Retail Industry Landscape

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Agenda

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02	**Approach & Methodology**
03	**Data Description**
04	**Key Insights**
05	**Conclusion**
06	**Next Steps**

Business Intent

Problem Statement:

- Identify critical topics that are being discussed across retail companies and how they have changed over time
- Explore trends/patterns on how topics travel over time and between companies
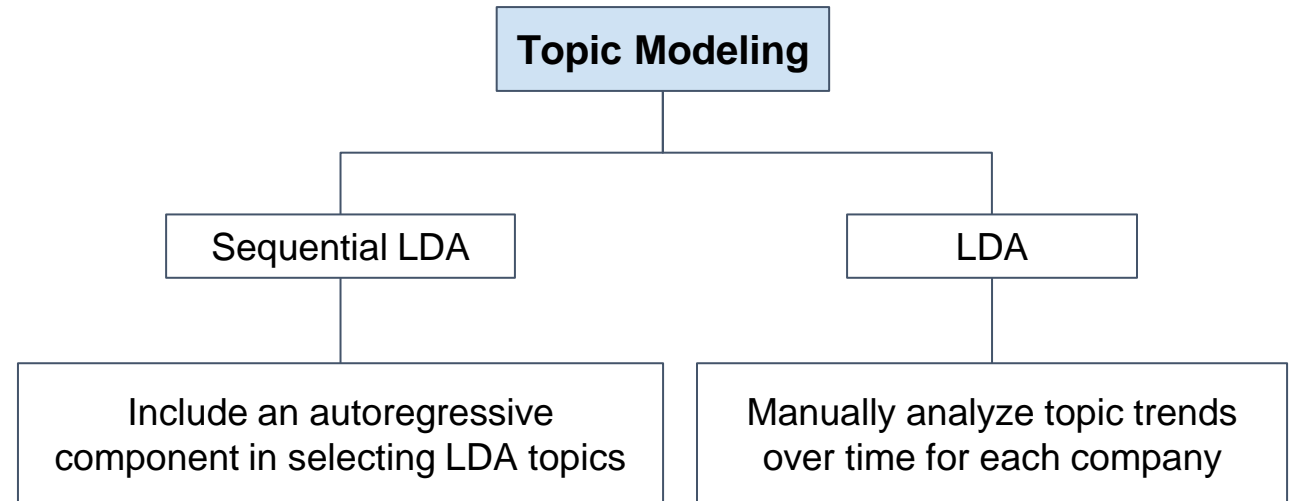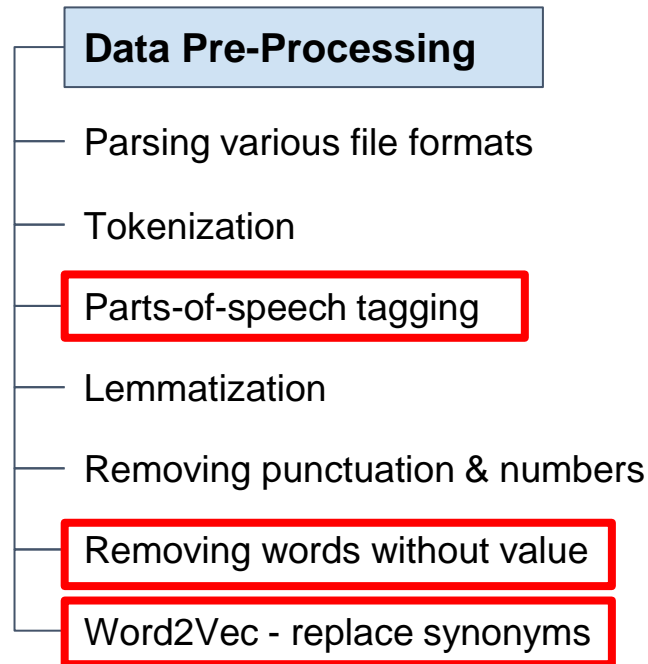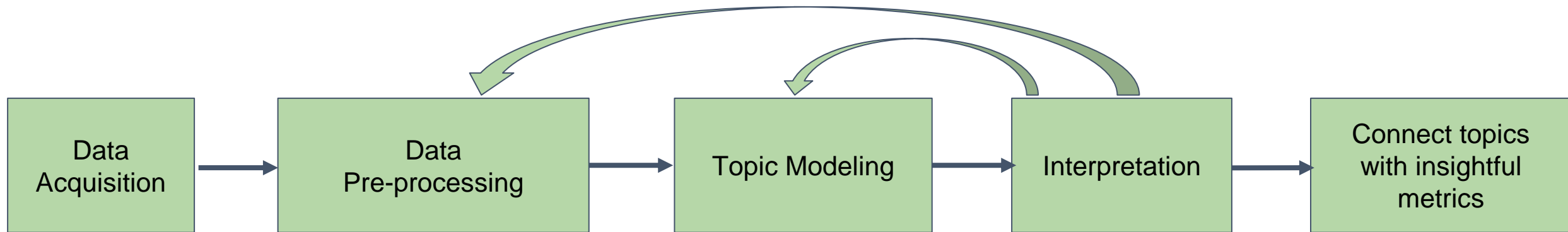
Business Value:

- Provide Walmart with an ongoing view of how their priorities and topics discussed compare with their competitors in the retail industry landscape

Stretch Goal:

- Connect topics with financial metrics

Approach & Methodology

Data Description

Data Source	Investor Relations Documents (Annual Reports, 10K, 10Q)	(1) Scraped Investor Relations Websites (2) Scraped SEC Website
	Proxy Statements	
	Earnings Call Transcripts	

Data Scope

Time span: 2010 Q1 - 2020 Q1

Key Insights

1. Strategic Topics

Topic	Topic Number
Membership Benefits	Topic 1 and 2
Pricing	Topic 3
Seasonal/ Holiday Events	Topic 4
Delivery Service	Topic 5
Brand Products	Topic 7
Associates/Employees	Topic 8
Content/Products	Topic 12

2. Macroeconomic Topics

| Topic	Topic Number
Income/Expense Growth	Topic 6
Inflation	Topic 11

3. Descriptive Topics

Topic	Topic Number
Investment Return	Topic 9
Others	Topic 10

Note:
(1) The above topics and the following results are from the analysis of earnings call transcripts.
(2) Topic Coherence score used to optimize the number of topics. Optimum number of topics = 12

Hypothesis 1: Delivery Service is a growing topic

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Topic: Delivery Service
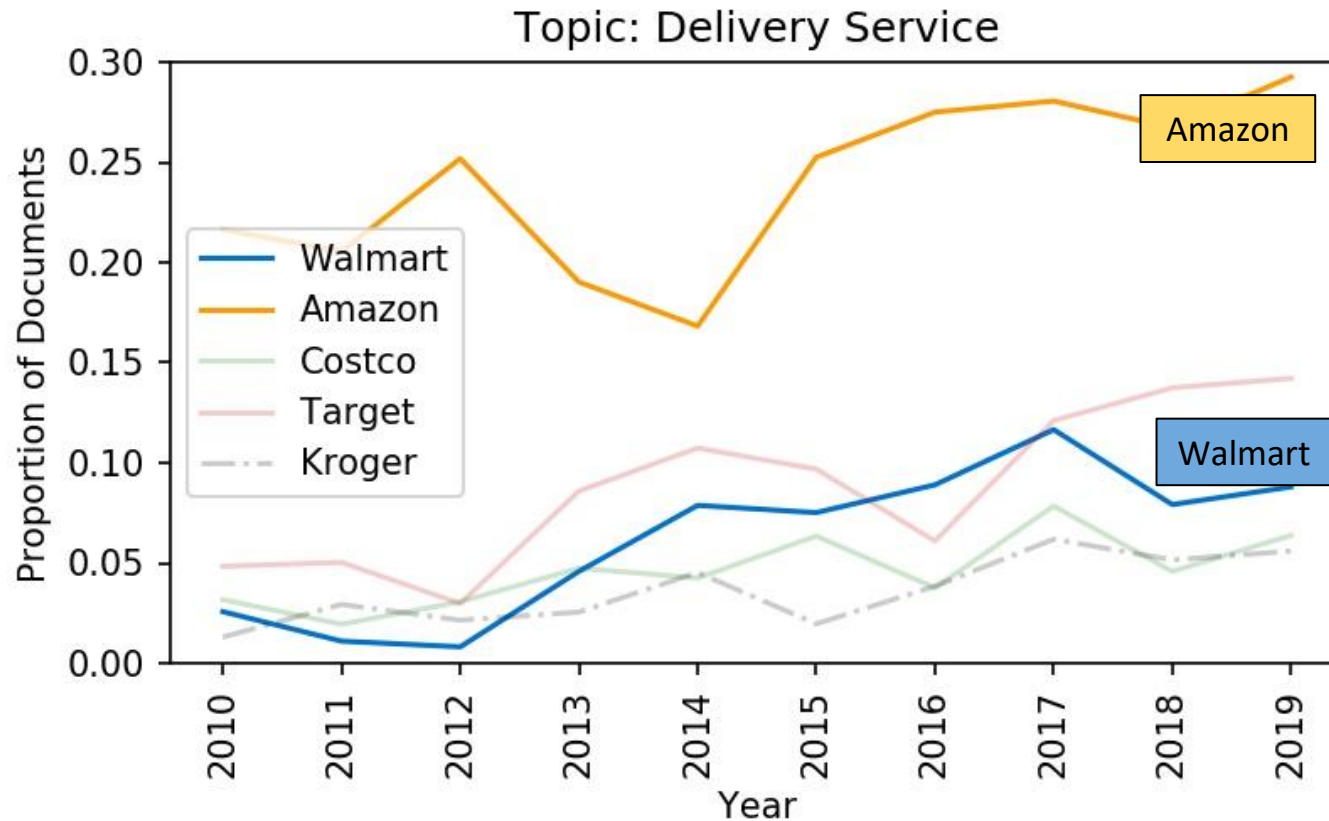
Topic Word Distribution	
delivery	2.32%
fulfillment	2.23%
center	1.74%
service	1.49%
cost	1.44%
order	1.38%
capacity	1.13%
build	1.01%
experience	0.97%
investment	0.93%

Note: online shopping and ecommerce often are discussed together with delivery

Hypothesis 2: Associates/Employees is a key topic

Hypothesis 2: Associates/Employees is a key topic

Topic: Associate/Employee
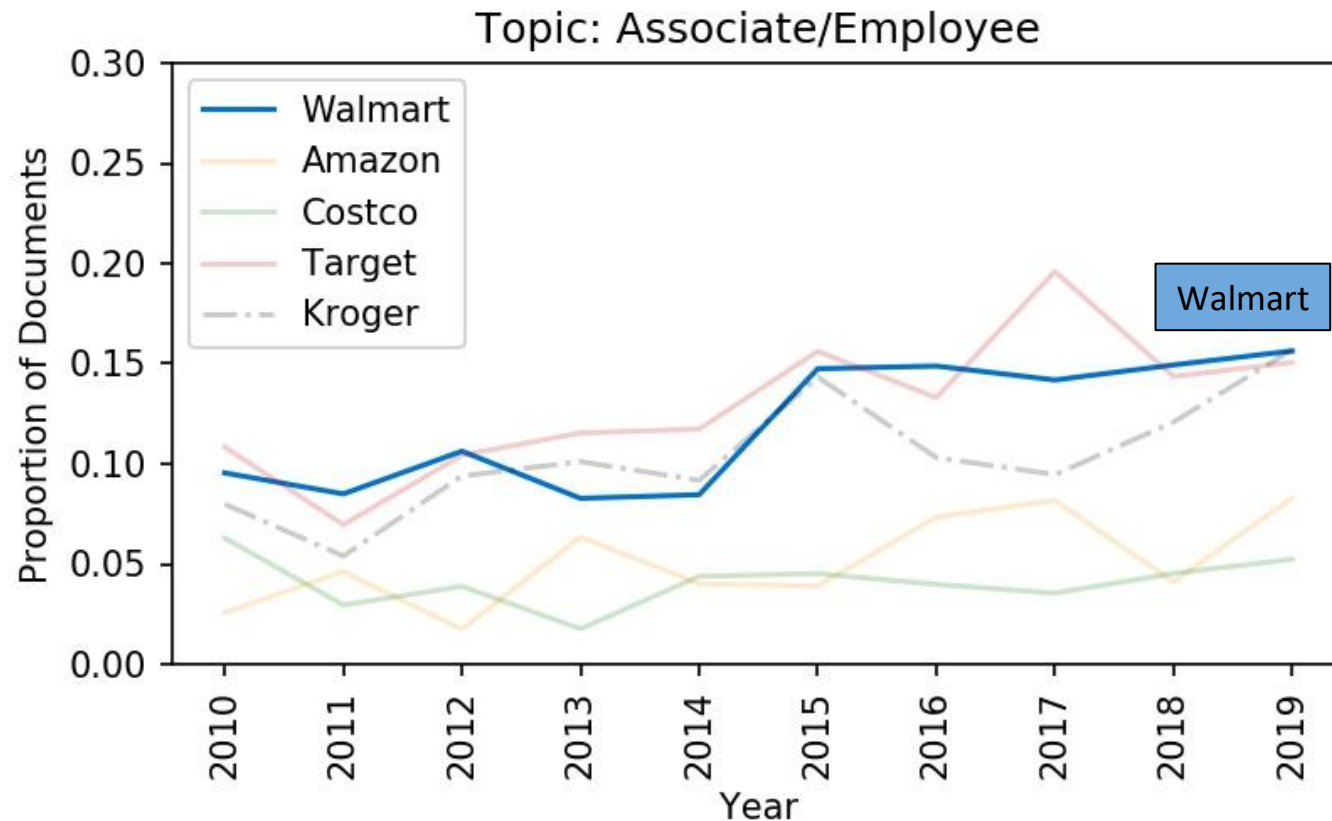
Topic Word Distribution	
team	2.93%
associate	2.12%
experience	1.59%
need	1.15%
focus	1.09%
technology	0.95%
help	0.86%
opportunity	0.81%
service	0.74%
serve	0.71%

Note: Associate = Employee

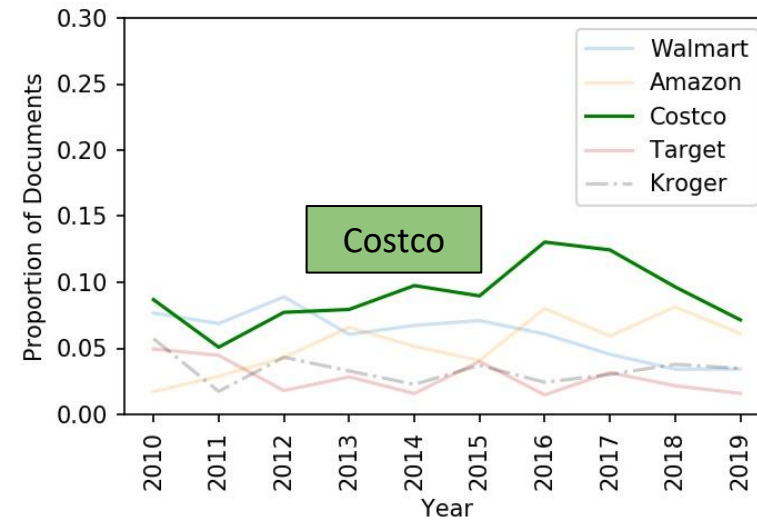# Hypothesis 3: Different companies have different strategic focuses

Content/Product
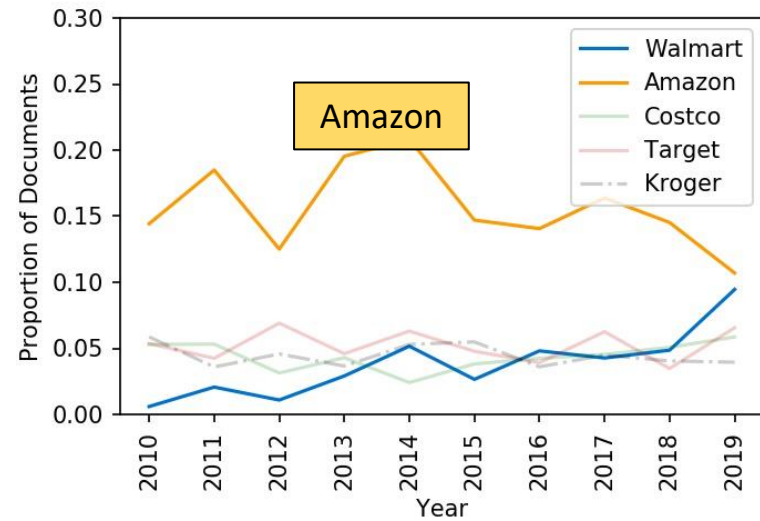
Topic Word Distribution	
price	1.97%
opportunity	1.94%
content	1.65%
product	1.58%
service	1.24%
medium	1.23%
Video	1.07%
team	1.02%
spend	0.84%
let	0.83%

Membership Benefits

Topic Word Distribution	
member	10.03%
membership	4.31%
club	2.90%
sign	1.72%
fee	1.64%
card	1.43%
renewal	1.30%
website	1.25%
information	1.09%
discussion	0.98%

Seasonal/Holiday Events
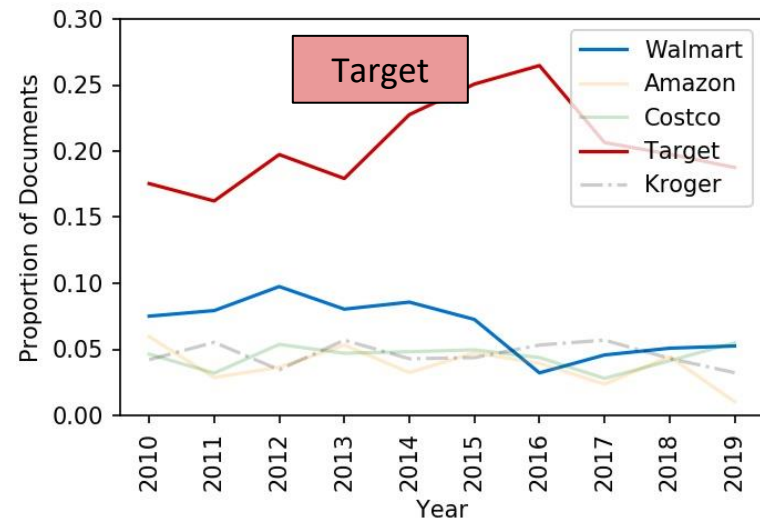
Topic Word Distribution	
category	3.46%
brand	2.22%
holiday	1.76%
season	1.64%
assortment	1.53%
traffic	1.38%
apparel	1.34%
product	1.24%
home	1.13%
performance	1.05%

Brand Products
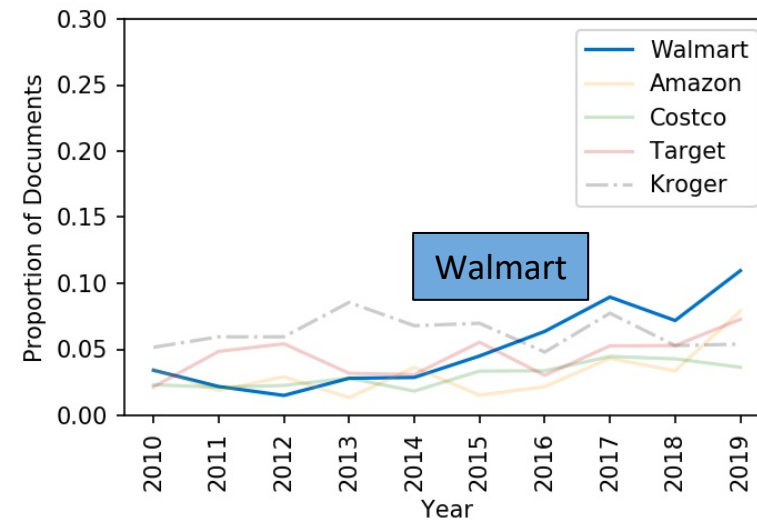
Topic Word Distribution	
brand	7.71%
product	3.07%
value	1.17%
quality	1.03%
food	0.98%
team	0.93%
ecommerce	0.90%
vendor	0.85%
price	0.81%
focus	0.79%

Strategy Analysis - Approach

Goal	Understand the relationship between strategic topics and financial metrics
Assumptions	(1) Frequencies of the topic = the levels of focus of the strategy (2) Strategy/topic discussed at time t has an effect on financial metric at time t+1
Methods	(1) Linear regression + forward selection (2) AIC for picking the best model

Variables

Independent Variables		Dependent Variables
Strategic Topics Membership Benefits Pricing Seasonal/ Holiday Events Delivery Service Brand Products Talents Investment Content Services/ Products	**Macroeconomic Topics** Income/Expense Growth Inflation **Non-topic variables** Consumer Purchase Index Seasonality Variables S&P 500 % change	**Revenue Y-o-Y growth rate** **Stock price % change**

Strategy Analysis - Revenue Growth

Significant Variables

Walmart
- Brand Products
- Income Growth

In Walmart's context, Brand Products are mainly discussed with "**Private Label Products**"

COSTCO WHOLESALE
- Pricing
- CPI
- Income Growth

TARGET
- Membership Benefits

Kroger
- No significant variables

Note: Amazon is not comparable as it has different revenue source

Strategy Analysis - Stock price % change

Significant Variables

Walmart
- Content/Products
- S&P 500 % change

In Walmart's context, **product content**: how they provide text, images, and other information about the products on their websites

This topic is often discussed together with Walmart's acquisitions to e-commerce companies

COSTCO WHOLESALE
- Delivery Service
- Quarter 3
- S&P 500

TARGET
- Quarter 3
- S&P 500 % change

Kroger
- Membership
- Quarter 4

amazon
- Pricing
- Delivery Service
- Inflation

Conclusion

Our framework for critical topic analysis is able to:

✓ successfully determine key topics from unstructured text data

✓ trend how the topics change over time

✓ connect topics with quantifiable outcome

Next Steps

The biggest value of this framework is that we can apply it to other datasets acquired from different sources:

Eg: Analyzing customer reviews will provide opportunities to improve customer satisfaction

Thank you!

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Appendix

Word2Vec (CBOW) - replacement of words

```
In [4]:  1  # check the result
         2  word = 'employee'
         3  dictionary.wv.most_similar(positive=word, topn=10)

Out[4]:  [('associate', 0.5780292749404907),
          ('agreement', 0.5143362879753113),
          ('protected', 0.48922455310821533),
          ('accrual', 0.4678422808647156),
          ('equity', 0.4583693742752075),
          ('approve', 0.4552827775478363),
          ('receivable', 0.4543809890747003),
          ('catcher', 0.4523097672462463),
          ('retirement', 0.44866833090782166),
          ('amendment', 0.44488590955734253)]
```

```
In [5]:  1  # check the result
         2  word = 'customer'
         3  dictionary.wv.most_similar(positive=word, topn=10)

Out[5]:  [('guest', 0.7368943095207214),
          ('customers', 0.5565394163131714),
          ('user', 0.5473891496658325),
          ('member', 0.5235416293144226),
          ('guests', 0.5000215768814087),
          ('consumers', 0.4689869284629822),
          ('subscriber', 0.45255839824676514),
          ('seamless', 0.4299562871456146),
          ('shopper', 0.4166208505630493),
          ('consumer', 0.41648435592651367)]
```

Coherence - optimize the number of topics
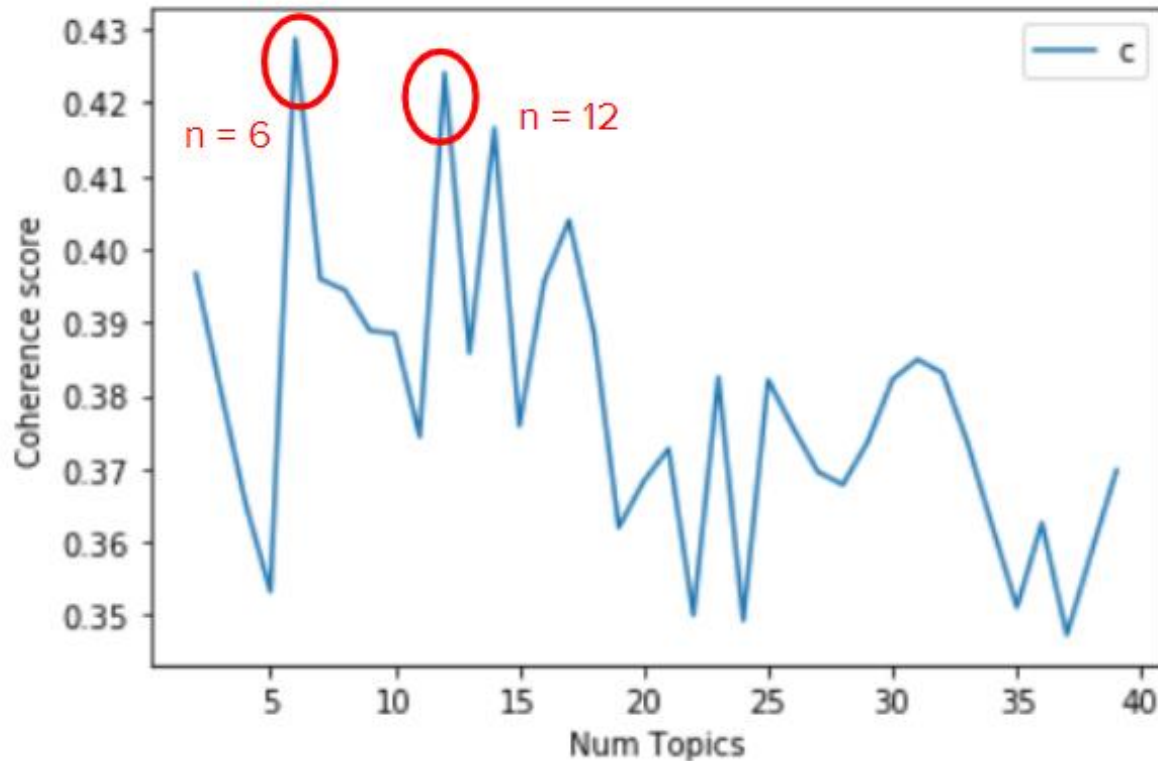
1. Coherence is used to optimize the number of topics
2. The higher the best
3. We chose 12 for a richer context

Strategy Analysis - Revenue Growth

Walmart (Regression Results)

```
Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)    -0.014699   0.009498  -1.548    0.130
Income_growth   0.237898   0.052488   4.532 6.21e-05 ***
Brand_products  0.197036   0.077917   2.529    0.016 *
CPI             0.007883   0.005335   1.478    0.148
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Walmart's growth is mainly associated with brand products and income growth

Competitors (Significant Variables)

- Target: membership benefits
- Kroger: no significant variables
- Costco: Income growth and CPI
- Amazon: CPI and 4th Quarter

Strategy Analysis - Stock price % change

Walmart

```
Coefficients:
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)        -0.007873   0.018518  -0.425 0.673250
sp500.index.change  0.637329   0.175826   3.625 0.000887 ***
Content_product     0.898167   0.389084   2.308 0.026830 *
Membership1        -0.706601   0.505862  -1.397 0.171018
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Competitors

- Target: market trend, 3rd quarter
- Kroger: 4th quarter
- Costco: market trend, 3rd quarter
- Amazon: pricing

Walmart's stock price % change is correlated with market trend and content topic

Content, in Walmart's context, means **product content**: how they provide text, images, and other information about the products on their website

This topic is often discussed together with Walmart's acquisitions of e-commerce companies

Connect Topics with Business Outcome

Note: delivery service and investment in technology are not key growth strategy for any of them, so I conclude these strategies are protective strategies - i.e. if you do not do it, you will lose the competition

Walmart

```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  -0.014699   0.009498  -1.548    0.130
Income_growth 0.237898   0.052488   4.532 6.21e-05 ***
Brand_products 0.197036  0.077917   2.529    0.016 *
CPI           0.007883   0.005335   1.478    0.148
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Walmart's growth is associated with brand products

Target

```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    0.01619   0.02664    0.608  0.54745
Pricing       -0.64595   0.21490   -3.006  0.00495 **
Membership1    0.20693   0.11586    1.786  0.08302 .
Brand_products 0.32734   0.20631    1.587  0.12185
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Target's growth is associated with membership benefits

Kroger

```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.08842   0.02159    4.096 0.000228 ***
Employee     -0.57994   0.17929   -3.235 0.002611 **
Pricing       0.49286   0.30832    1.599 0.118663
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

No significantly correlated "strategic factors"

Amazon

```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    0.31234   0.07116    4.389  0.00013 ***
CPI            0.08649   0.02682    3.225  0.00304 **
Membership2   -1.14286   0.46168   -2.475  0.01918 *
Membership1   -0.79019   0.38049   -2.077  0.04648 *
Quarter4       0.07858   0.03452    2.276  0.03013 *
Inflation     -0.57636   0.35715   -1.614  0.11705
Income_growth  0.40334   0.27306    1.477  0.15007
Employee       0.53970   0.38674    1.396  0.17310
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.
```

Amazon's growth is correlated with economic growth

Costco

```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.001159  0.049922   0.023
Pricing      -1.255483  0.458730  -2.737  0.01084 *
CPI           0.044273  0.015128   2.927  0.00687 **
Income_growth 0.604356  0.253946   2.380  0.02464 *
Quarter2     -0.029851  0.017367  -1.719  0.09710 .
Membership2   0.357325  0.243578   1.467  0.15393
Content_service 0.418840 0.305165  1.373  0.18120
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Costco's growth is correlated with economic growth