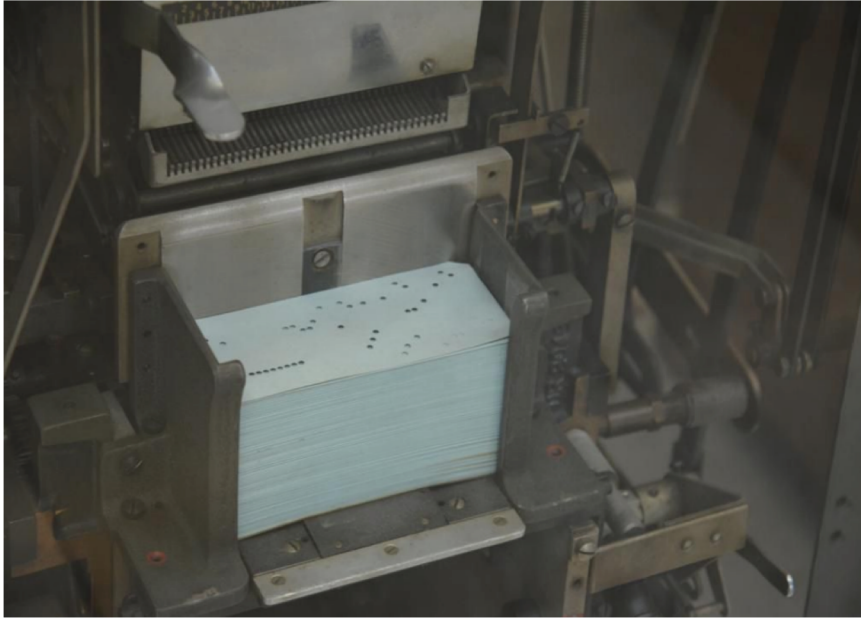


# Communication With Machines



~50-70s

```
File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT BS9U.DEV13.CLIAPAU(TIMMIES) - 01.31 Columns 00001 00
Command ==> Scroll ==>
***** Top of Data *****
000001 /* REXX EXEC *****
000002 /*
000003 /* TIMMIES FACTOR - COMPOUND INTEREST CALCULATOR
000004 /*
000005 /* AUTHOR: PAUL GAMBLE
000006 /* DATE: OCT 1/2007
000007 /*
000008 /*
000009 /******
000010
000011
000012 say '*****'
000013 say 'Welcome Coffee drinker.'
000014 say '*****'
000015 DO WHILE DATATYPE(CoffeeAmt) \= 'NUM'
000016 say ""
000017 say "What is the price of your coffee?",
000018 "(e.g. 1.58 = $1.58)"
000019 parse pull CoffeeAmt
000020 END
000021
000022 DO WHILE DATATYPE(CoffeeWk) \= 'NUM'
000023 say ""
000024 say "How many coffees a week do you have?"
000025 parse pull CoffeeWk
000026 END
000027
000028 DO WHILE DATATYPE(Rate) \= 'NUM'
000029 say ""
000030 say "What annual interest rate would you like to see on that money?",
000031 "(e.g. 8 = 8%)"
000032 parse pull Rate
000033 END
000034 Rate = Rate * 0.01 /* CHG TO DECIMAL NUMBER */
```

~80s

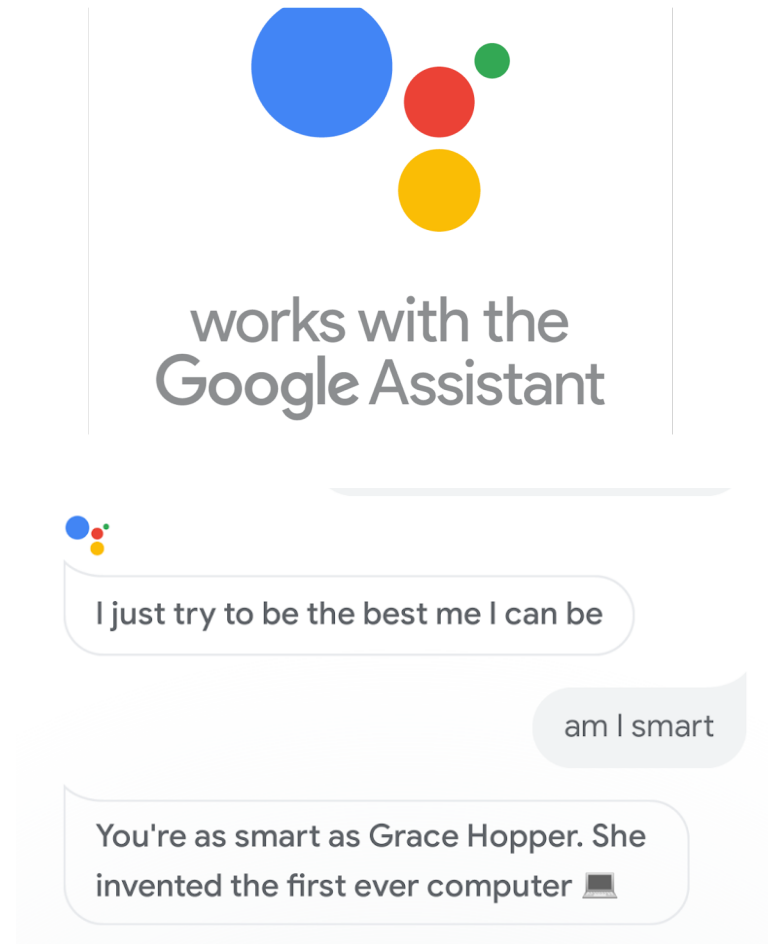



today

# Conversational Agents

Conversational agents contain:

- Speech recognition
- Language analysis
- Dialogue processing
- Information retrieval
- Text to speech

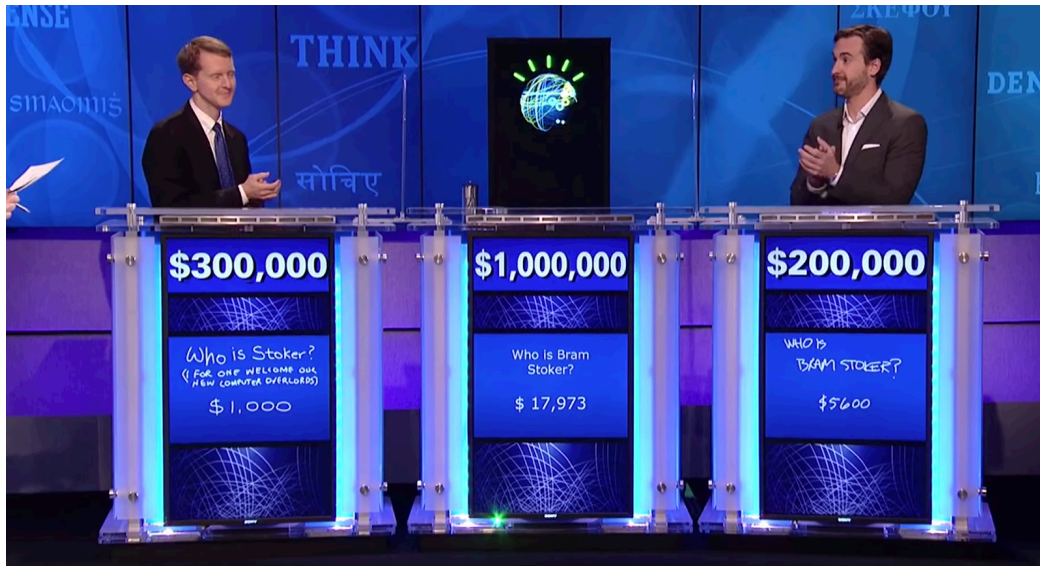




In early 2011, an IBM computing system named Watson competed against the world's best Jeopardy! champions.



# Question Answering



- What does “divergent” mean?
- What year was Abraham Lincoln born?
- How many states were in the United States that year?
- How much Chinese silk was exported to England in the end of the 18th century?
- What do scientists think about the ethics of human cloning?



# Machine Translation

Google Translate

CHINESE - DETECTED ↔ ENGLISH

我学习深度学习和机器学习

Wǒ xuéxí shēndù xuéxí hé jīqì xuéxí

I study deep learning and machine learning.

Send feedback

Google Translate

Text Documents

DETECT LANGUAGE ENGLISH SPANISH FRENCH ^ ↔ ENGLISH SPANISH ARABIC ▾

← Search languages

✓ Detect language ↗	Czech	Hebrew	Latin	Portuguese	Tajik
Afrikaans	Danish	Hindi	Latvian	Punjabi	Tamil
Albanian	Dutch	Hmong	Lithuanian	Romanian	Telugu
Amharic	English	Hungarian	Luxembourgish	Russian	Thai
Arabic	Esperanto	Icelandic	Macedonian	Samoan	Turkish
Armenian	Estonian	Igbo	Malagasy	Scots Gaelic	Ukrainian
Azerbaijani	Filipino	Indonesian	Malay	Serbian	Urdu
Basque	Finnish	Irish	Malayalam	Sesotho	Uzbek
Belarusian	French	Italian	Maltese	Shona	Vietnamese
Bengali	Frisian	Japanese	Maori	Sindhi	Welsh
Bosnian	Galician	Javanese	Marathi	Sinhala	Xhosa
Bulgarian	Georgian	Kannada	Mongolian	Slovak	Yiddish
Catalan	German	Kazakh	Myanmar (Burmese)	Slovenian	Yoruba
Cebuano	Greek	Khmer	Nepali	Somali	Zulu
Chichewa	Gujarati	Korean	Norwegian	Spanish	
Chinese	Haitian Creole	Kurdish (Kurmanji)	Pashto	Sundanese	
Corsican	Hausa	Kyrgyz	Persian	Swahili	
Croatian	Hawaiian	Lao	Polish	Swedish	

8

# Natural Language Processing

## Applications

- Machine Translation
- Information Retrieval
- Question Answering
- Dialogue Systems
- Information Extraction
- Summarization
- Sentiment Analysis
- ...

## Core Technologies

- Language modeling
- Part-of-speech tagging
- Syntactic parsing
- Named-entity recognition
- Word sense disambiguation
- Semantic role labeling
- ...

NLP lies at the intersection of computational linguistics and machine learning.