

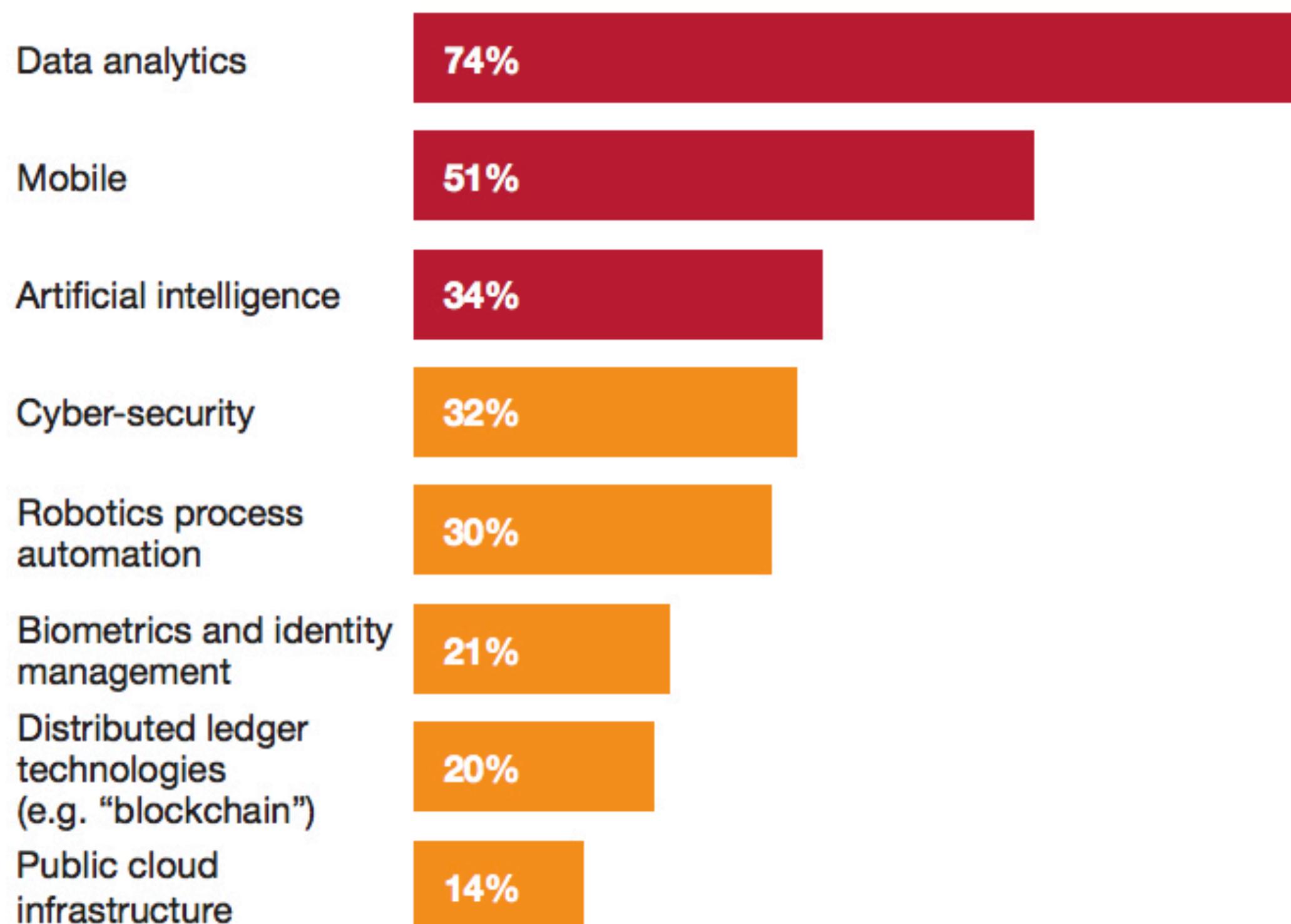
Natural Language Processing *In Banking*

Lei Yu

Technology in FinTech and Financial Institutions

Figure 1 Technological areas of investment

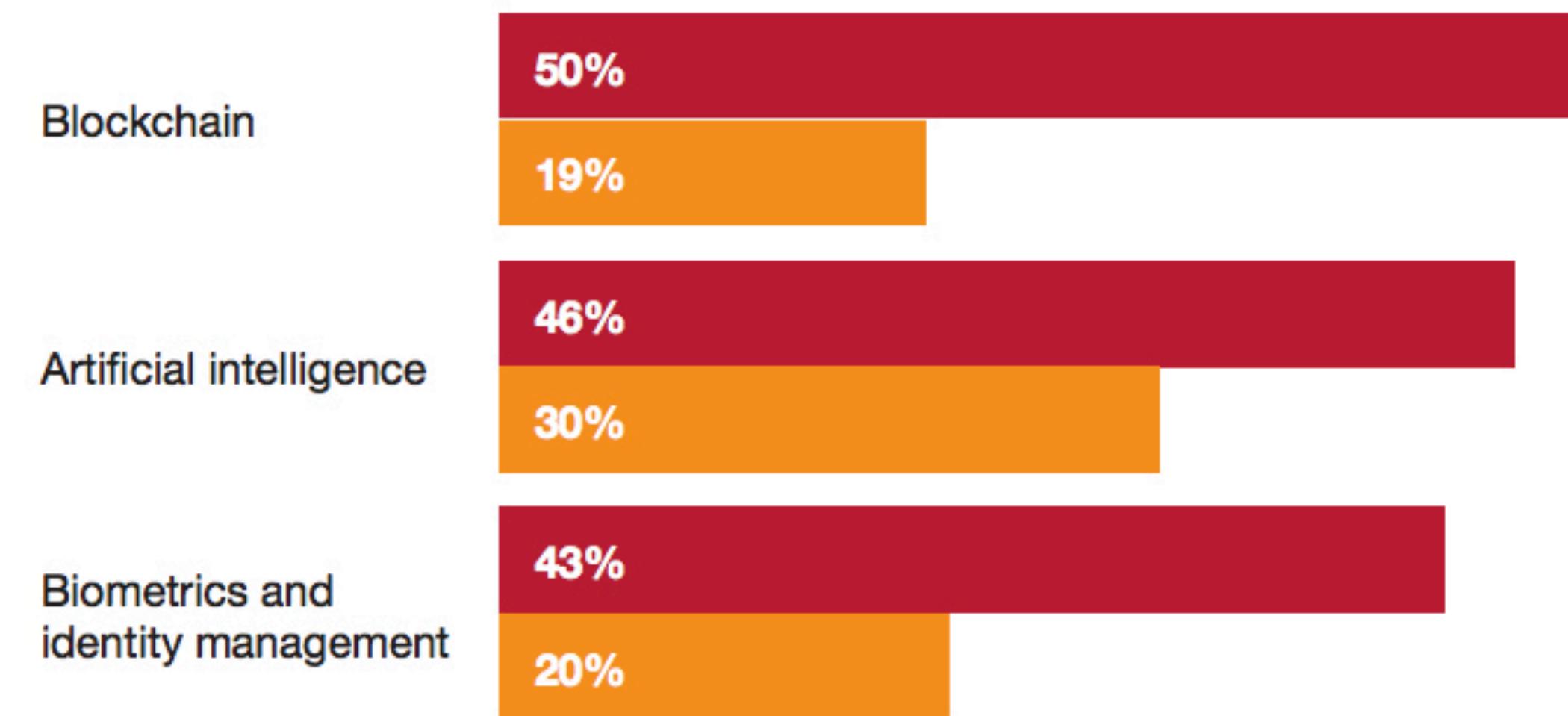
What are the most relevant technologies for your business that you plan to invest in within the next 12 months?



Source: PwC Global FinTech Survey 2017

Figure 2 Focus on emerging technologies

Percentage of large companies that identified these emerging technologies as the most relevant to invest in within the next 12 months



■ Large FinTech ■ Large Financial Institutions

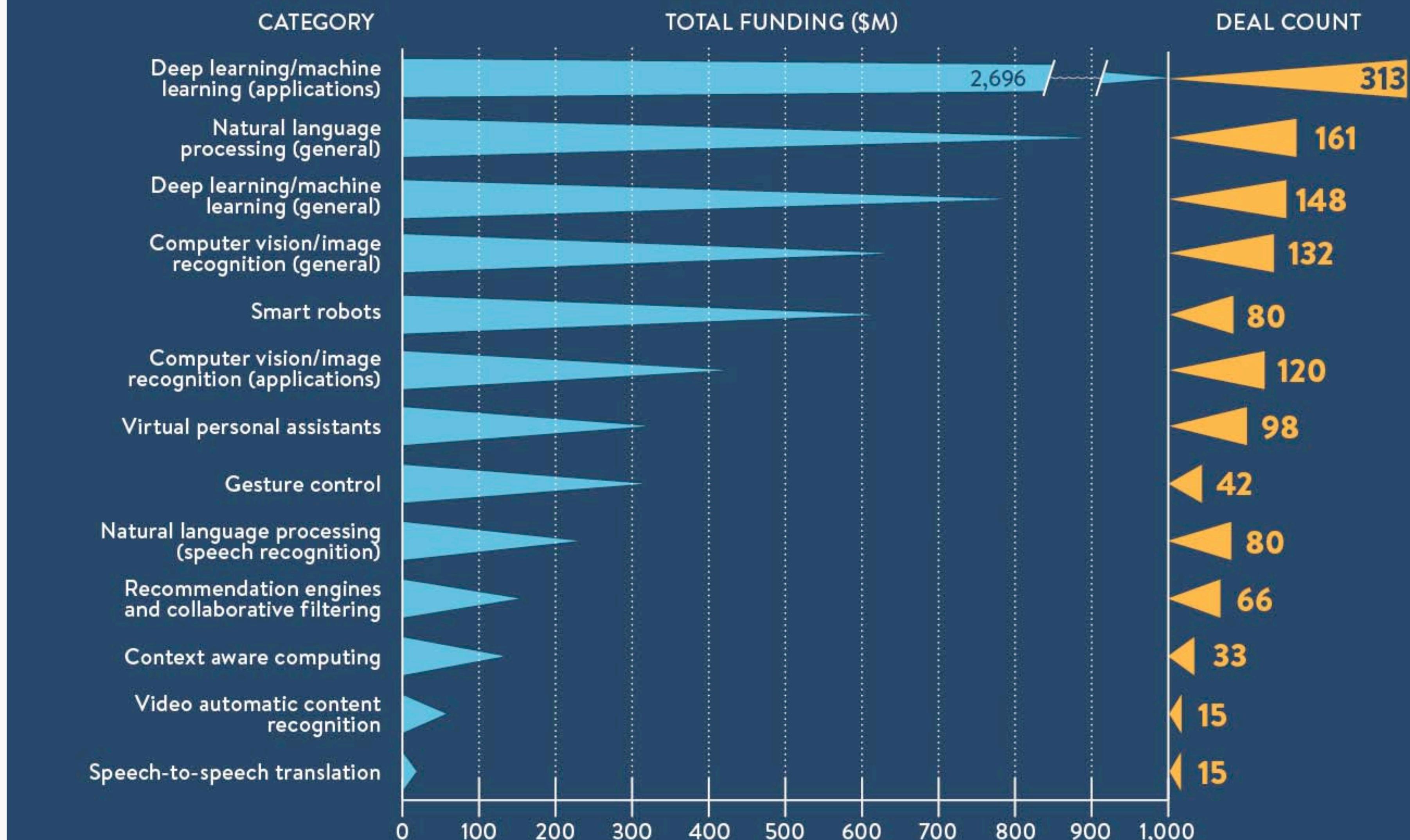
Source: PwC Global FinTech Survey 2017

Note: We include only responses of companies with more than 500 employees.



VENTURE FUNDING IN ARTIFICIAL INTELLIGENCE

Source: Venture Scanner 2016



Here's the things we want to talk today:



Background



Use Cases in Banking



What is Natural Language
Processing ?



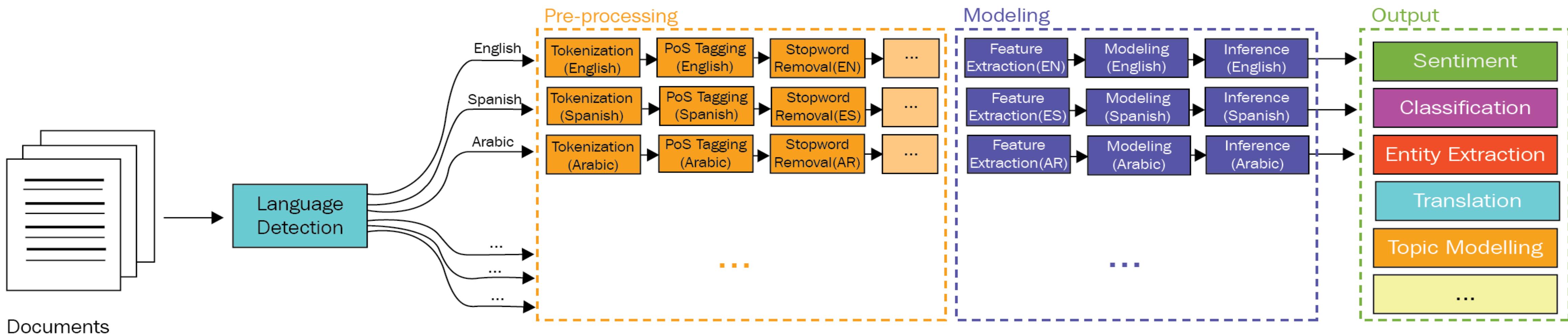
NLP models and Architecture

Background

What is Natural Language Processing?



Classical NLP



Use Cases



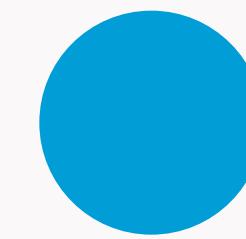
Real-Time
Data
Analytics and
Forecasting

Natural
Language
Search in
Database

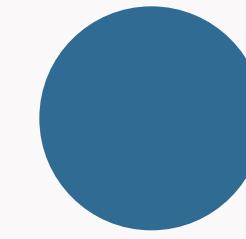
Chatbot and
Virtual
Assistant



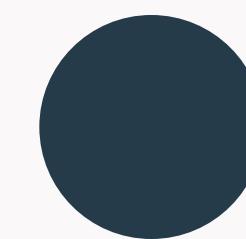
Real-Time Data Analytics



Every day, Reuters publishes thousands of pages of financial news

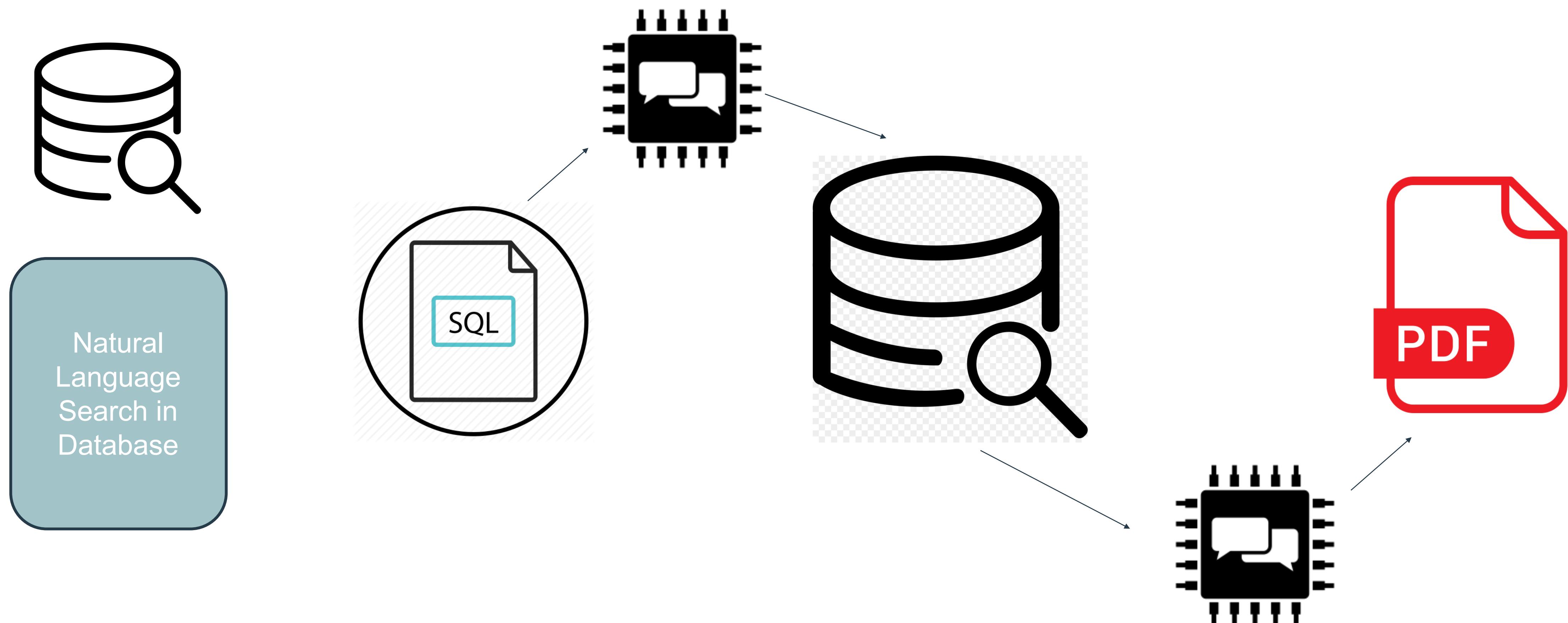


Every minute, Wall Street analysts produce several research documents



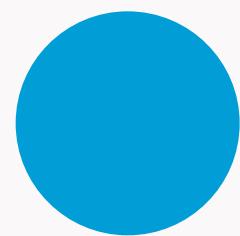
Every second, financial services professionals receive emails with important financial information

Natural Language Search

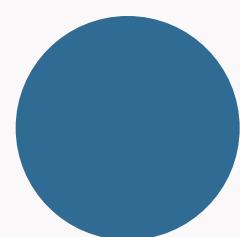




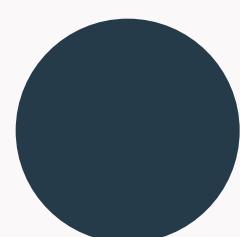
Conversational AI



Retrieval-Based vs. Generative Models



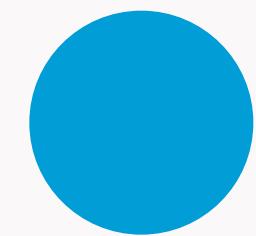
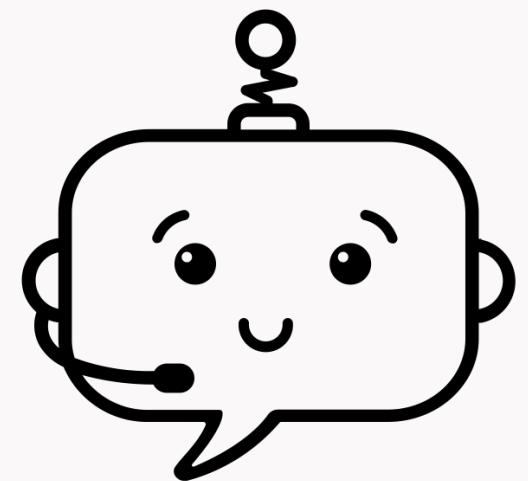
Long vs. Short Conversations



Open Domain vs. Closed Domain



Conversational AI in Banking



Don't Need to learn how bank speak



Chatbot and
Virtual
Assistant



Conversational AI in Banking

Account balances

Available credit

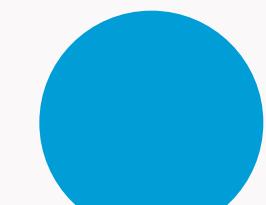
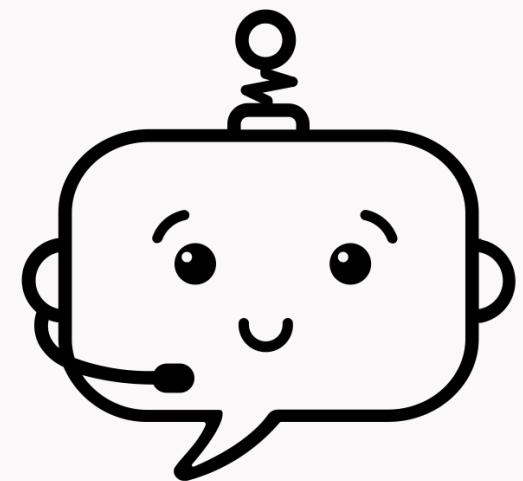
Minimum payment amounts

Due dates

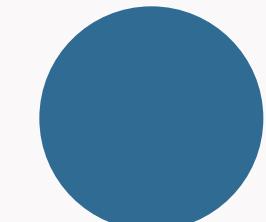
Transaction history



Conversational AI in Banking



Don't Need to learn how bank speak



Improve Customer Experience

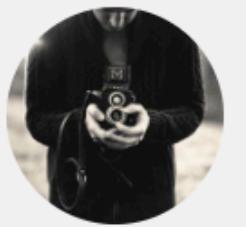


Conversational AI in Banking

Chatbot understands the way you talk and loves emojis.
Want to check your balance? Text “balance please,” “Bal,”
or even .

Lost your card and need a replacement? Text “Replace lost
card,” “Lost card,” or “Help! I can’t find my card.”

Chat Messages



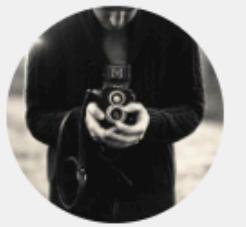
What's the balance on my Freedom card?

11:00



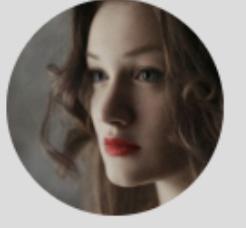
Your statement balance is \$3,142.38.

11:01



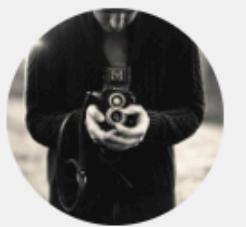
Pay bill.

11:02



Sure, I can pay your bill. Your minimum payment is \$25.00 and your statement balance is \$3,142.38. Do you want to pay the minimum statement or a different amount?

11:05



\$153

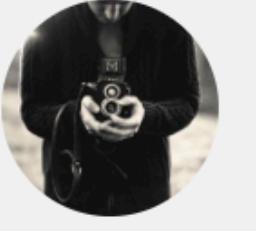
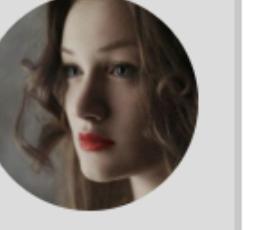
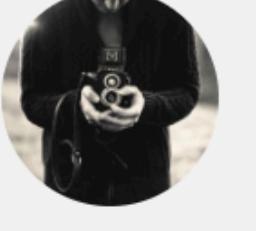
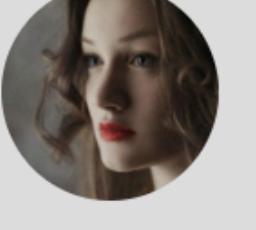
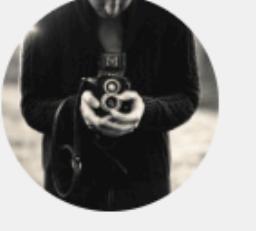
11:02



You got it. I can transfer \$153.00 to your credit card ending 1234 from your preferred account 5678.

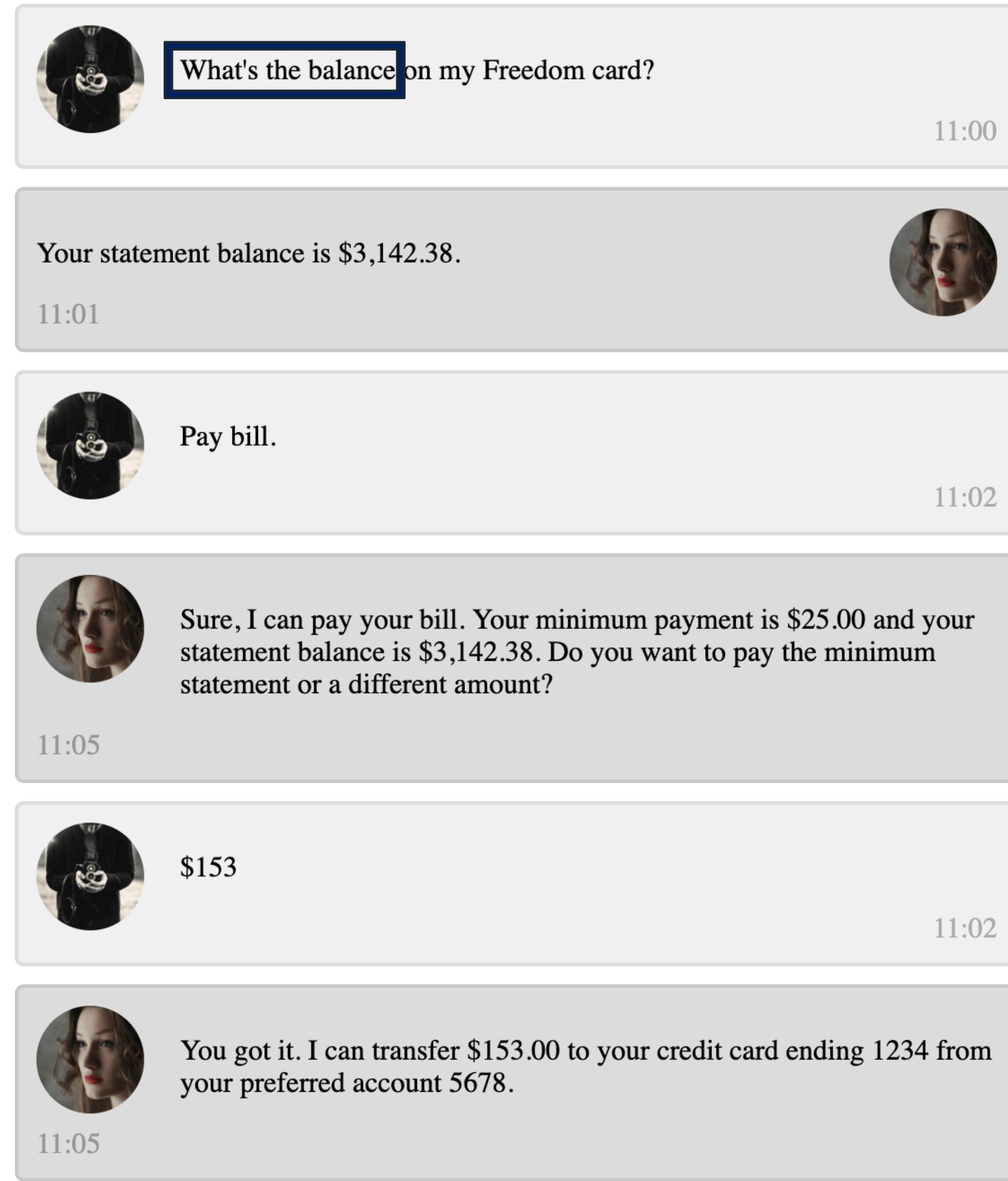
11:05

Chat Messages

-  What's the balance on my Freedom card?
11:00
-  Your statement balance is \$3,142.38.
11:01
-  Pay bill.
11:02
-  Sure, I can pay your bill. Your minimum payment is \$25.00 and your statement balance is \$3,142.38. Do you want to pay the minimum statement or a different amount?
11:05
-  \$153
11:02
-  You got it. I can transfer \$153.00 to your credit card ending 1234 from your preferred account 5678.
11:05

Intent Classification

Chat Messages

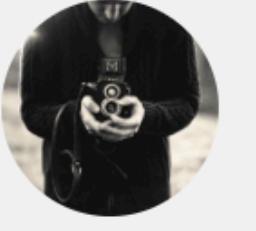
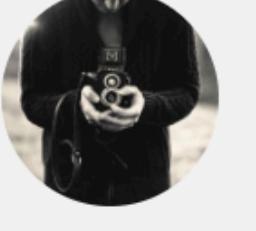
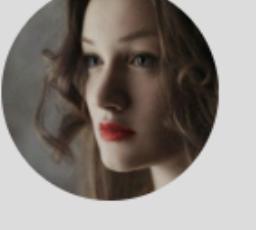
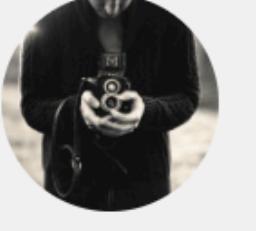


Intent Classification

What's my balance?
Give me the balance on my card.
Pay my credit card.
I'd like to make a payment.



Chat Messages

-  What's the balance on my Freedom card? 11:00
-  Your statement balance is \$3,142.38. 11:01
-  Pay bill. 11:02
-  Sure, I can pay your bill. Your minimum payment is \$25.00 and your statement balance is \$3,142.38. Do you want to pay the minimum statement or a different amount? 11:05
-  \$153 11:02
-  You got it. I can transfer \$153.00 to your credit card ending 1234 from your preferred account 5678. 11:05

Intent Classification

What's my balance?
Give me the balance on my card.
Pay my credit card.
I'd like to make a payment.

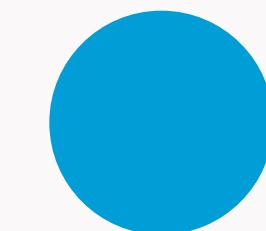
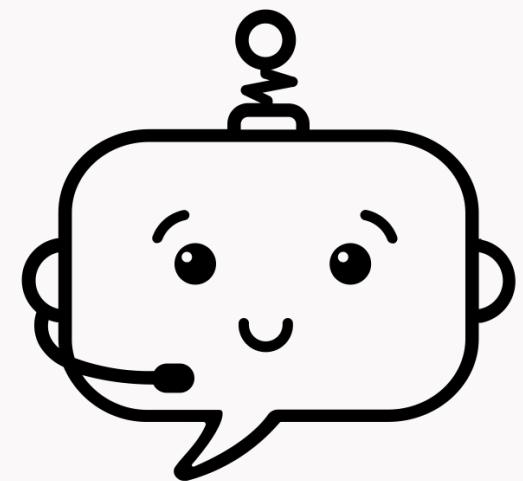
Named Entity Recognition



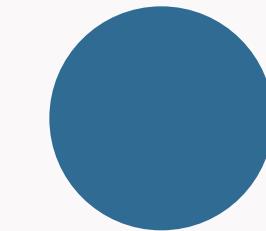
Utterance from Customer	Intent Labeled by Human Annotator
What is my balance	Account Balance
Turn on card	Activate Card
Much appreciated	Thanks
Pay my bill	Payment
Balance for card	Account Balance
Please make my card work	Activate Card



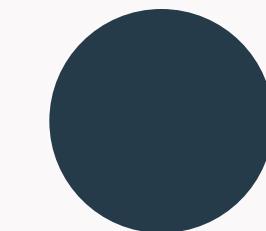
Conversational AI in Banking



Don't Need to learn how bank speak



Improve Customer Experience



Information Hub and Financial Advisor



Conversational AI in Banking



Did you make both purchases?

COZYSHOPS.COM

Sunday, June 10, 2018

\$40.00

Sunday, June 10, 2018

\$40.00

Yes, I Made Both

No, Help Me Fix This



Did you expect an increase?

Hi there.

I noticed G & L Energy charged you \$140.40 this month on your account ending in 1234. That's \$70.20 more than last month.

Your Monthly G & L Energy Charges

\$70.20

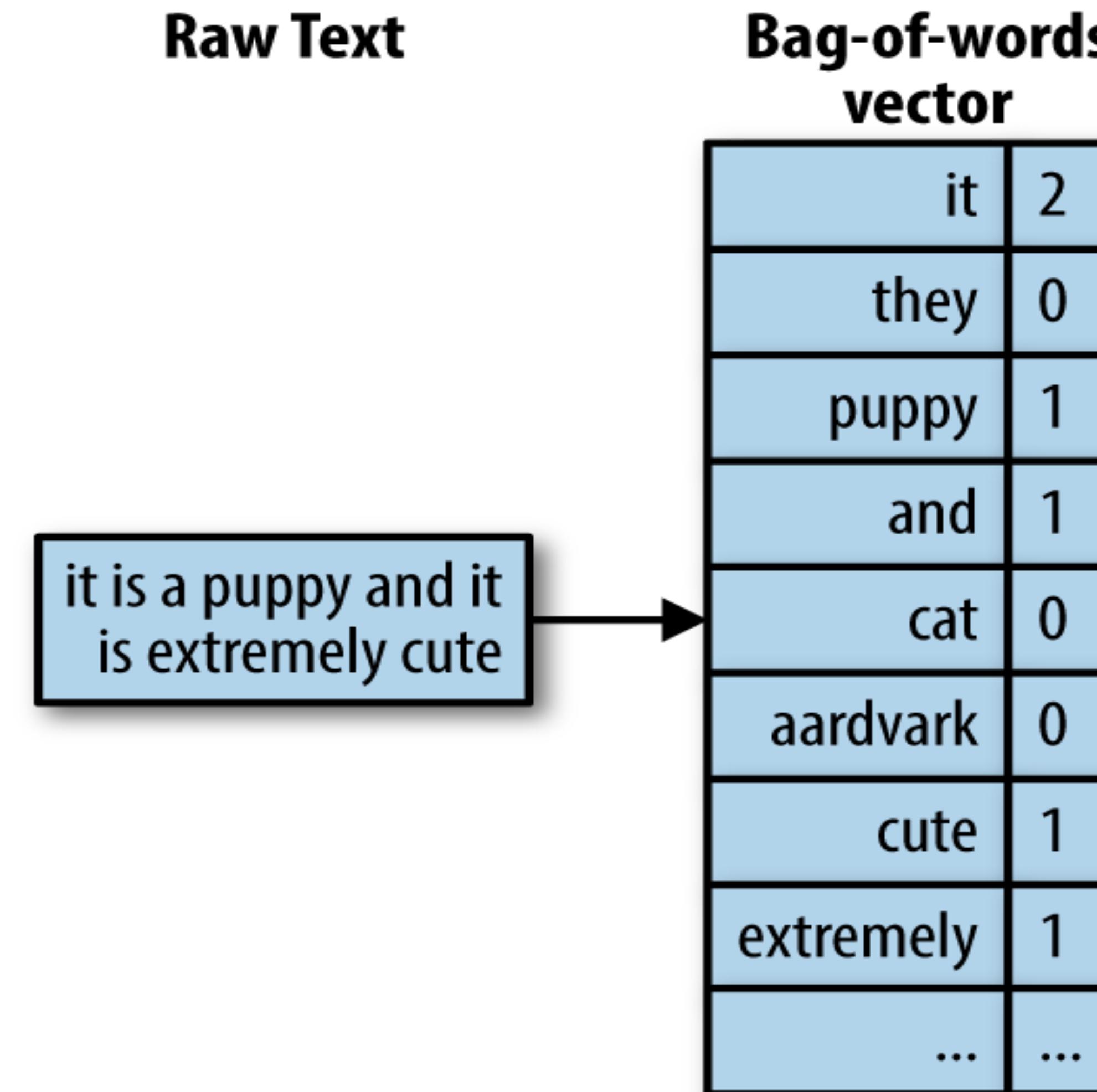
JULY

\$140.40

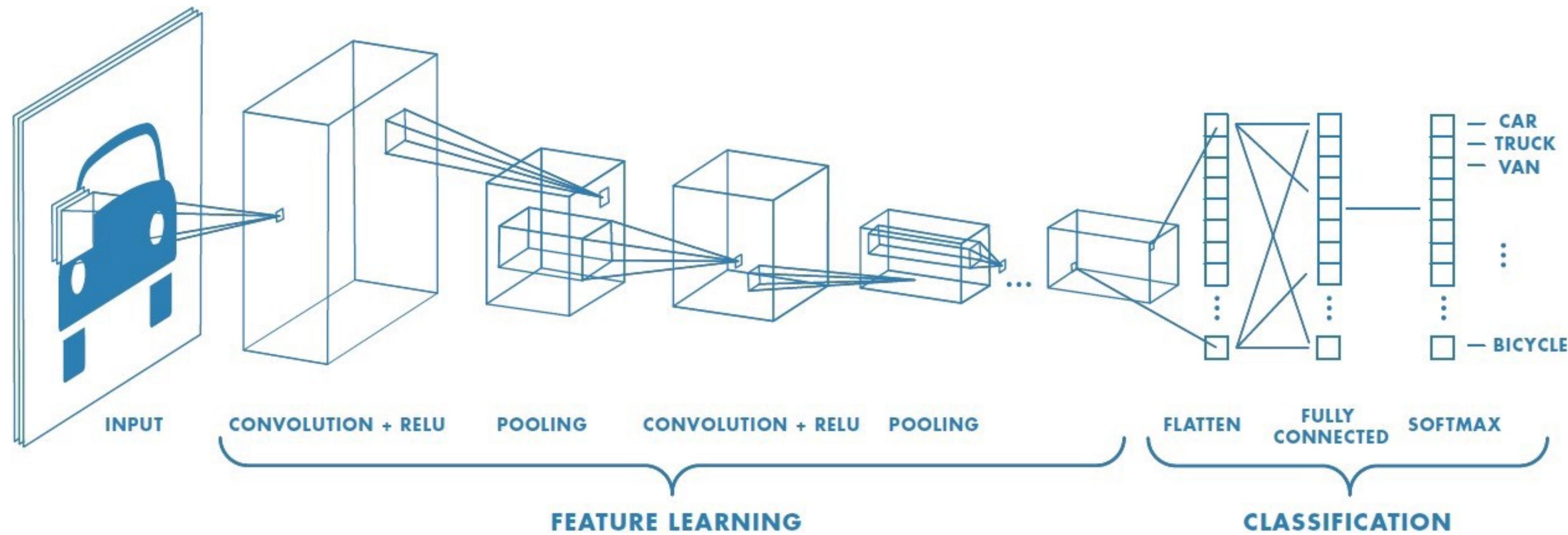
AUGUST

Natural Language Processing Models

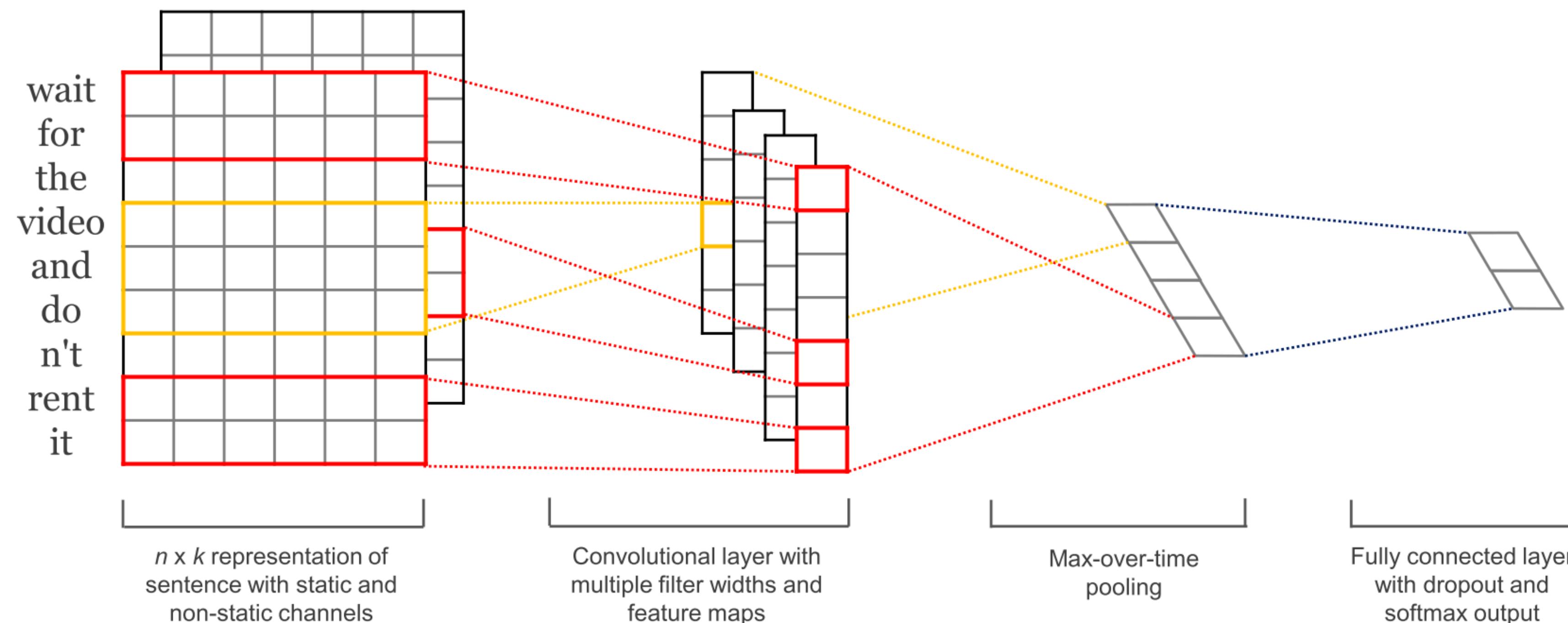
Bag of Words



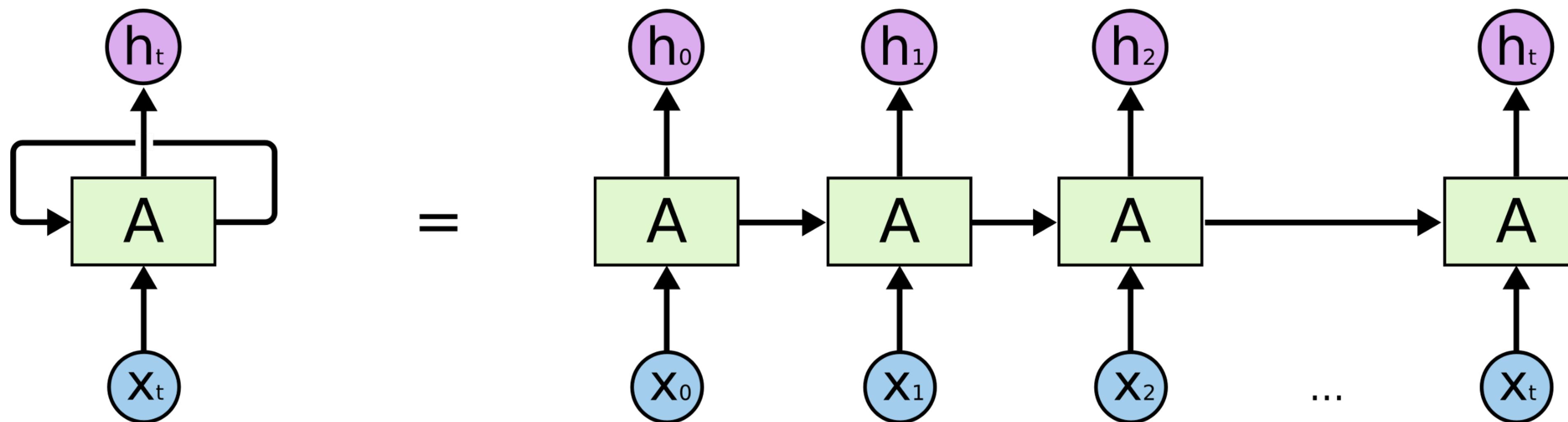
Convolutional Neural Networks



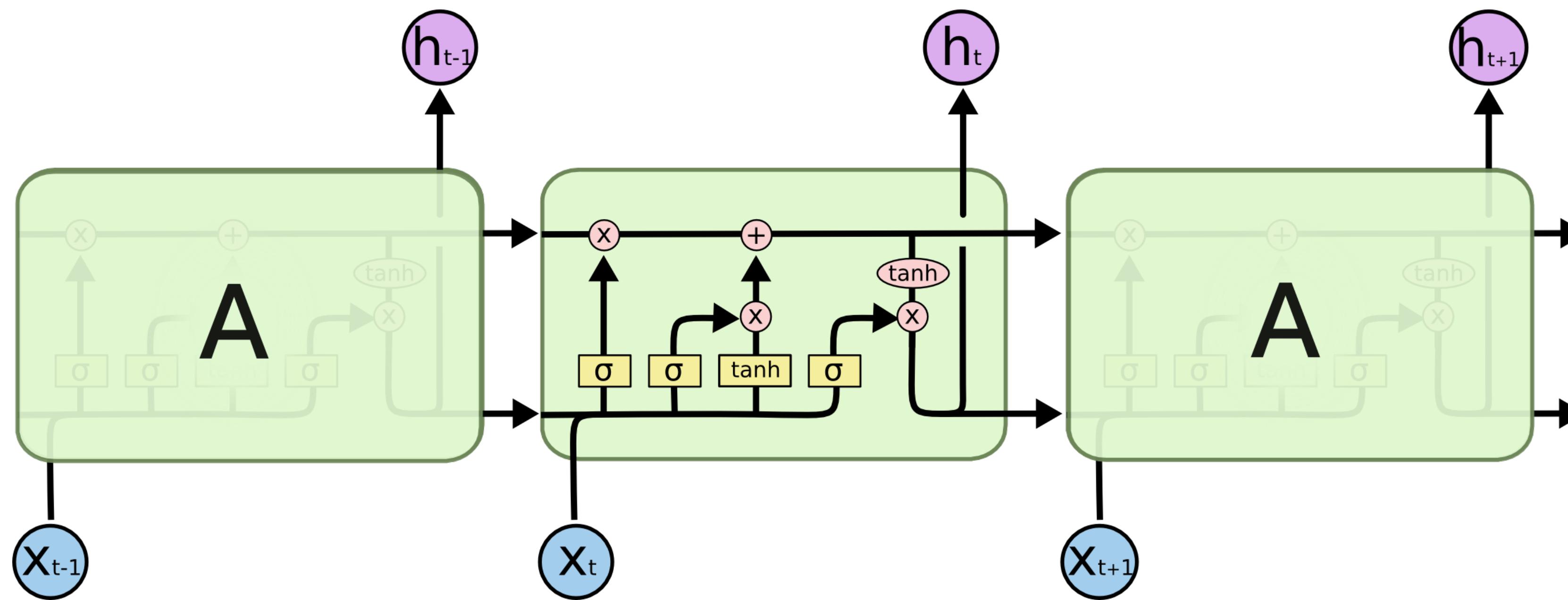
Convolutional Neural Networks



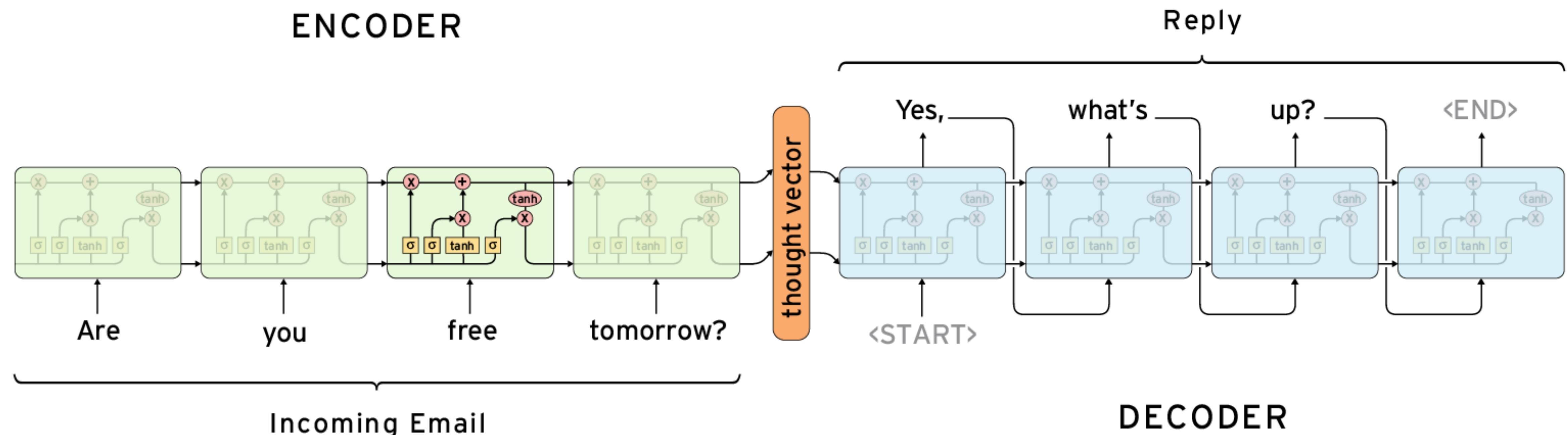
Recurrent Neural Networks



Long Short-Term Memory



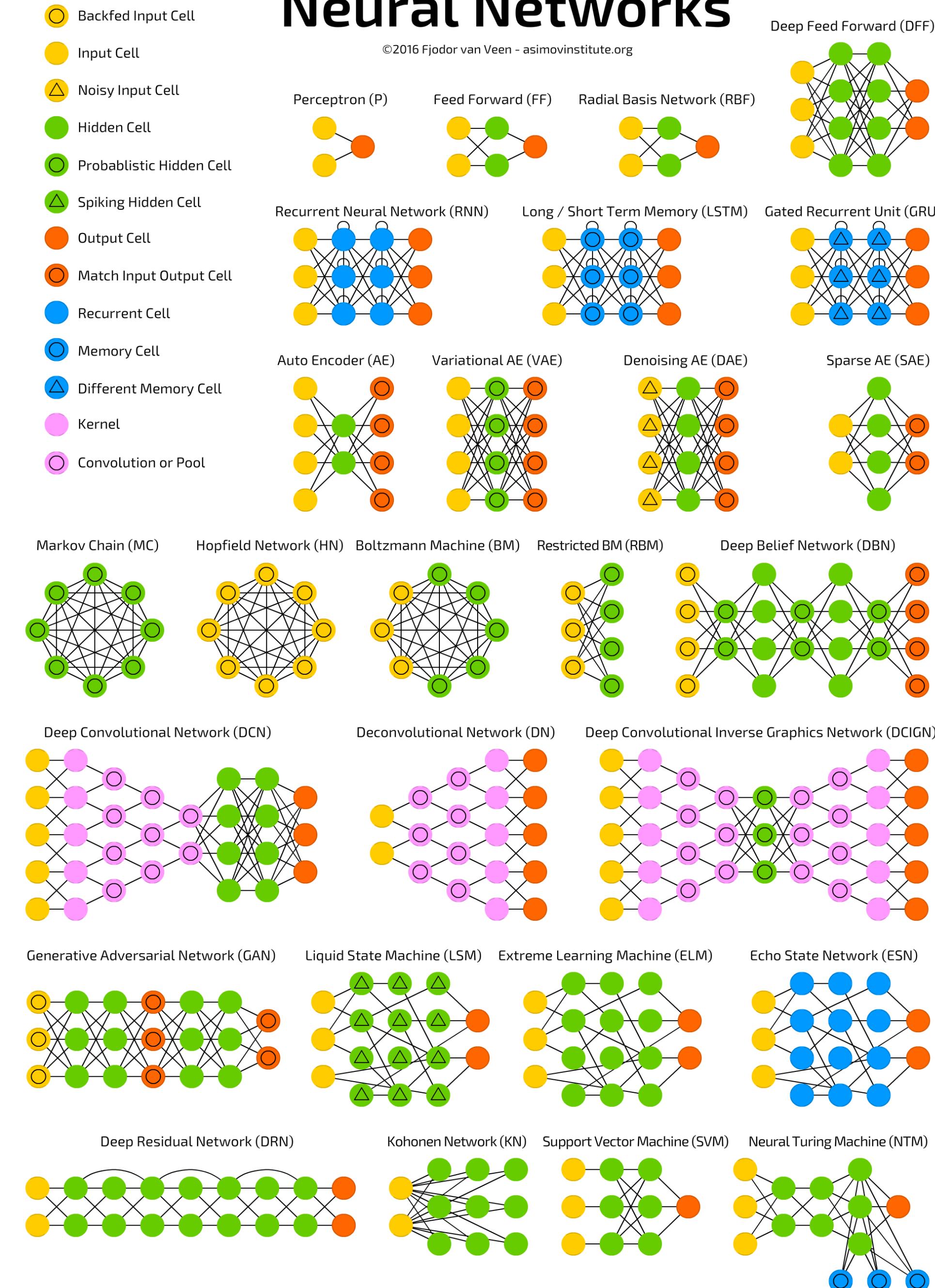
Sequence to Sequence Model



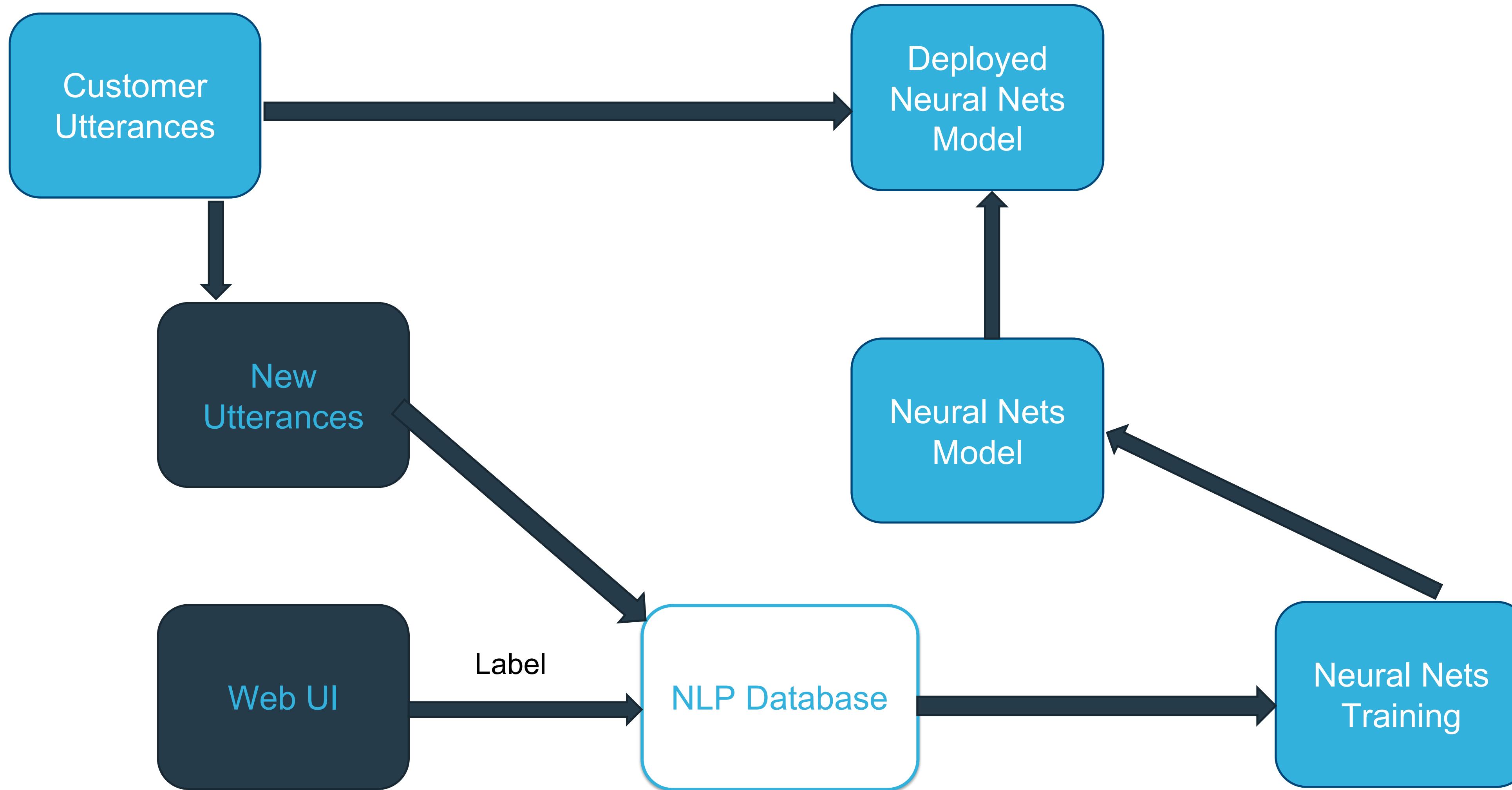
A mostly complete chart of

Neural Networks

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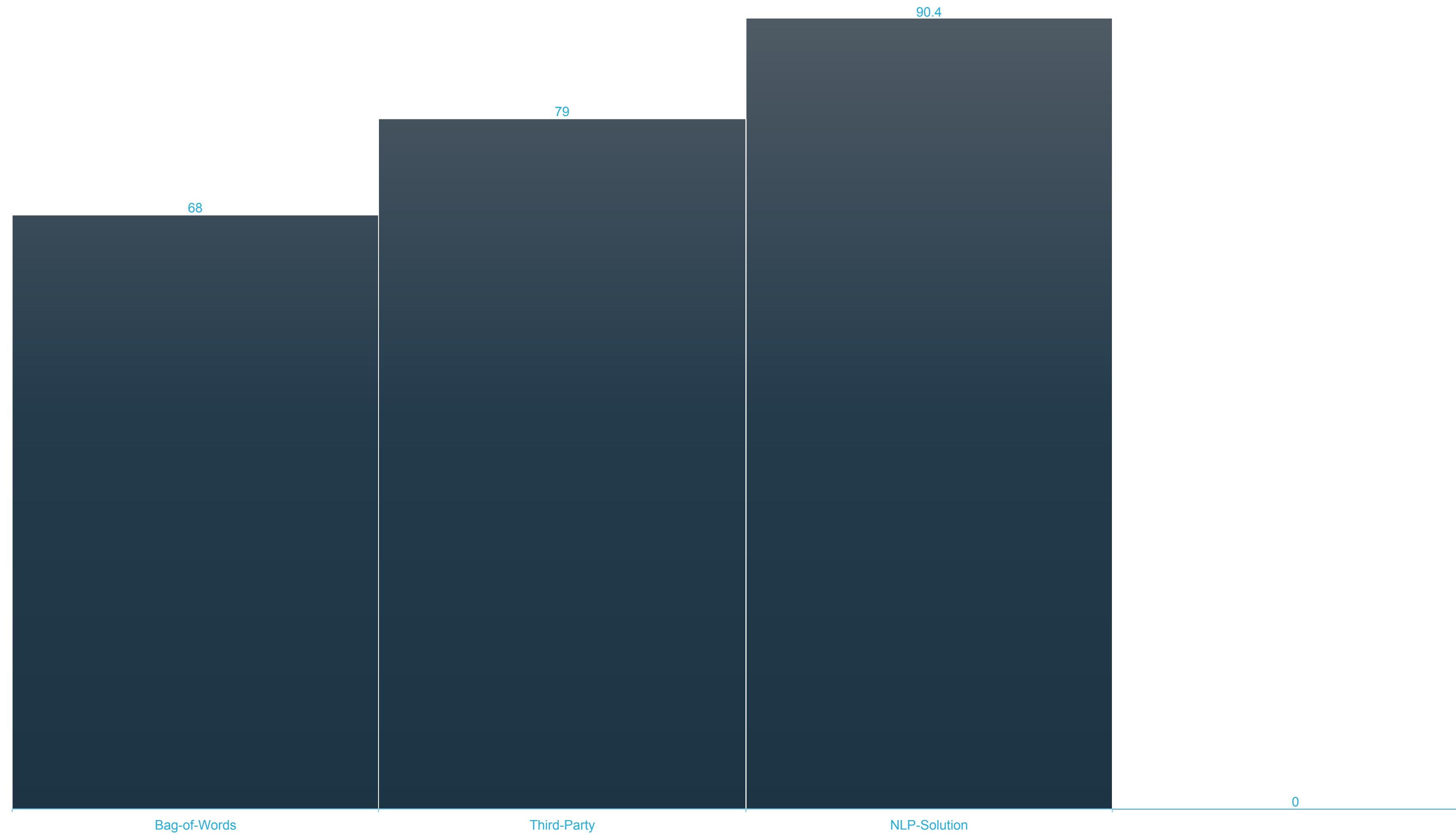


Architecture

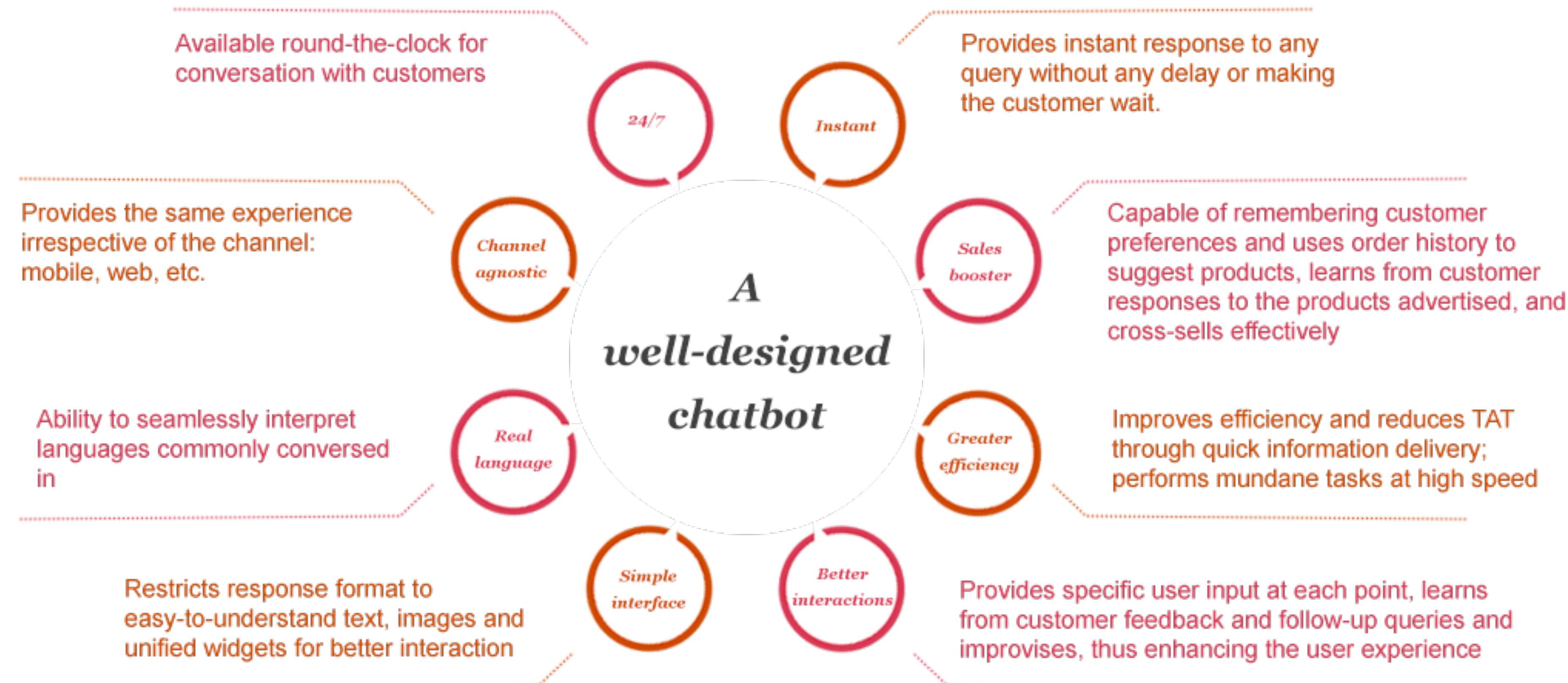




Intent Classification Accuracy



Well-Designed Chatbot



GET IN TOUCH



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Lei Yu

goldin20082011@gmail.com

References:

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