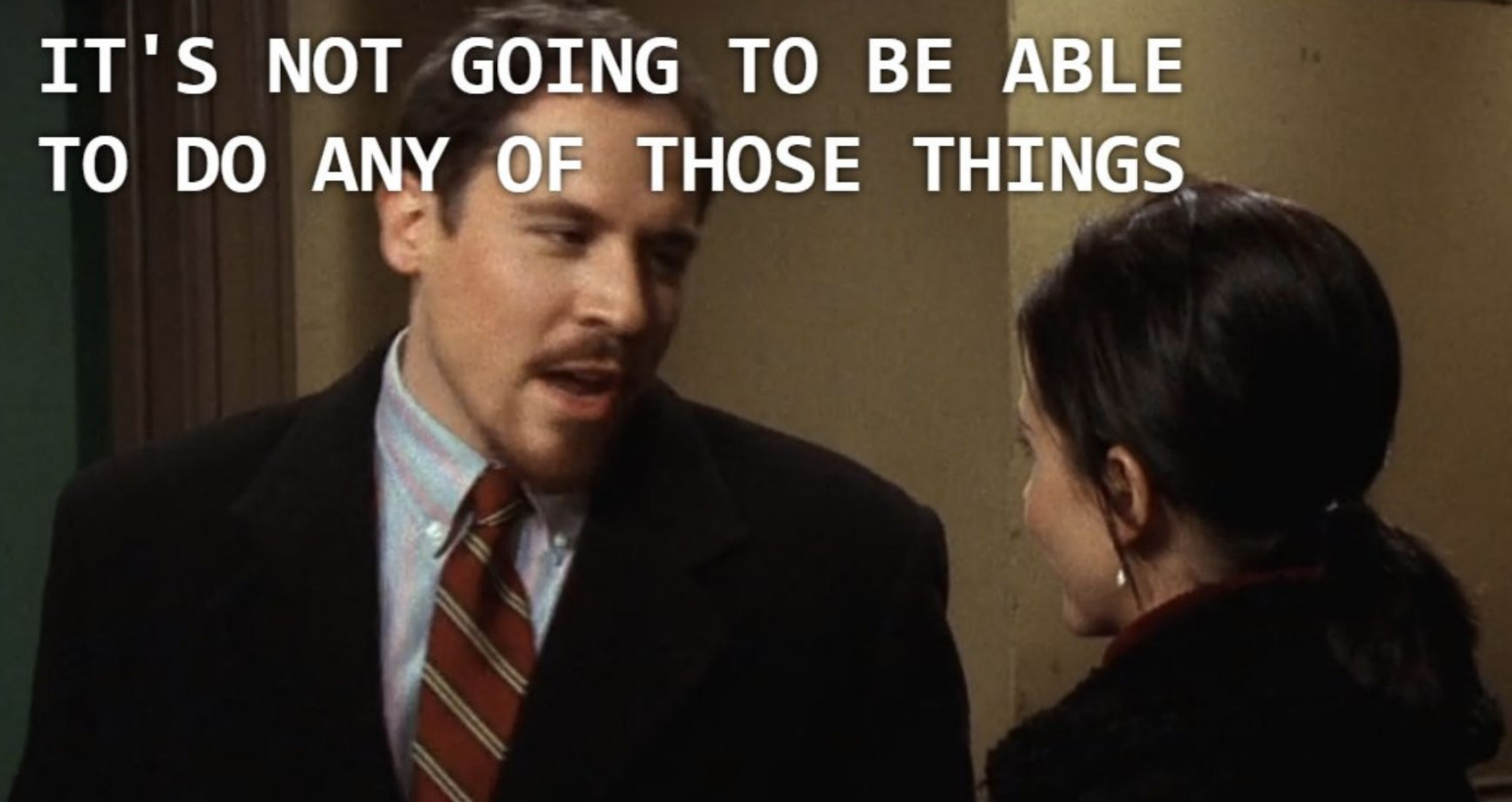
A close-up shot of a man in a dark suit and a woman in a dark coat. The man is speaking to the woman.

SO YOU CAN BE LIKE,
"WASH MY CAR," "CLEAN MY ROOM."

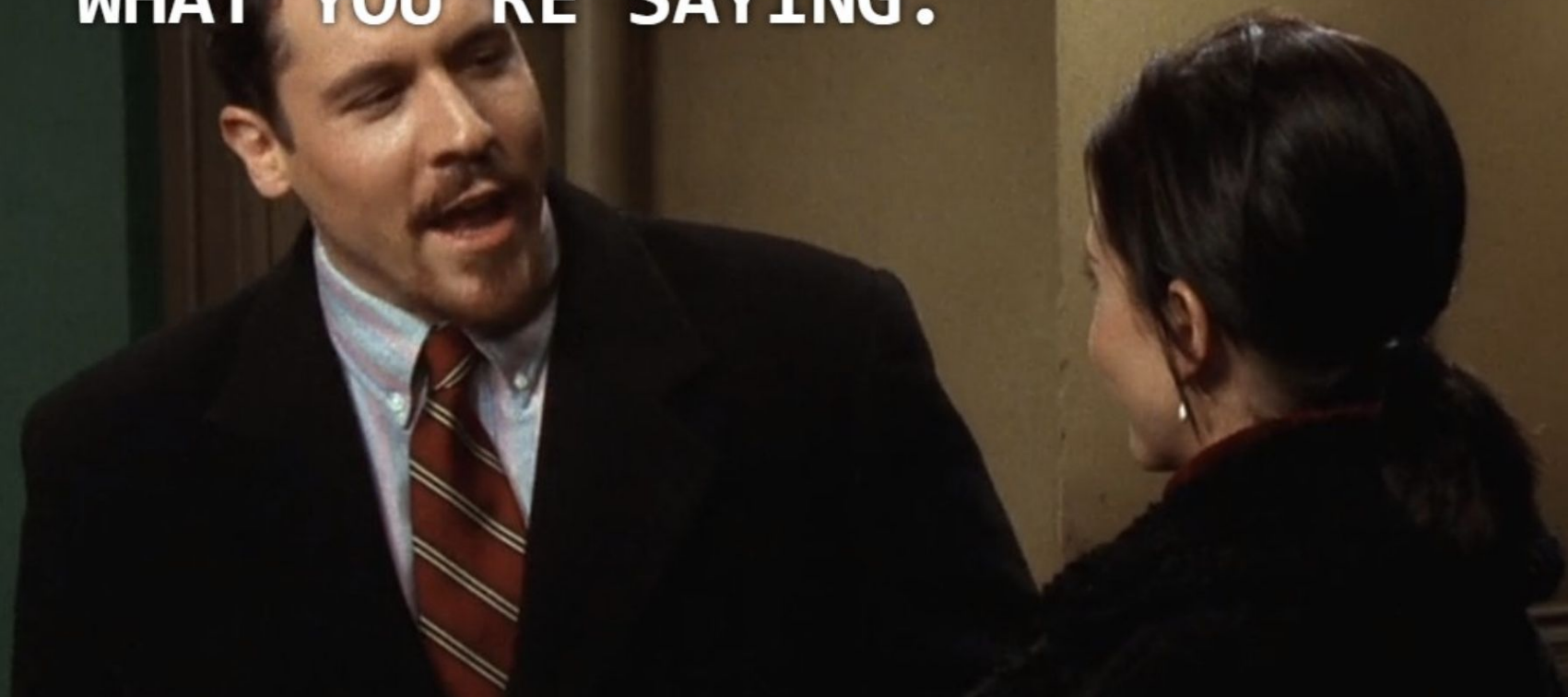
Voice Recognition - The Complete story



**IT'S NOT GOING TO BE ABLE
TO DO ANY OF THOSE THINGS**






**BUT IT WILL UNDERSTAND
WHAT YOU'RE SAYING.**



Key Takeaways



-  Language understanding is AI Complete.
-  Focus on solving customer pain points in your domain.
-  Voice will become the new User Interface.



Thank you



Resources



[Einstein.ai](https://www.einstein.ai) - published papers, research etc.

[Einstein.ai/careers](https://www.einstein.ai/careers) - We are hiring!



@vmanju

