Revisiting Customer Complaints using NLP

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Agenda

01 | Introduction to Barclays

02 | Customer Experience

03 | NLP Workflow

04 | Topic Modeling

05 | Sentiment Analysis

06 | Lessons Learnt

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Barclays PLC: 327 Years and Counting….

Business Snapshot

Co-branded Credit Cards

Branded Credit Cards

Savings Products

Personal Loans

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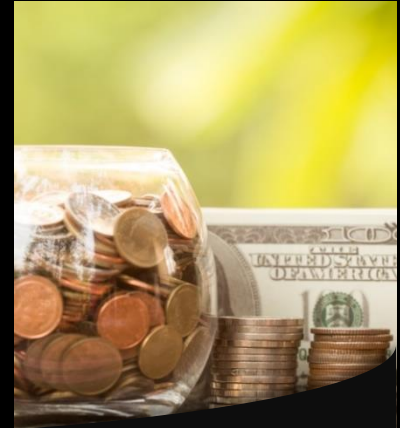# Importance of Customer Experience

Competitive Industry


Millennial Customers

Customer Advocacy

Profitability Impact
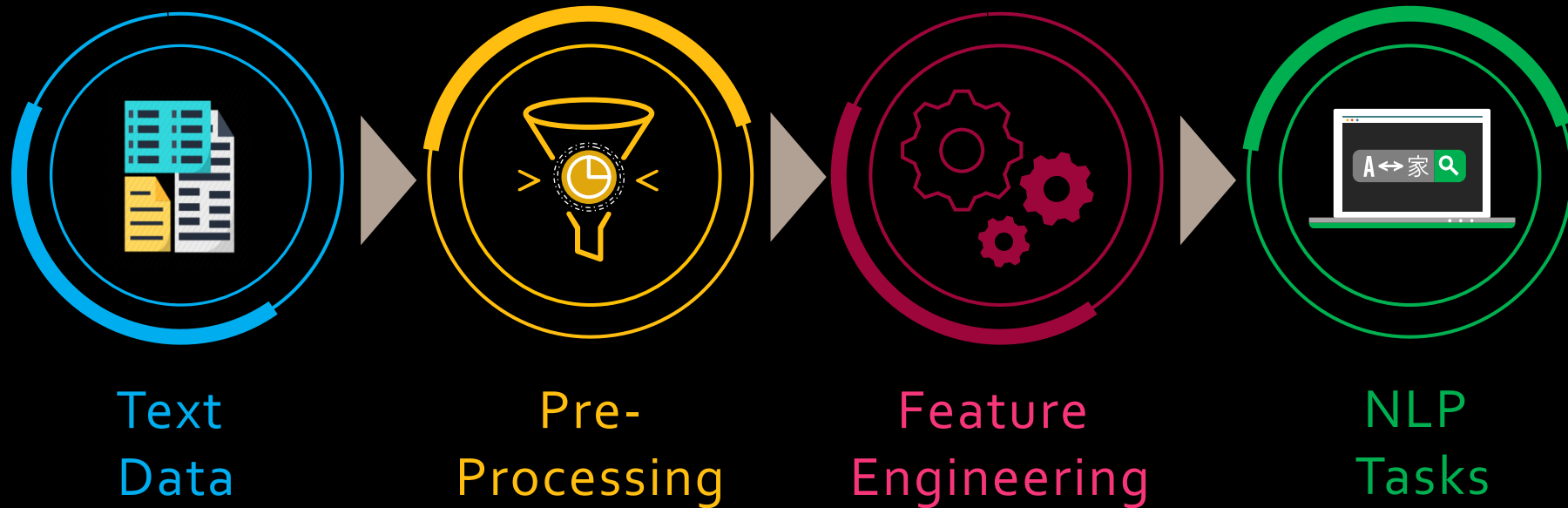
A Customer Complaint

........I booked a vacation with XXXX through a program called XXXX. The vacation took place XX/XX/XXXX. I have asked XXXX about the issue and they have stated for six months "We are waiting for XXXX to respond". I have been patient and waited until this week to file this complaint. It appears to me the problem is we changed the reservation by cutting off a day. Subsequently we spoke with a supervisor on another call who was able to patch things up. This doesn't change the fact we used the program and did not drop the ball, the representative did and we still paid with the card and stayed at the same place as we agreed originally. The reward offer did not specify a minimum dollar amount or certain days required to stay. We simply had to use XXXX and pay with the XXX MasterCard. I would like to get this resolved since I used these programs to book because of their offer. They have had ample time to sort this out. If I had used another card for the trip, I would long ago have received the reward, as I have several cards that have never once left me out in the cold like this........

Natural Language Processing (NLP)

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NLP Workflow

Text Data → Pre-Processing → Feature Engineering → NLP Tasks

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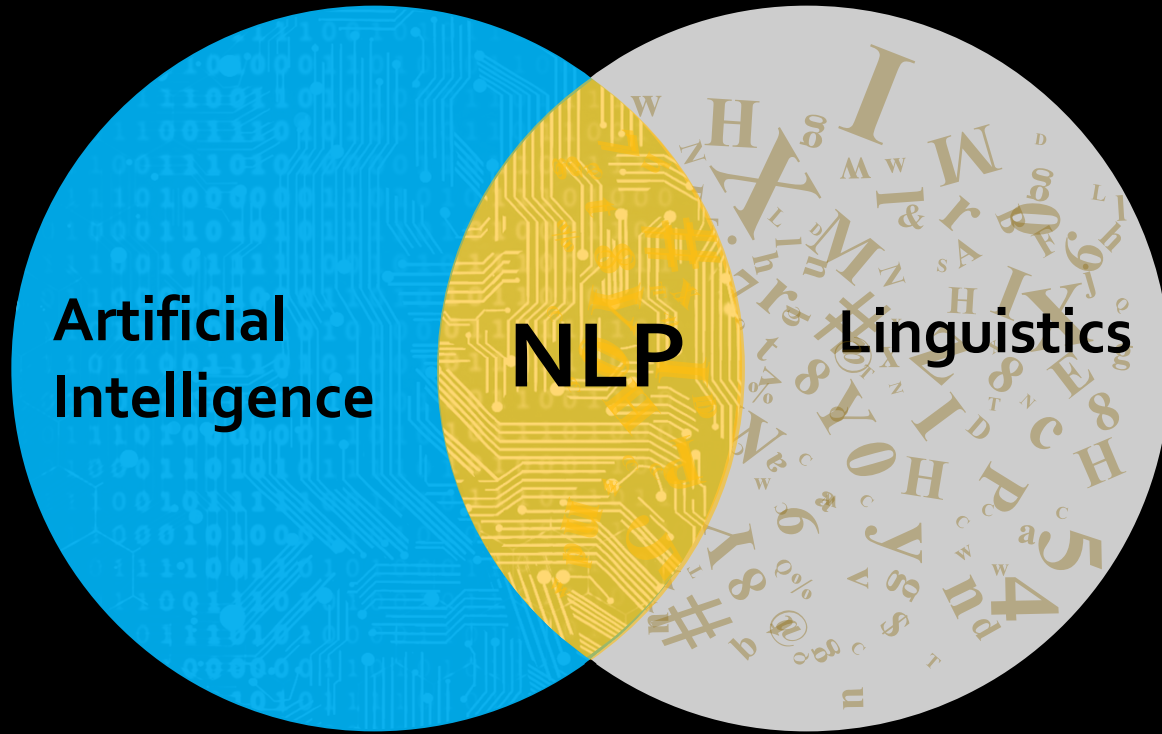
Case Study #1:
Topic Modeling

Problem

~25% of customer complaints were misclassified

Solution

Topic modeling on complaint narratives

Methods

TF-IDF Algorithm

LDA Algorithm

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TF-IDF Algorithm

TF-IDF = Term Frequency X Inverse Document Frequency

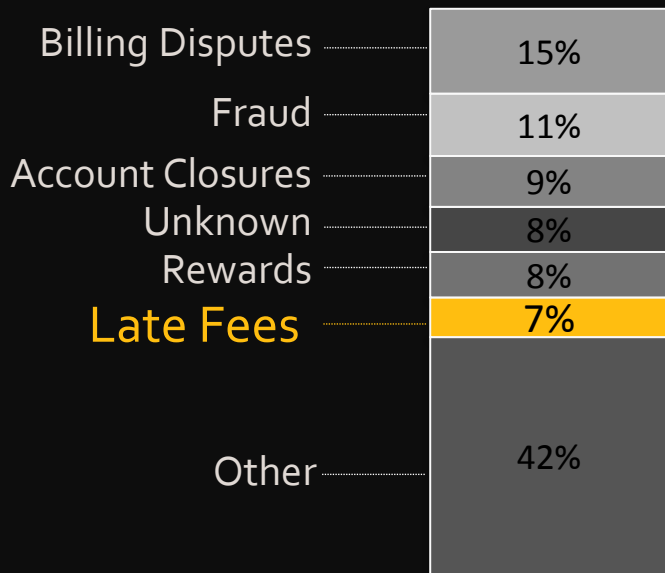(How often the word occurs in a document)

(How often the word occurs in the overall corpus)
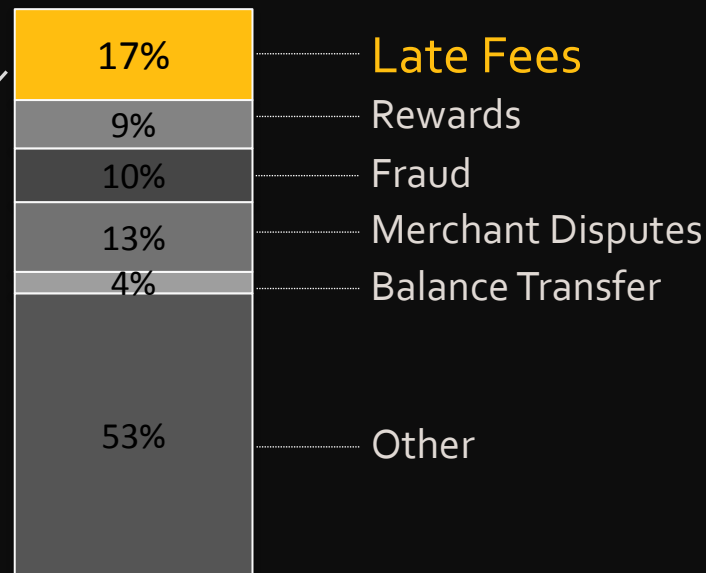
"Museums were great but the food in Paris was the best!"

museum	were	great	but	the	food	in	Paris	was	best
0.3	0.03	0.15	0.05	0.01	0.2	0.02	0.6	0.02	0.12

Complaints Categorization using NLP

Original Complaint Categories

Category	%
Billing Disputes	15%
Fraud	11%
Account Closures	9%
Unknown	8%
Rewards	8%
Late Fees	7%
Other	42%

New Complaint Categories using NLP

Category	%
Late Fees	17%
Rewards	9%
Fraud	10%
Merchant Disputes	13%
Balance Transfer	4%
Other	53%

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Accurate Categorization of Complaints

Billing Disputes — 15%
Fraud — 11%
Account Closures — 9%
Unknown — 8%
Rewards — 8%
Late Fees — 7%
Other — 42%

Credit Line
Identity Theft
Merchant Disputes
Account Closures
Bureau Reporting
Annual Fees

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Complaints Network Map

Credit Bureau Reporting (12%)

Collection Calls (6.8%)

Credit Line Decreases (4.6%)

Merchant Disputes (13%)

Fraud & Identity Theft (10%)

Account Closures (6.2%)

Social Security Number (3.7%)

Rewards/Bonus Points (9.2%)

Billing disputes (2.4%)

Annual Fees (4.3%)

Interest Rates (5.8%)

Balance Transfer (3.7%)

Late Fees (17%)

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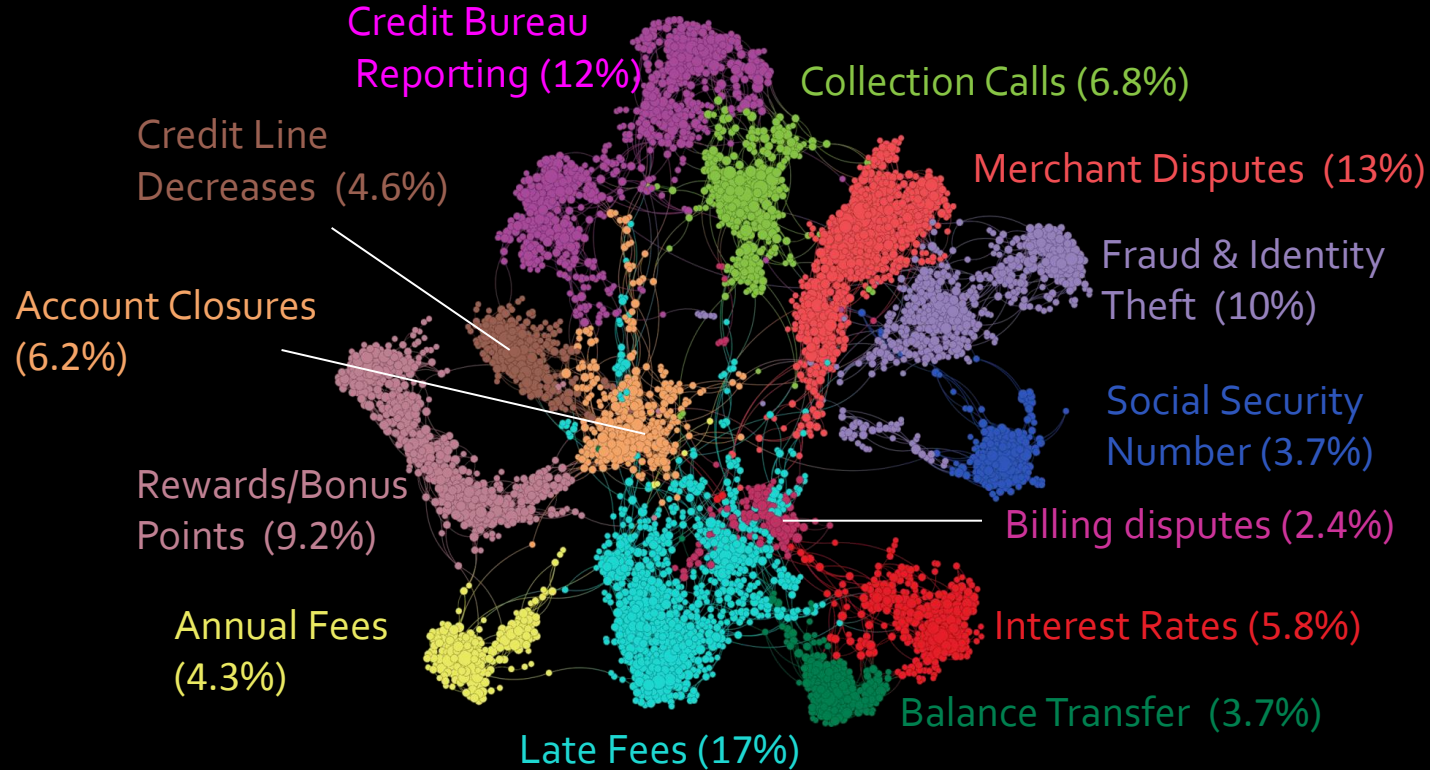
Results and Impact

Foreign transaction fee waived for ~1.5MM customers
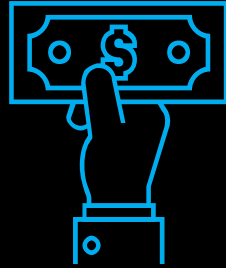
Late fee waivers for ~30K customers each year

Lowest complaint rate in 4 years (~1.1 complaints/1,000)

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Case Study #2: Sentiment Analysis

Problem — We were oblivious to the underlying consumer sentiment

Solution — Sentiment analysis on complaint narratives

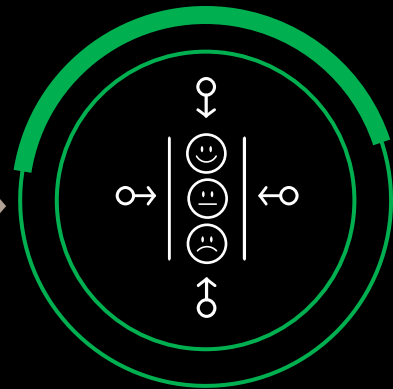**Methods** — Bag-of-Words Model
Deep Learning Methods

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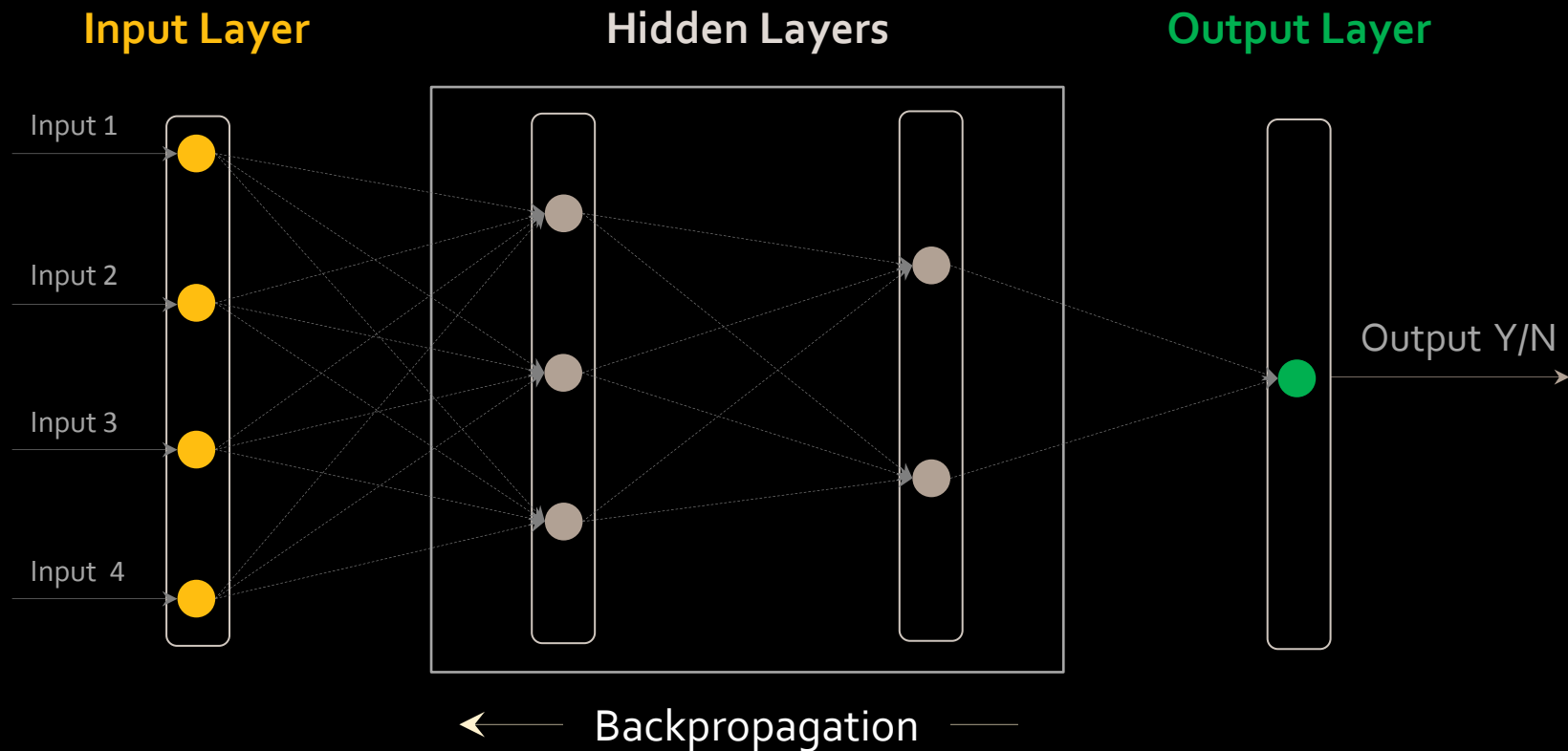
Sentiment Analysis Workflow

Data
Pre-processing

Sentiment
Detection

Sentiment
Polarity

Sentiment
Aggregation

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Artificial Neural Networks

Input Layer **Hidden Layers** **Output Layer**

Input 1

Input 2

Input 3

Input 4

Output Y/N

Backpropagation

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Long Short Term Memory Networks
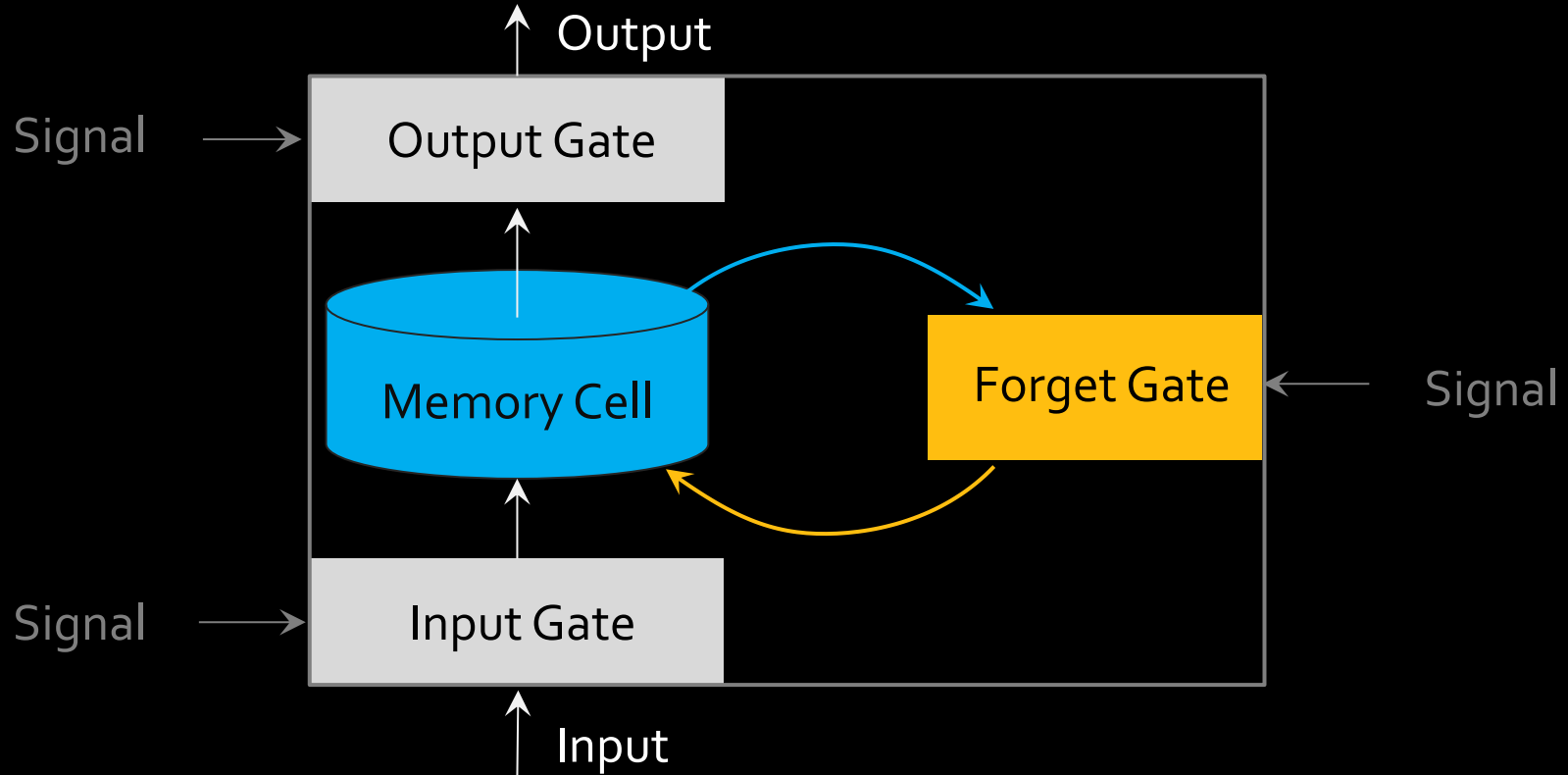
Sentiment Predictions Using LSTMs

Improvement in Model Accuracy

Bar chart showing: Baseline Model 0%, Random Forest 6%, Gradient Boosting Machine 8%, LSTM Networks 20%.
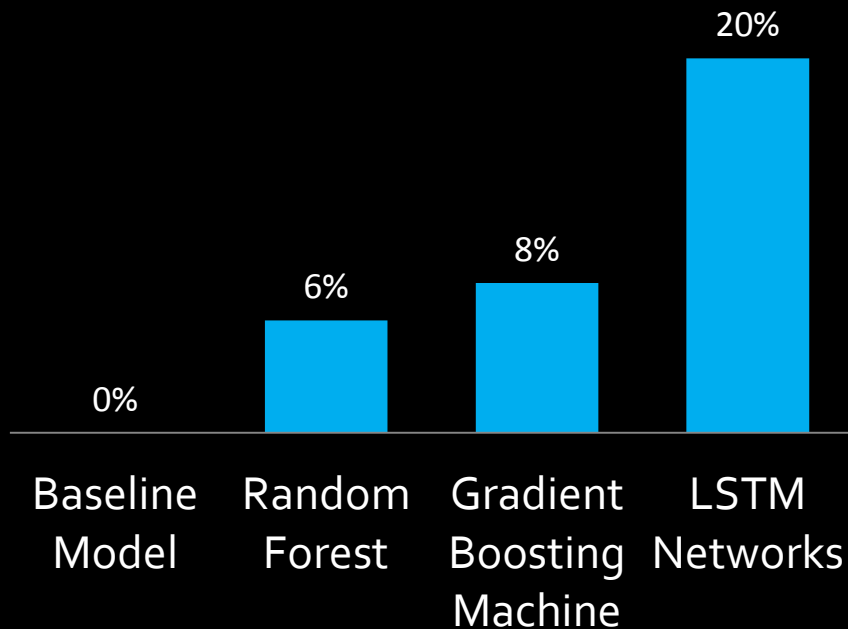
Further Opportunities:

- Better training data

- Handling of sarcasm/irony

- Ensemble sentiment models

- Live sentiment scores
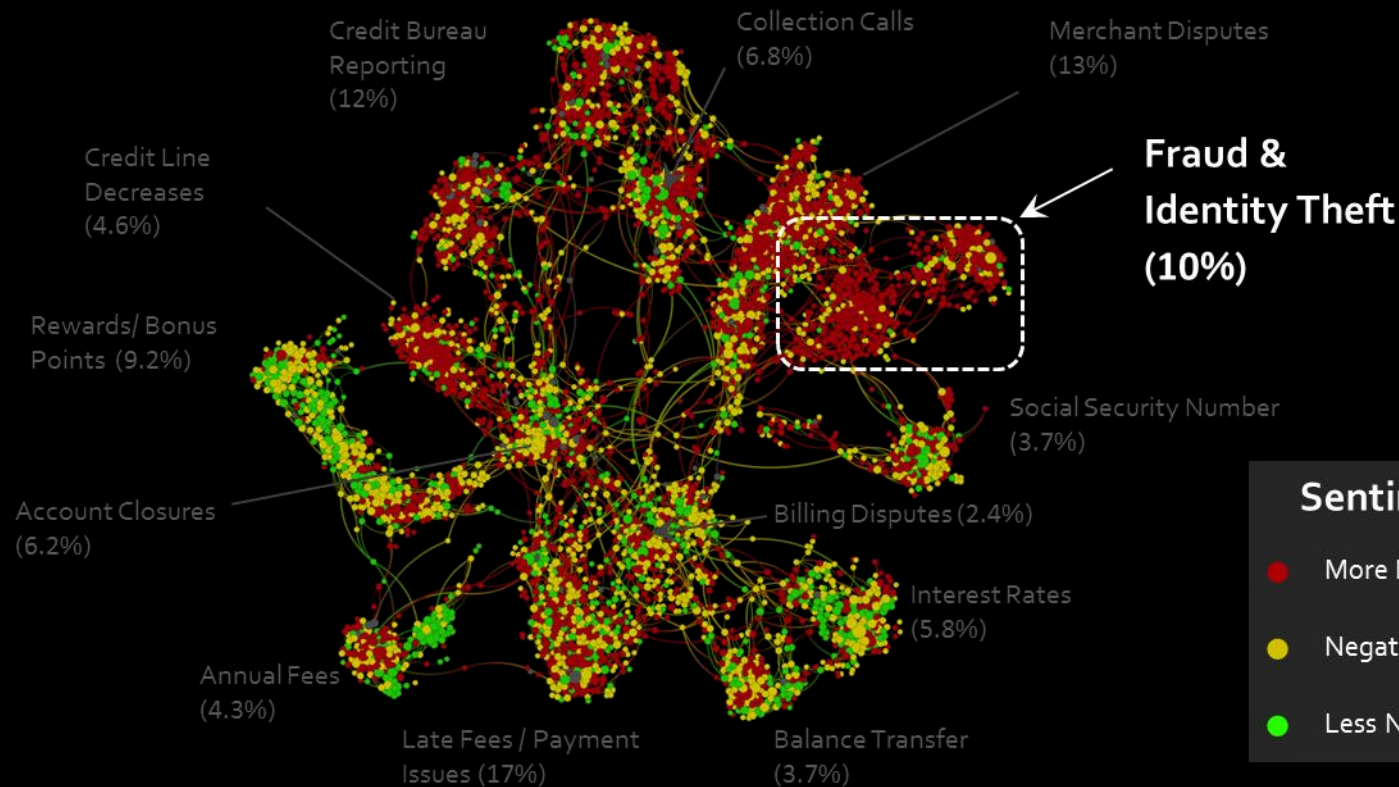
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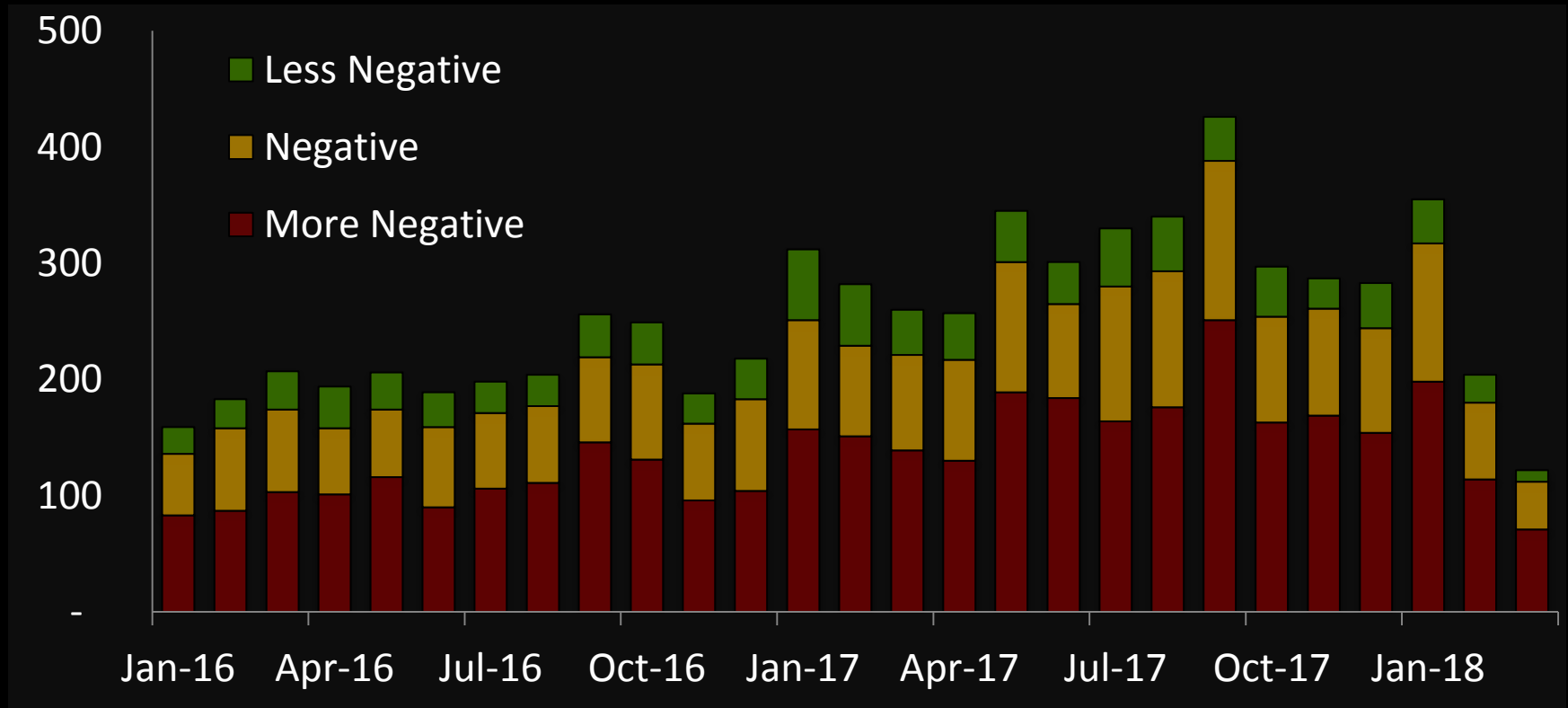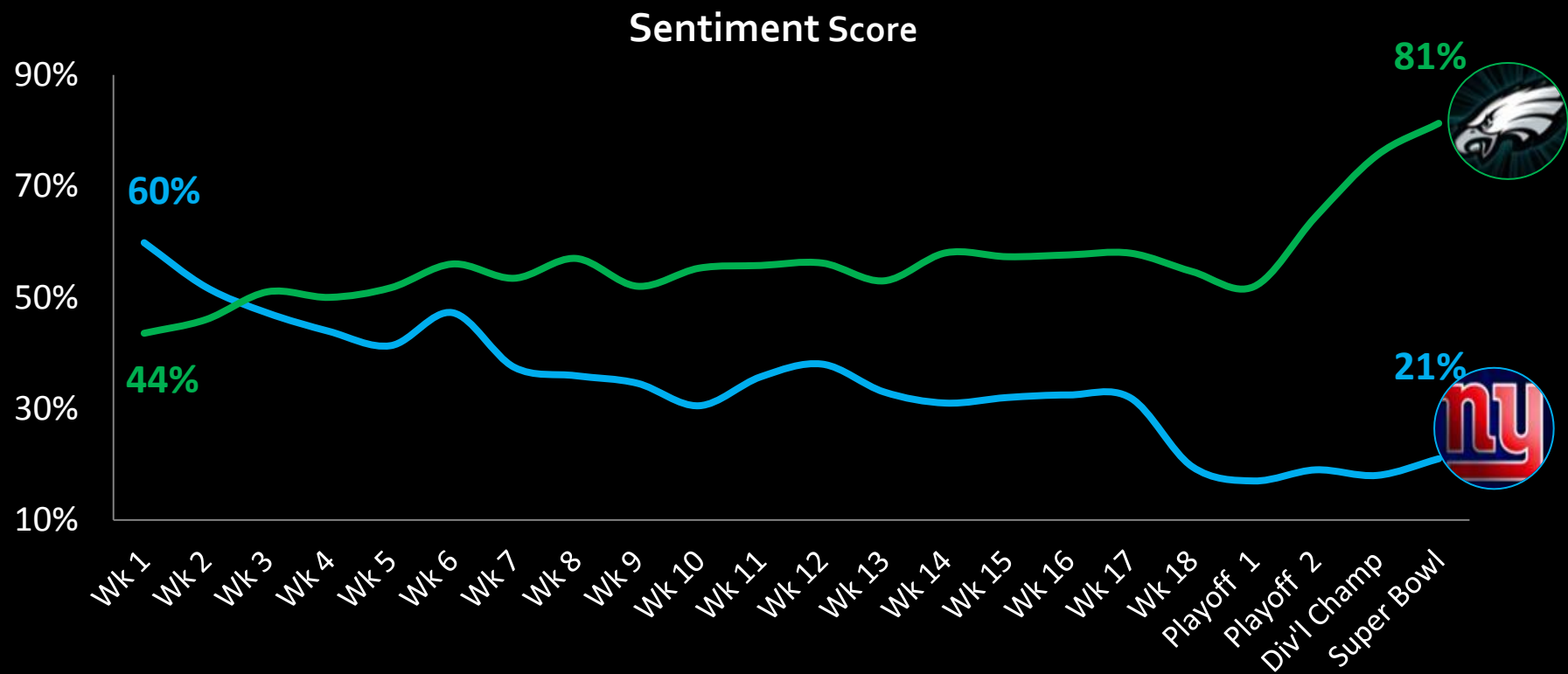Philadelphia Eagles vs. New York Giants

Sentiment Score

Results and Impact

Revamped fraud prevention strategies

'BVocal' and 'Voice-of-Customer' campaigns

Moved up in J.D. Powers rankings from 7th to 3rd position

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Next Steps…

Market Intelligence

NLP Democratization

Conversational Agents

Speech Analytics

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#1: Data is Your Biggest Asset

#2: Complaint = Insight

#3: NLP is the Future of AI

Thank You!

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