# Classifying brands on Facebook using supervised machine learning


## General Assembly DSI : Capstone Project

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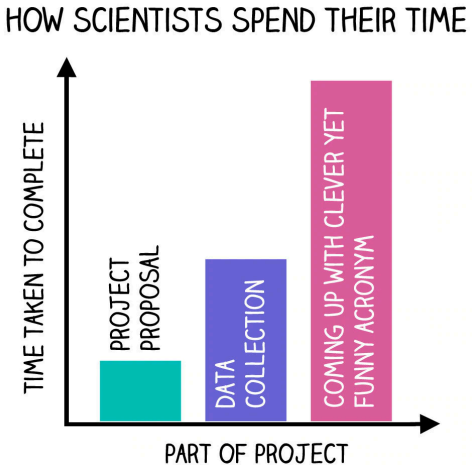
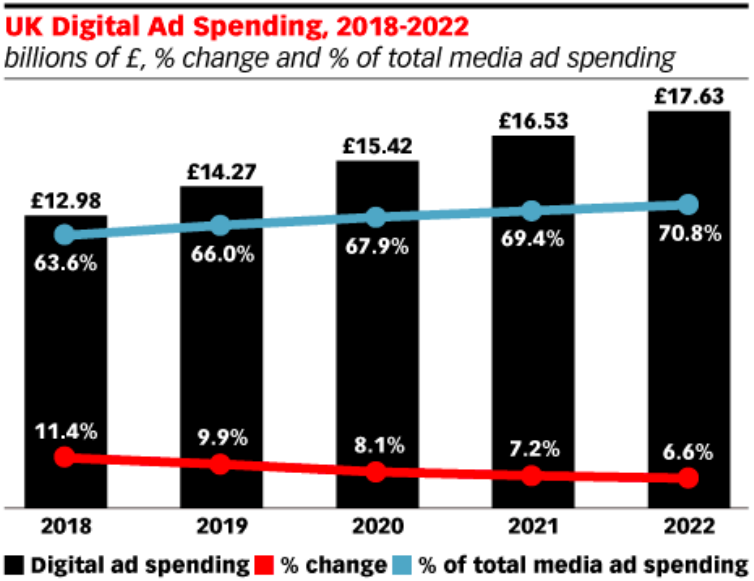
# The Agenda : ‘CADET’

Context Aims Data EDA | Modelling Implications




CONTEXT
© WILL PEARSON

# In 2018, almost two thirds of all advertising spend was on digital




https://www.emarketer.com/content/more-than-60-of-uk-media-ad-spending-is-digital

# Why does this matter?


More spend =

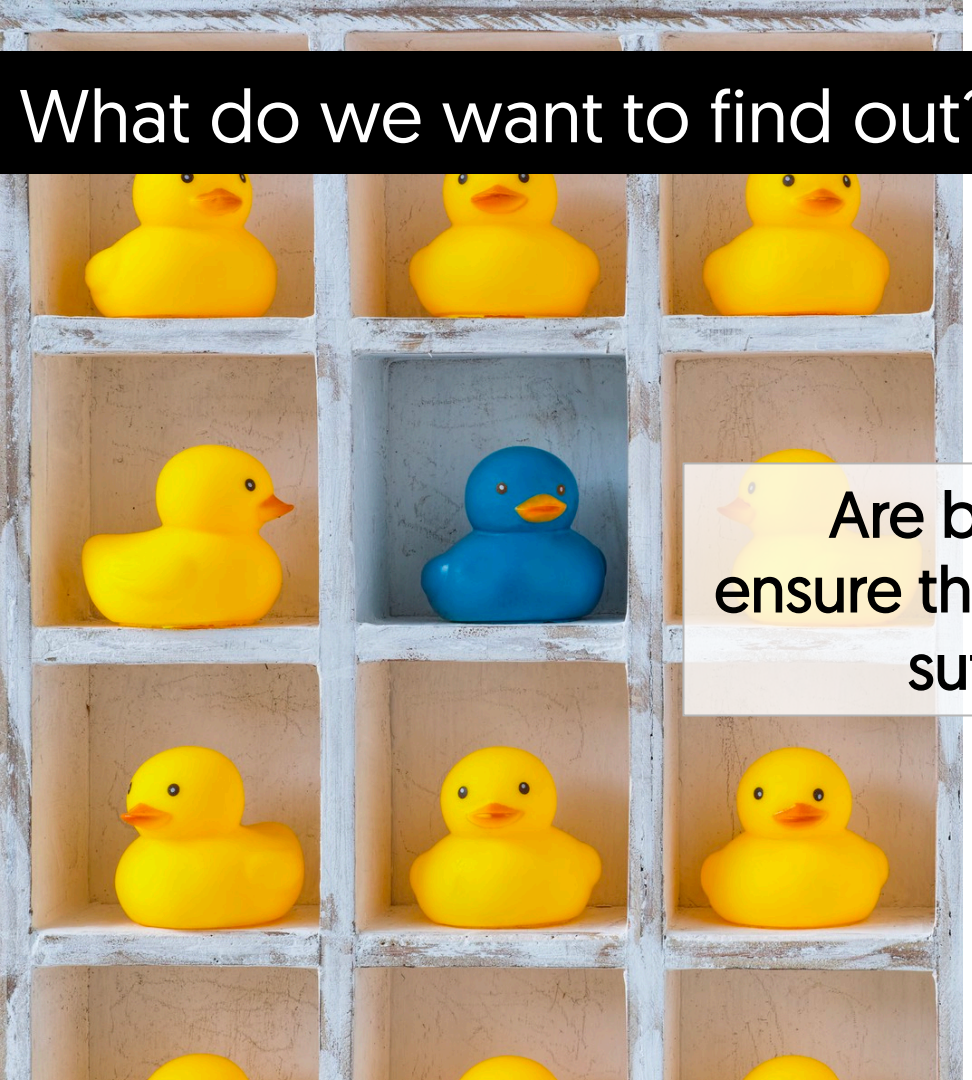
...more content
...more noise

Increasing pressure to

...stand out
...to differentiate


AIMS

# What do we want to find out?



Are brands doing enough to ensure their Facebook content is sufficiently differentiated?

# How do we use Data Science to answer this?

Can we make a robot smart enough to be able to tell the difference between brands on Facebook?*


*Can we use supervised machine learning to allow us to classify different brand content on Facebook?


DATA

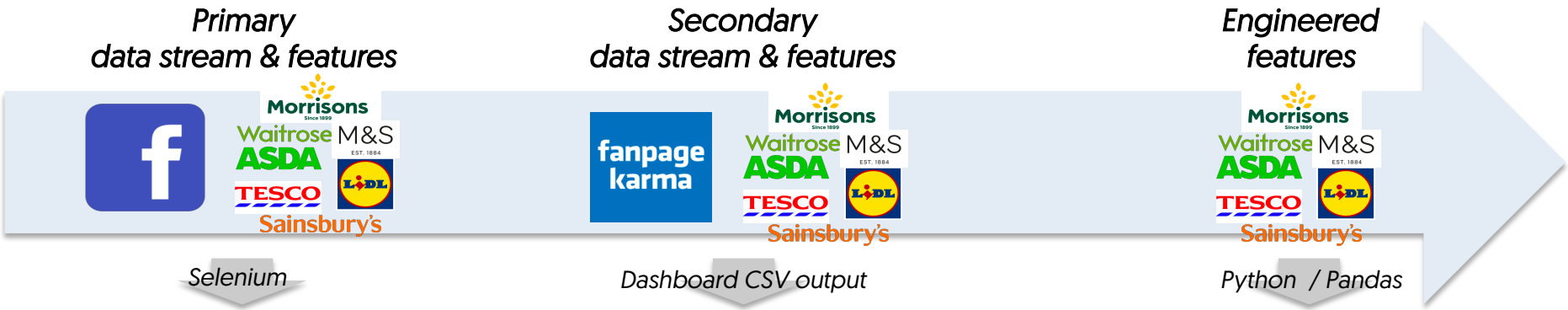
# One category, seven brands


*Higher End / Premium*

*Lower End / Budget*

All on Facebook. All posting consistently. All with some purpose.

# Two main data streams followed by feature engineering




Post Content

Vectorised Post Content
Contains_Link
Contains_Video
Has_Hashtag
Hashtag_Count

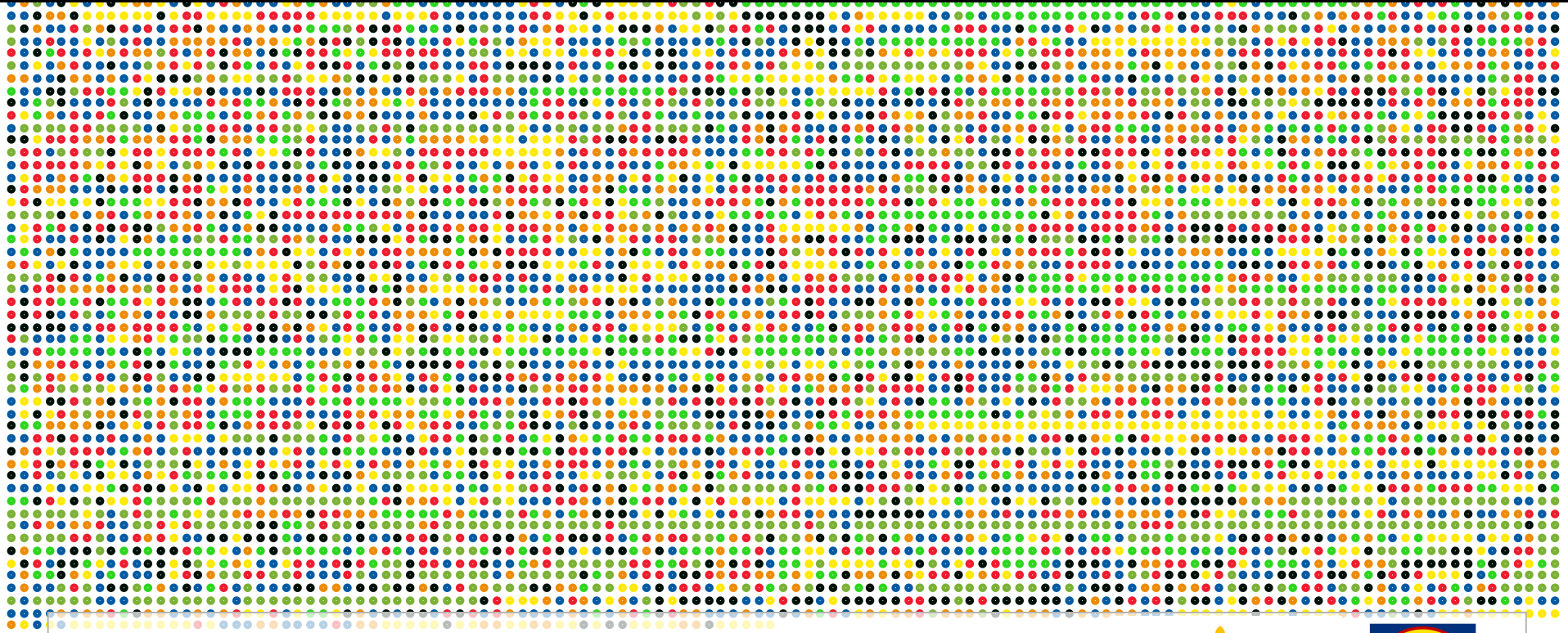
#Responses
#Comments
#Shares
#Video views

# Page Likes
(by date)

Response_Rate
Comments_Rate
Shares_Rate
Video_Rate

The key feature for classification modelling

# 6350 social media posts were scraped

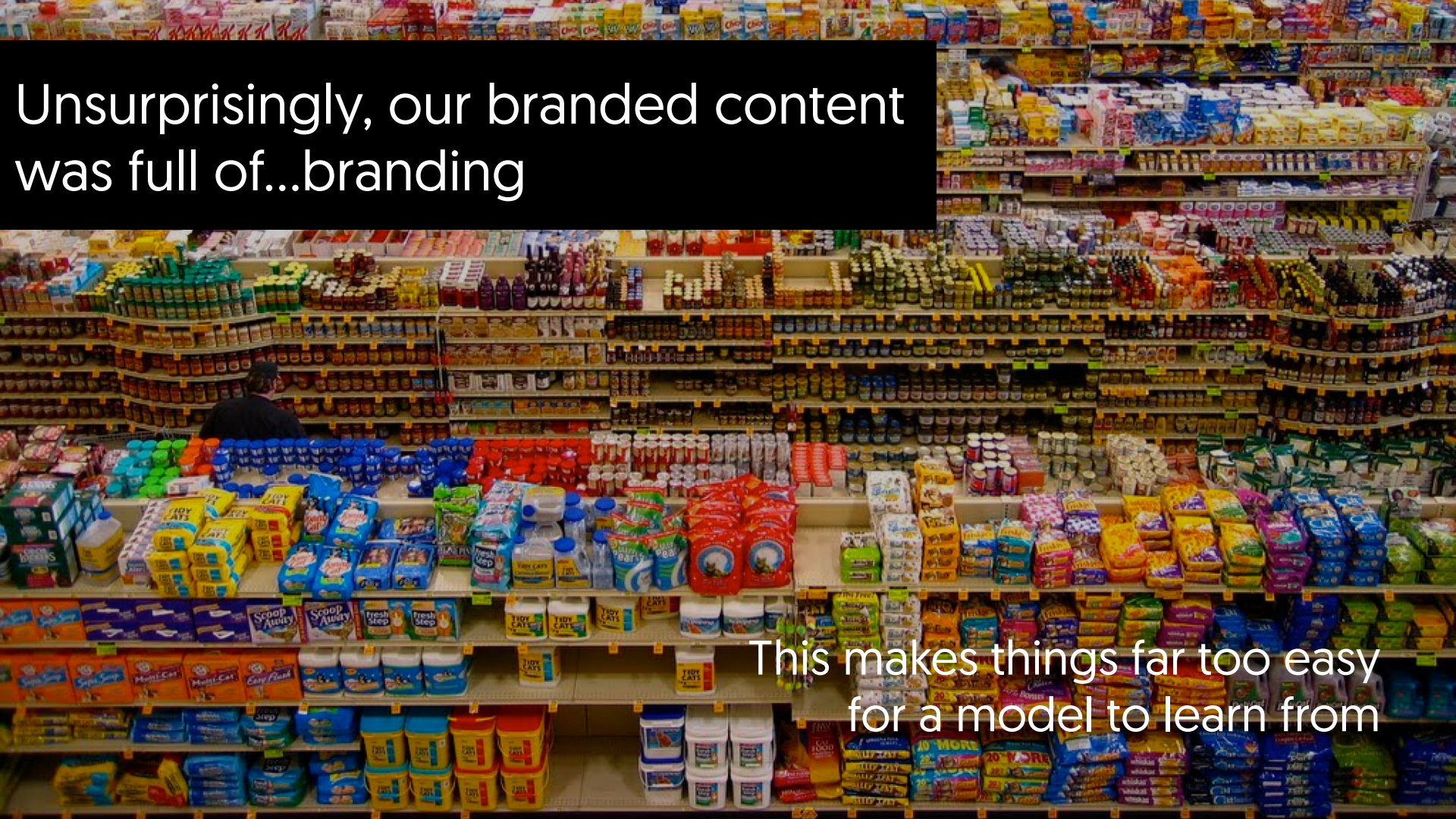


M&S EST. 1884 Waitrose Sainsbury's TESCO ASDA Morrisons Since 1899 LIDL

# Classes were mostly balanced


| M&S | Waitrose | Sainsbury's | TESCO | ASDA | Morrisons | LIDL |
|---|---|---|---|---|---|---|
| *870 posts (0.13)* | *777 posts (0.12)* | *714 posts (0.11)* | *1068 posts (0.16)* | *770 posts (0.12)* | *798 posts (0.12)* | *1353 posts (0.21)* |

Our baseline is 0.21 – our dominant class. If we can build a model that can score higher than this, then we can reject the null hypothesis and concede that there are genuine differences in the content produced by our brands


Unsurprisingly, our branded content was full of...branding
This makes things far too easy for a model to learn from


We need to do some cleaning up

# How?

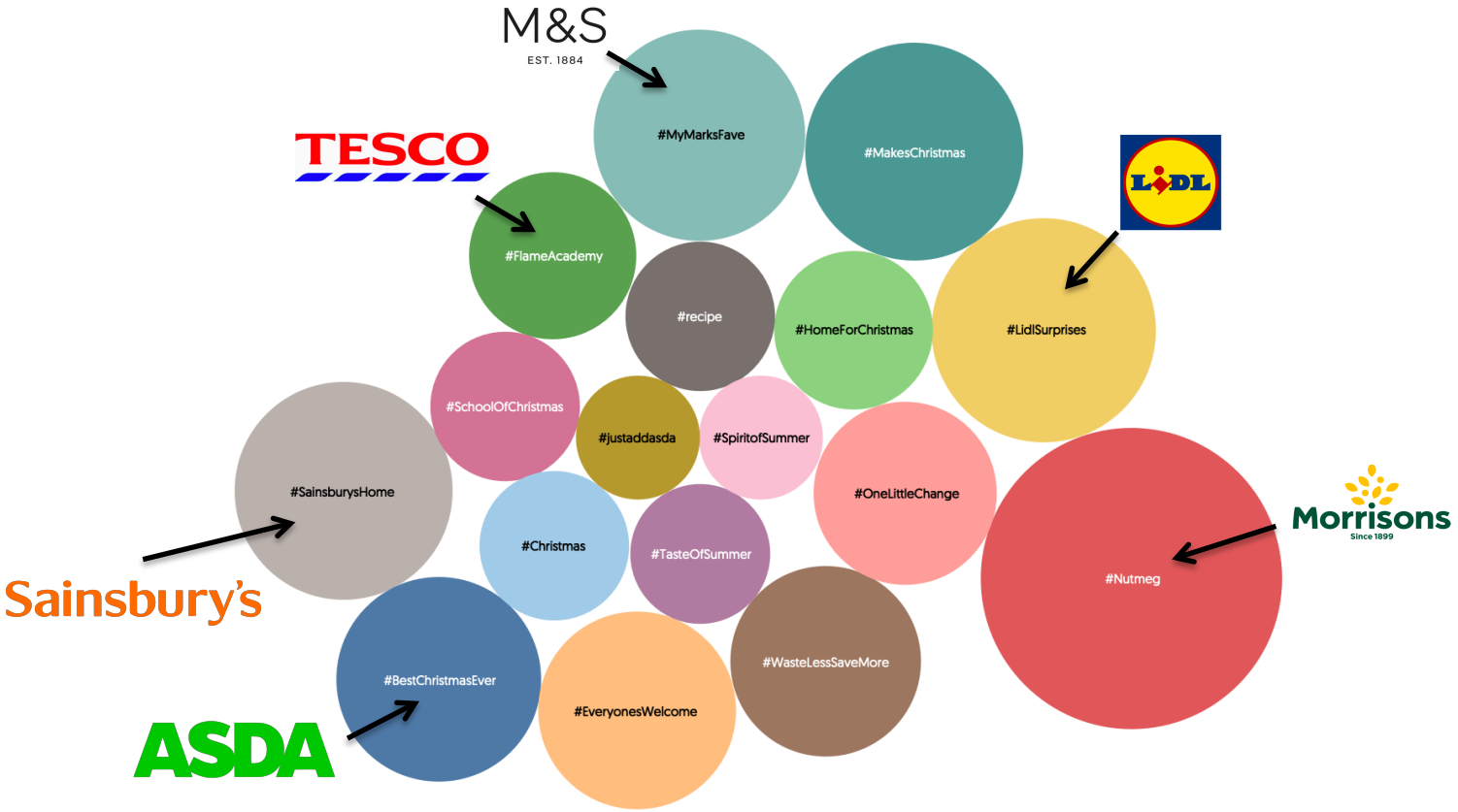
Extensive & bespoke ‘stop word’ lists

Lots and lots of regular expressions

# Remove all ‘hard’ branding cues : specific mentions of a brand

# Remove all ‘soft’ branding cues : celebrity endorsements

# Remove all ‘soft’ branding cues : hashtags




All we want left is the narrative

# All we want left is the narrative

**Morrisons**
Yesterday at 10:00 AM ·

Why not try one of our #tasty steak pies at £2 for a 2 pack baked fresh in store #MorrisonsMakesIt
po.st/MStoreFinder

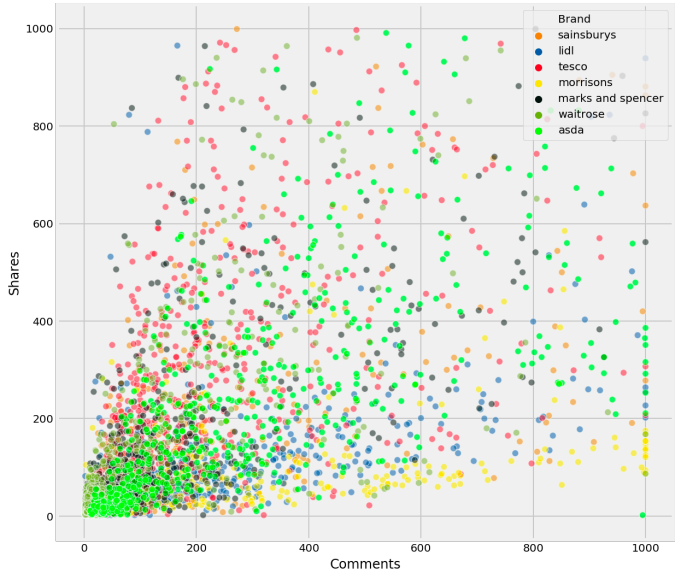

**Morrisons**
Yesterday at 10:00 AM ·

Why not try one of our steak pies at £2 for a 2 pack baked fresh in store

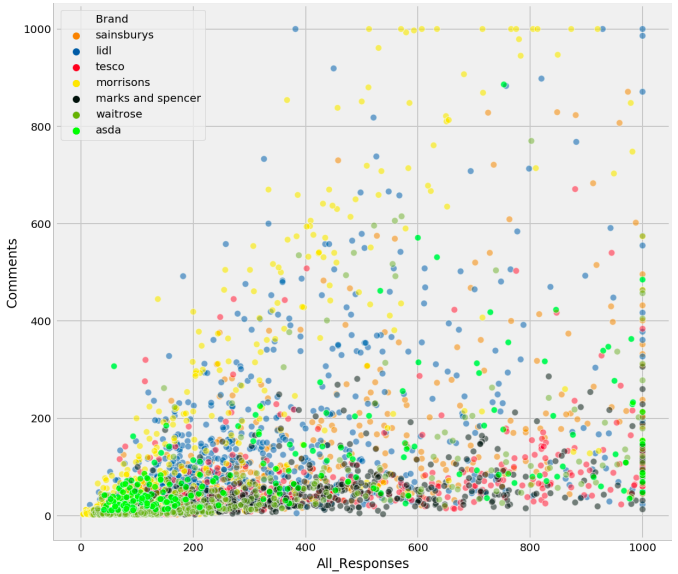
# EDA & MODELLING

# Engagement metrics aren't correlated strongly

r=0.36

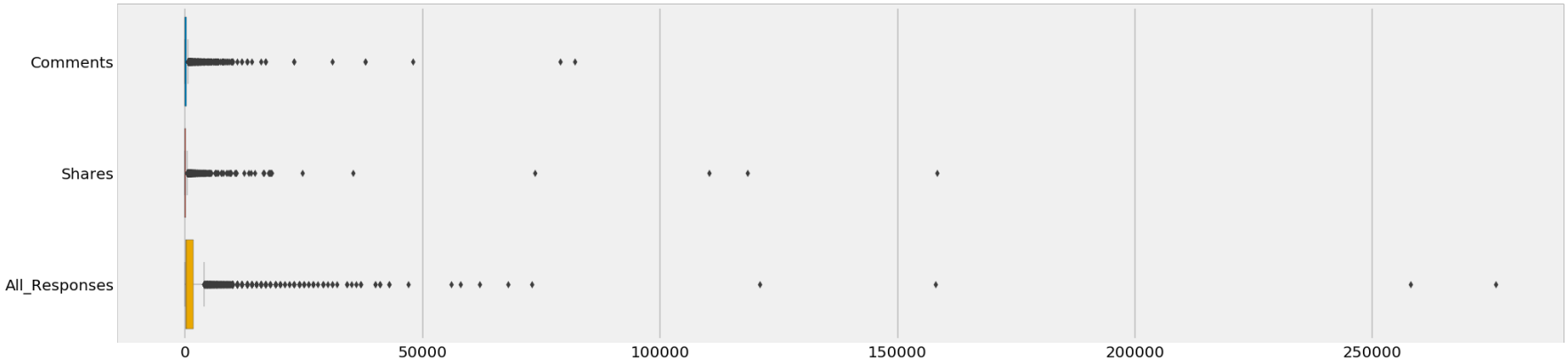



r=0.38



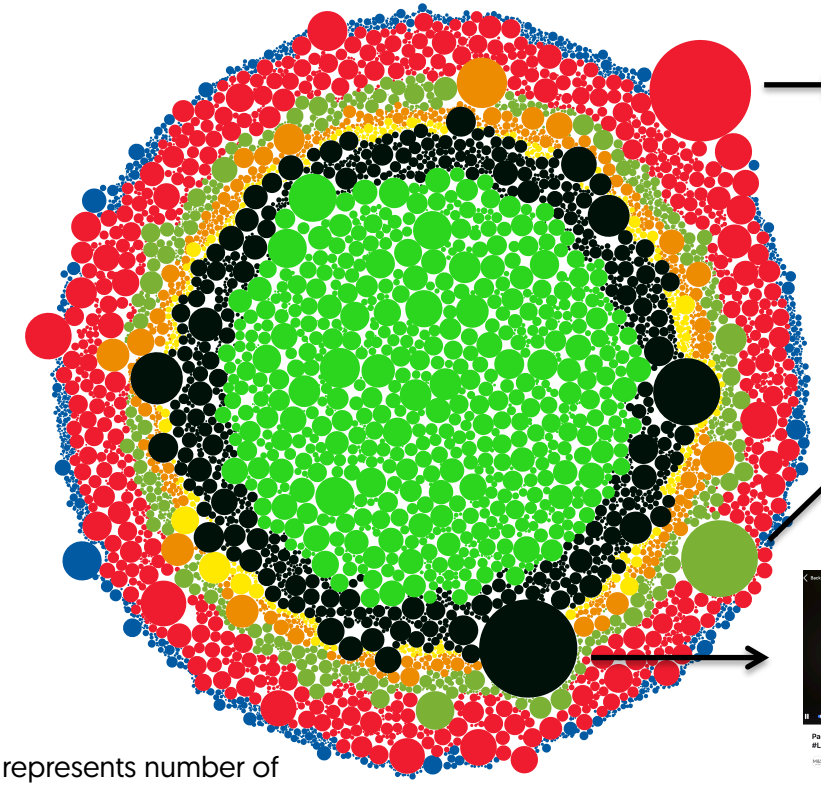

i.e. if a post gets a lot of comments, it doesn't necessarily get a lot of shares

# Engagement metrics are prone to outliers*



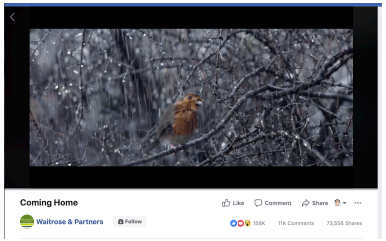

*posts that were very popular, receiving an unusually high number of shares, comments and responses

# Those outliers are usually videos that are entertaining or that carry an emotional resonance of some kind

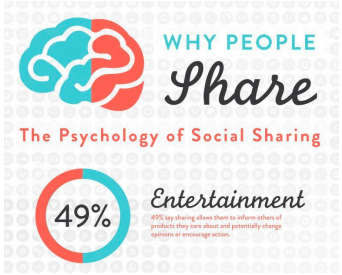


Brand
- asda
- marks and spencer
- morrisons
- sainsburys
- waitrose
- tesco
- lidl

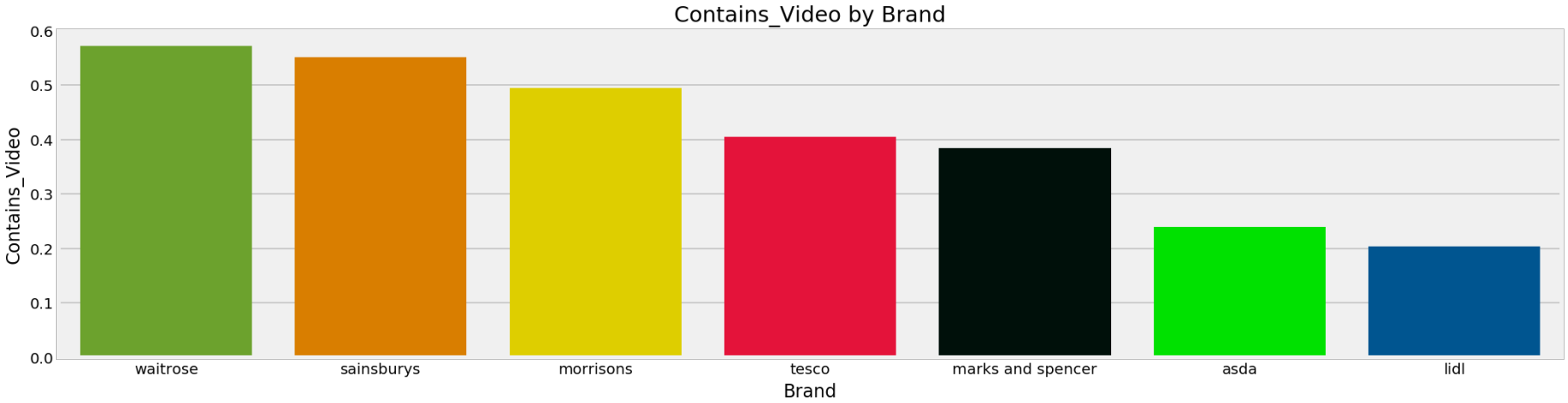
Size of circles represents number of shares post received



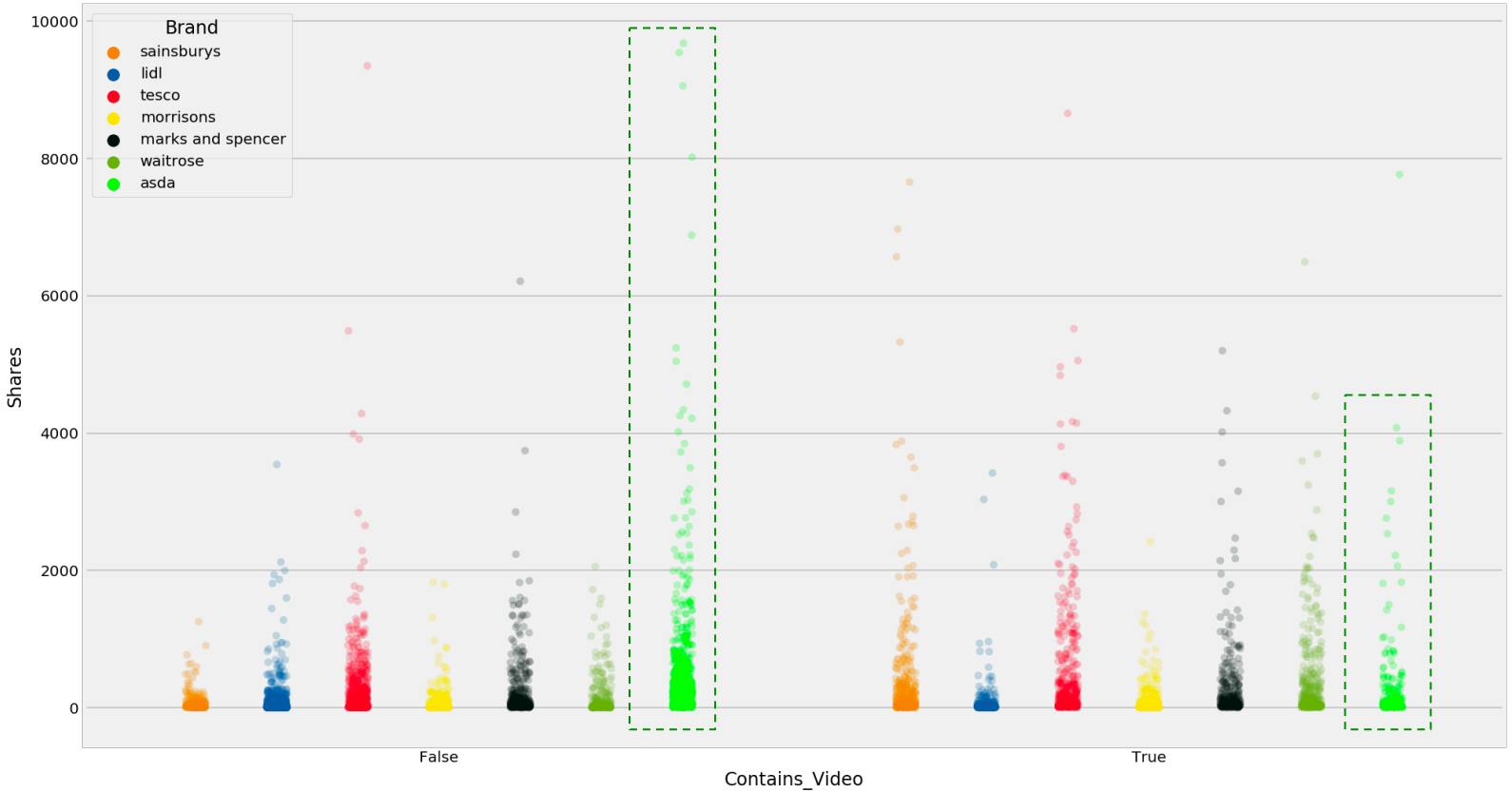


# Some brands are far more likely to post videos than others




# Does this mean they also get a lot of shares?

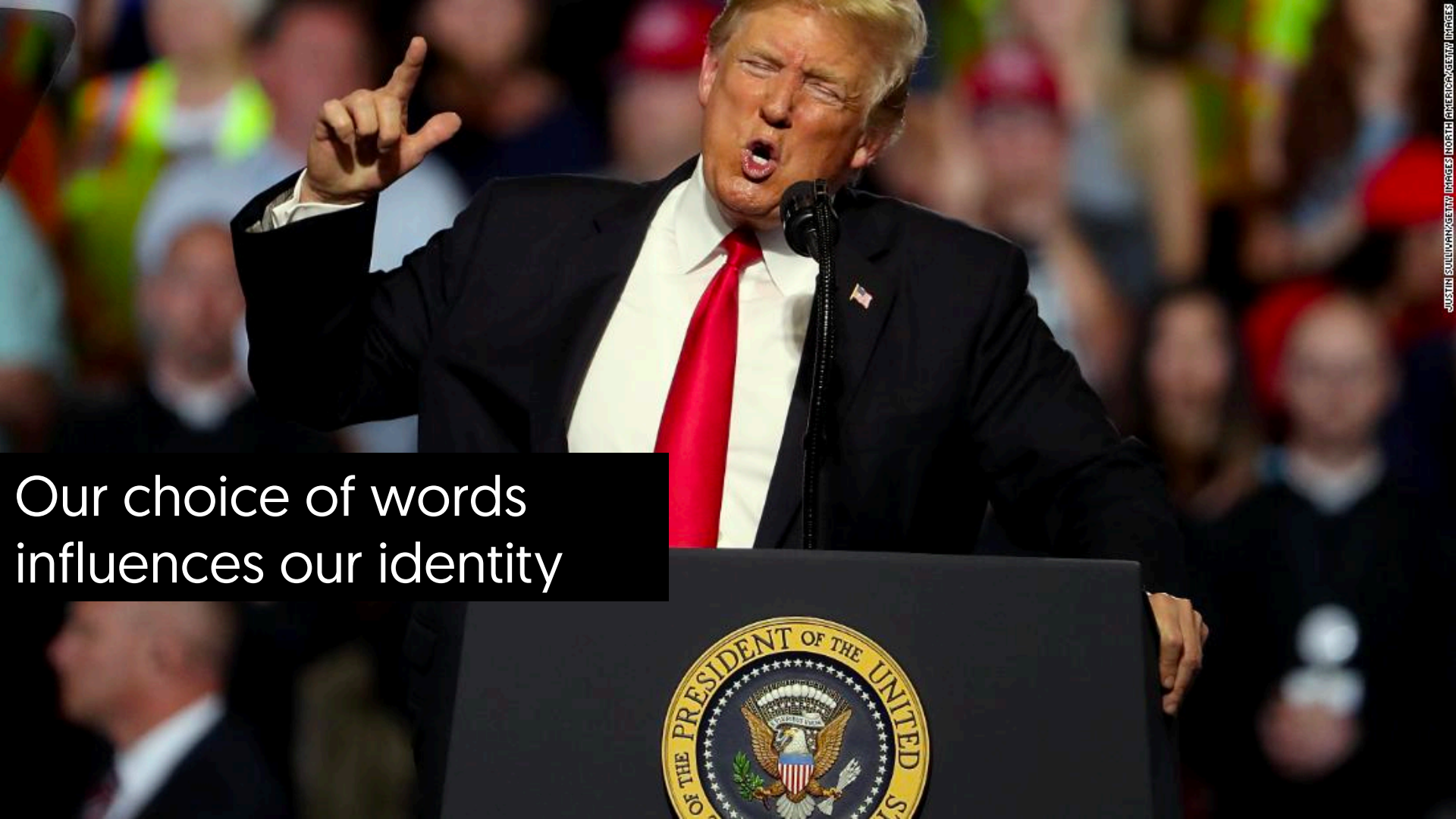
# Not in all cases and particularly with ASDA – whose posts without videos consistently get shared more



# Qualitatively, it feels there is a big difference in what supermarket brands talk about on Facebook

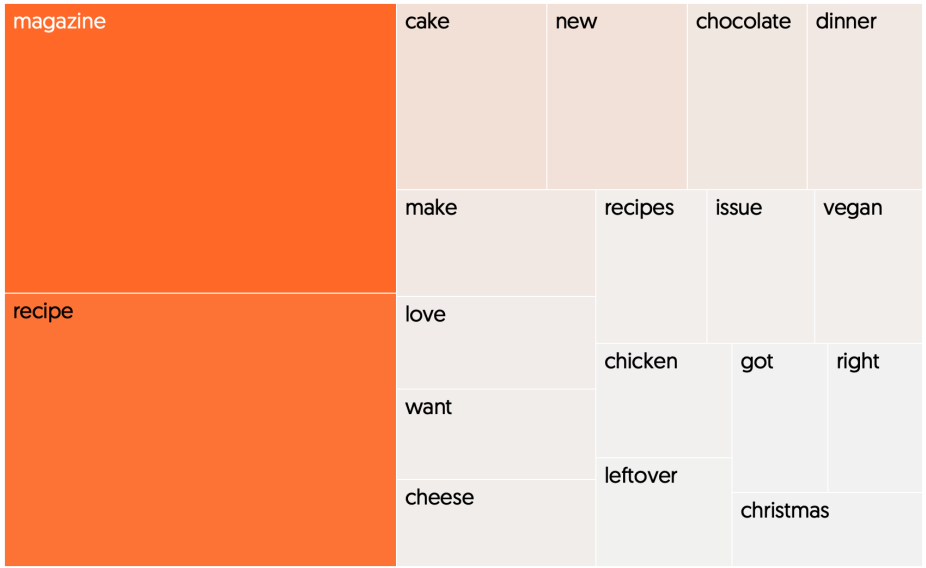

Short. To the point.
Food. Recipes.


Wordier.
People. Causes

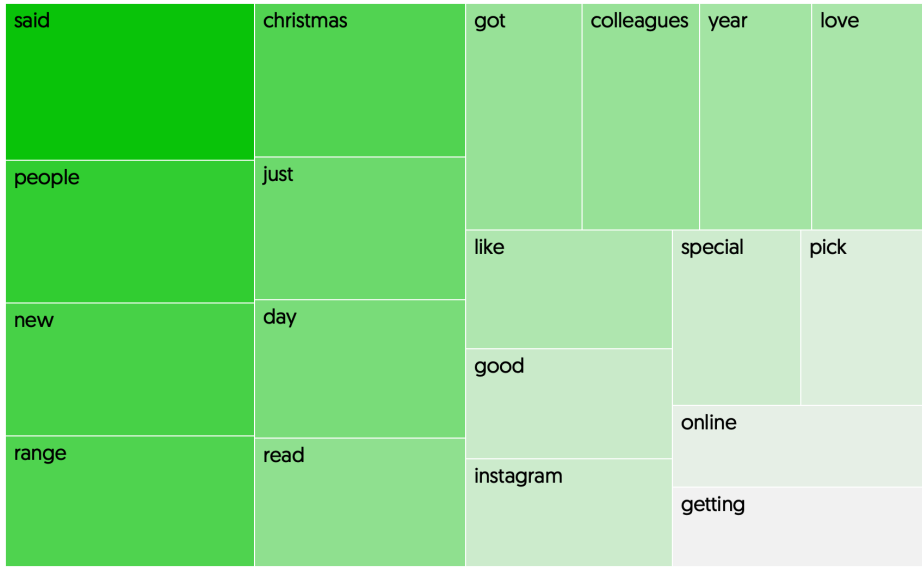

Our choice of words
influences our identity
PRESIDENT OF THE UNITED
JUSTIN SULLIVAN/GETTY IMAGES NORTH AMERICA/GETTY IMAGES

# Sainsbury's talk about their magazine/recipes.....less so for ASDA who focus on people and communities

Sainsbury's

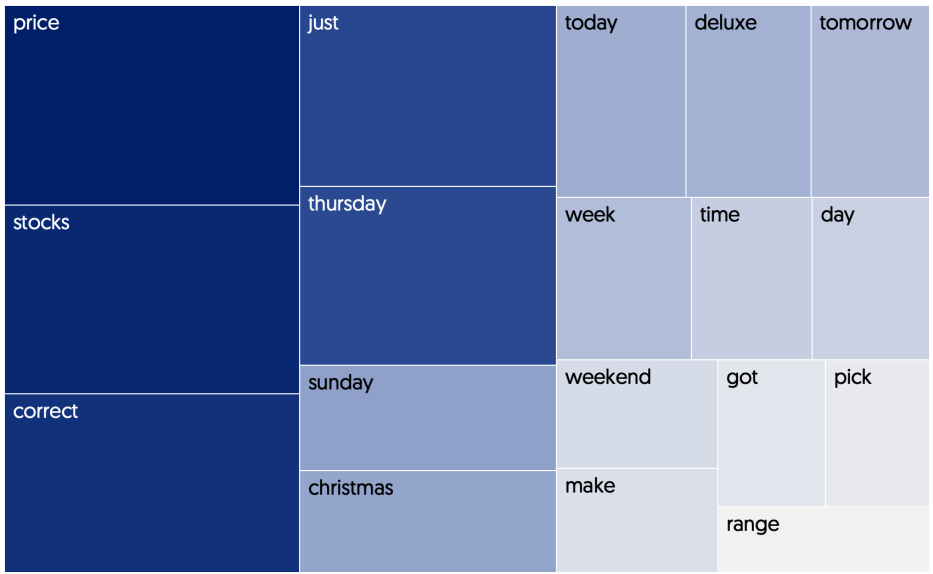


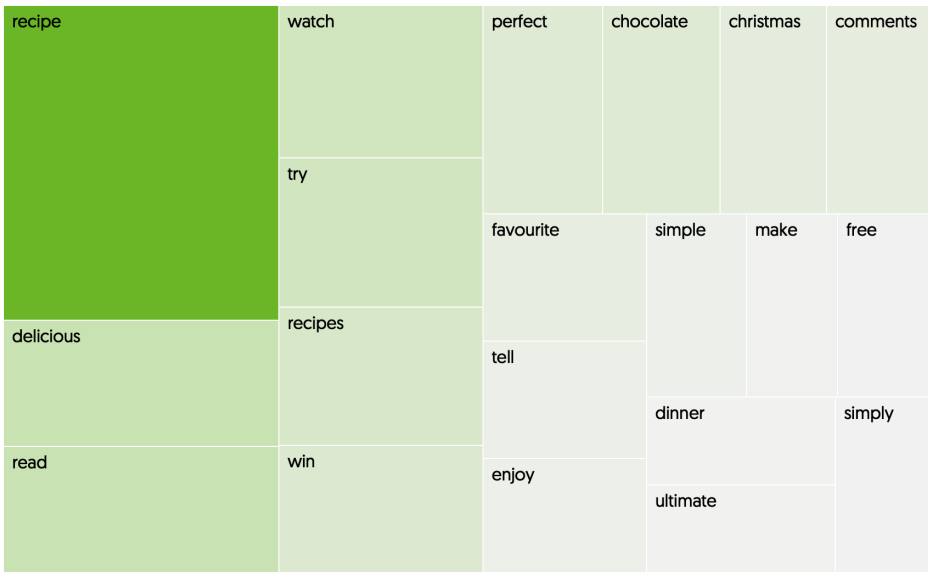

ASDA




Weighted term frequencies by brand : (TF-IDF) Vectorisation

# Lidl talk about price and stock availability whereas Waitrose focus on recipes



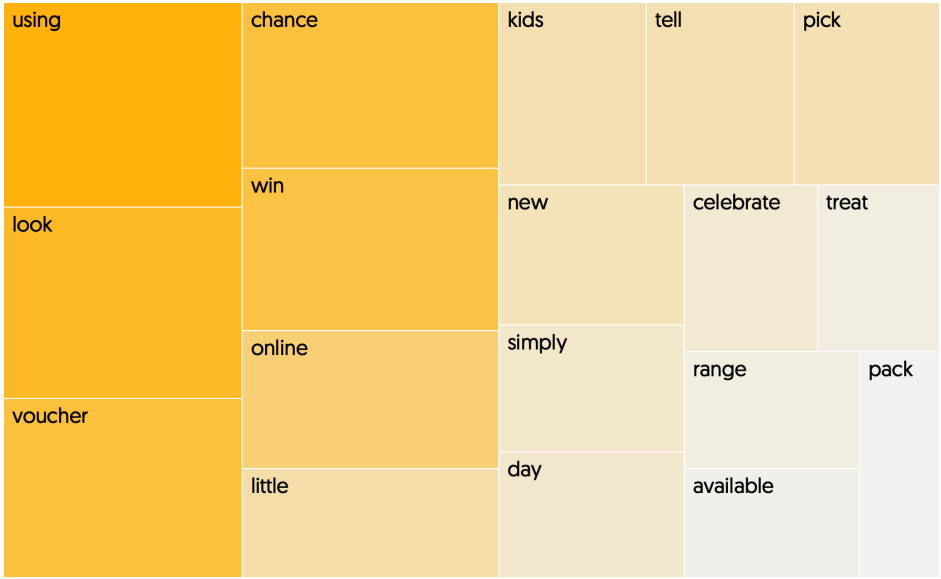




Weighted term frequencies by brand : (TF-IDF) Vectorisation

# M&S talk about new things to shop for, Morrisons (a bit like Asda), avoid talking about food

M&S
EST. 1884


Morrisons
Since 1899

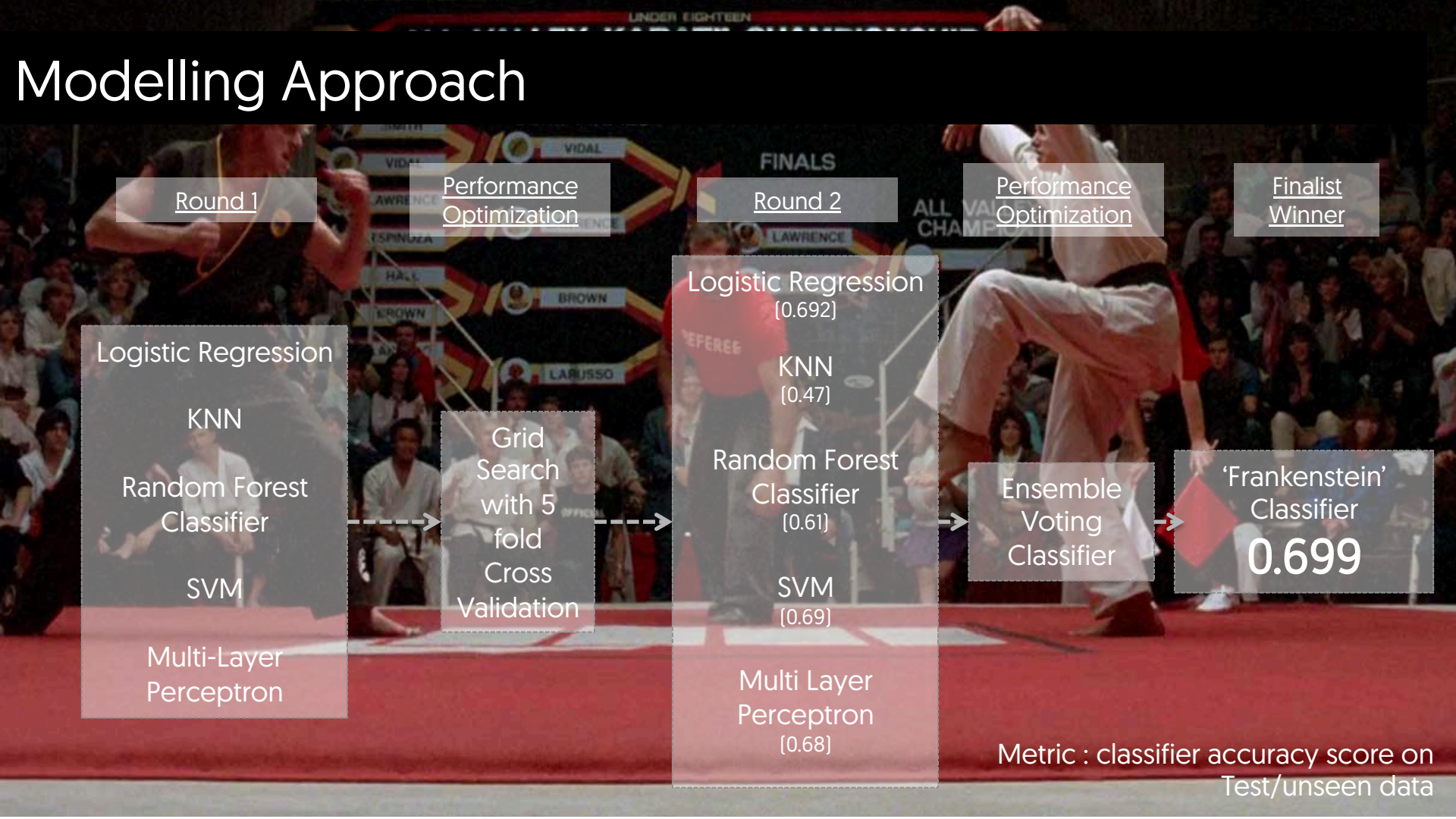



Weighted term frequencies by brand : (TF-IDF) Vectorisation

# Tesco owns Christmas


Weighted term frequencies by brand : (TF-IDF) Vectorisation

# Modelling Approach



# Classifier Evaluation : Confusion matrix

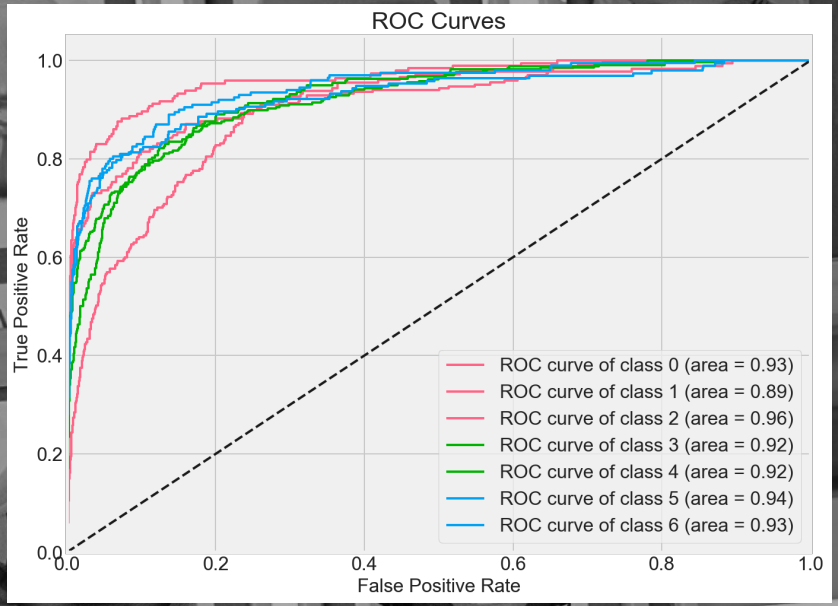
High precision with Waitrose, Sainsbury's and ASDA i.e. when our model predicted these brands over 80% of the time it was correct

| | p_Sainsbury's | p_Tesco | p_Waitrose | p_Lidl | p_M&S | p_Morrisons | p_ASDA |
|---|---|---|---|---|---|---|---|
| Sainsbury's | 111 | 19 | 5 | 23 | 11 | 8 | 1 |
| Tesco | 5 | 189 | 7 | 30 | 17 | 13 | 6 |
| Waitrose | 0 | 22 | 147 | 11 | 7 | 6 | 1 |
| Lidl | 9 | 42 | 4 | 246 | 23 | 6 | 8 |
| M&S | 3 | 33 | 3 | 23 | 135 | 19 | 2 |
| Morrisons | 1 | 20 | 2 | 10 | 8 | 153 | 6 |
| ASDA | 3 | 27 | 2 | 8 | 9 | 14 | 130 |

| | precision | recall | f1-score | support |
|---|---|---|---|---|
| Sainsbury's | 0.84 | 0.62 | 0.72 | 178.0 |
| Tesco | 0.54 | 0.71 | 0.61 | 267.0 |
| Waitrose | 0.86 | 0.76 | 0.81 | 194.0 |
| Lidl | 0.70 | 0.73 | 0.71 | 338.0 |
| M&S | 0.64 | 0.62 | 0.63 | 218.0 |
| Morrisons | 0.70 | 0.76 | 0.73 | 200.0 |
| ASDA | 0.84 | 0.67 | 0.75 | 193.0 |

Poorer performance with M&S and Tesco

# Classifier Evaluation : ROC-AUC



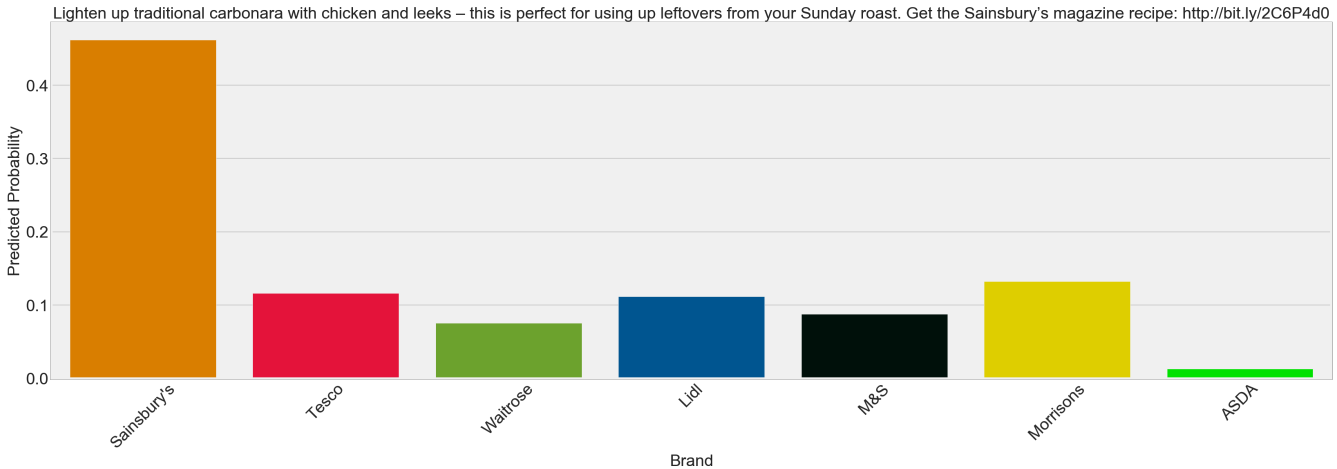

Area under ROC curve (ROC-AUC):
Sainsbury's: 0.93
Tesco: 0.89
Waitrose: 0.96
Lidl: 0.92
M&S: 0.92
Morrisons: 0.94
ASDA: 0.93

## ROC-AUC Curve Interpretation

All classes (brands) have high ROC-AUC scores which implies that for most of our brands, our model has been able to provide strong separability between **true positives** for that brand (i.e. predicting 'Waitrose' and it being brand 'Waitrose') and true negatives (i.e. correctly predicting it as something else other than Waitrose).

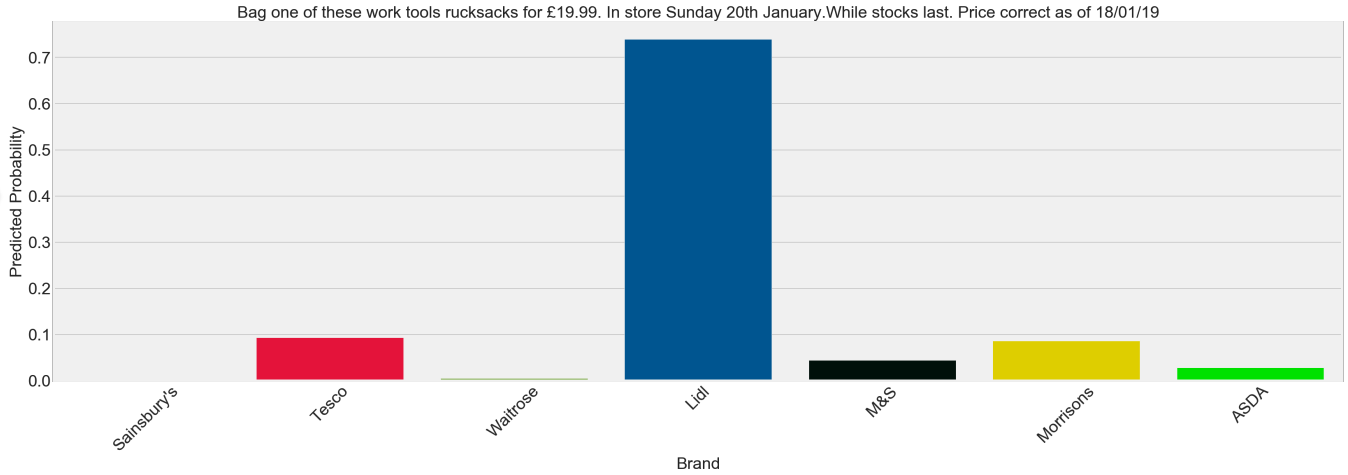
The only brand that has slightly weaker AUC scores is Tesco - this implies that the proportion of false positives and false negatives for Tesco is higher i.e. that our model sometimes incorrectly classed a post as Tesco when it was Morrisons (False Positive) and should have classed a post as Tesco, when it classed it as something else (e.g. Morrisons)

# Testing the model on new data


Note – there is a pre-processor in the pipeline that removes all branding cues before the model makes any predictions !

# Testing the model on new data

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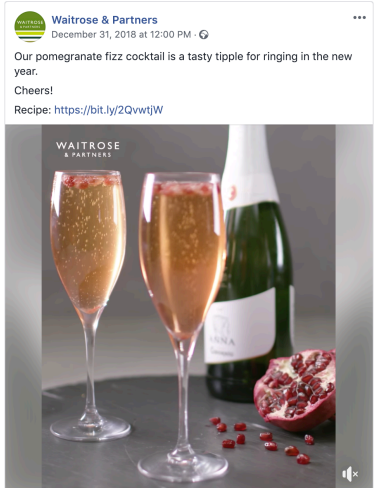


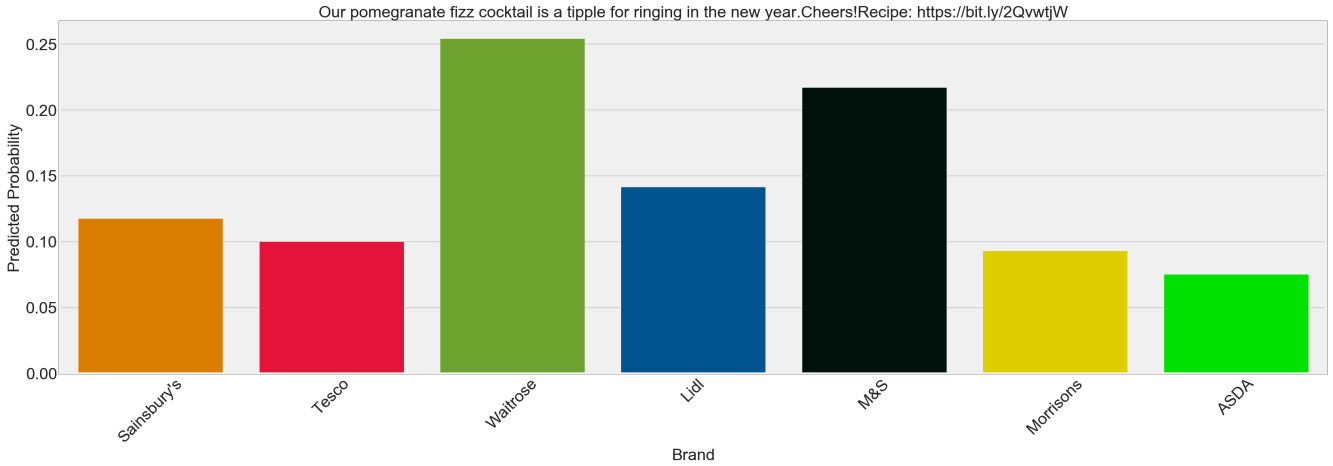

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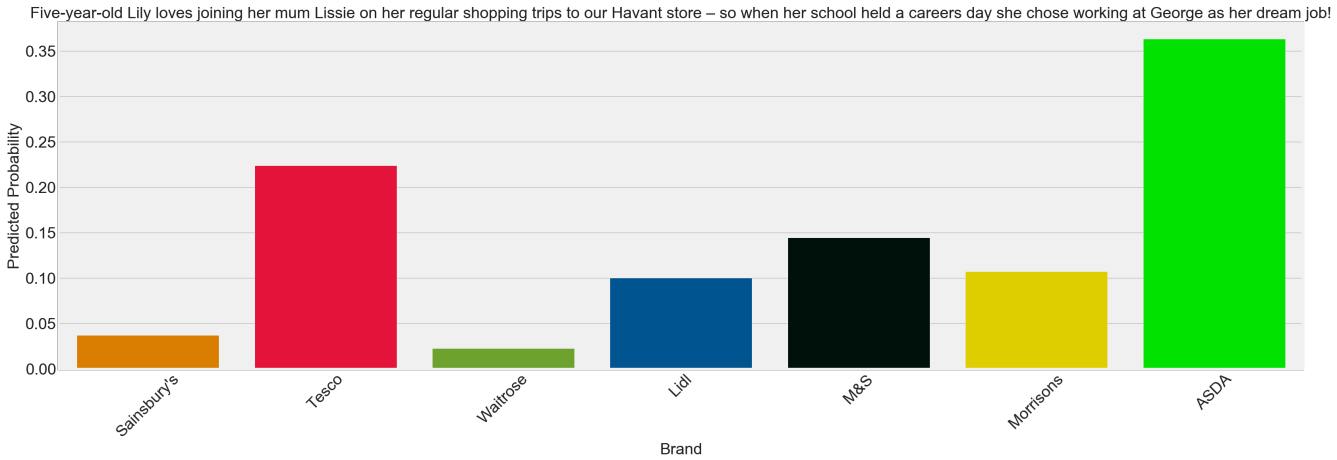
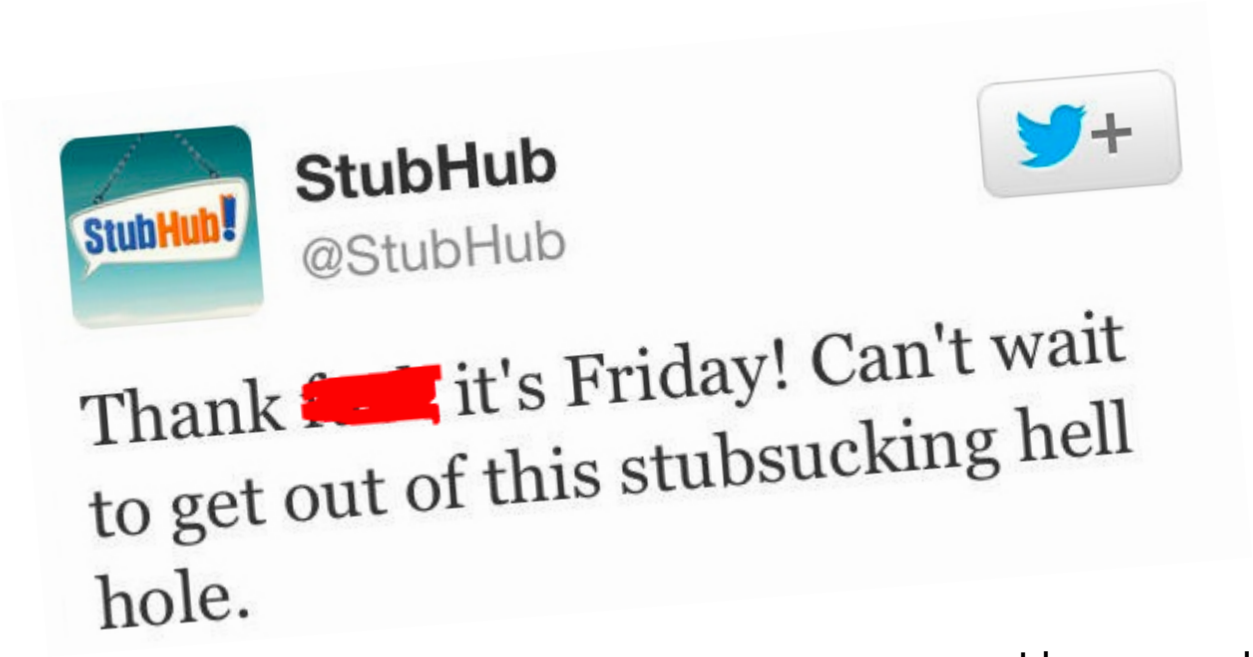


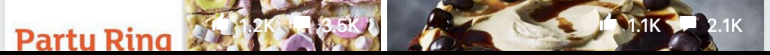

IMPLICATIONS

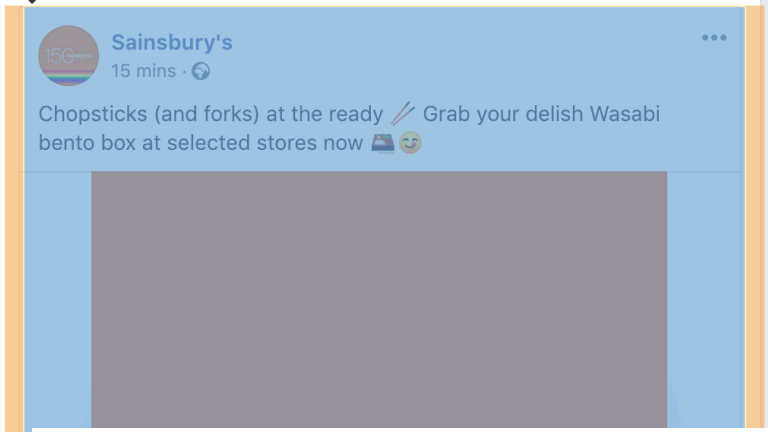
# Sense checking your social content

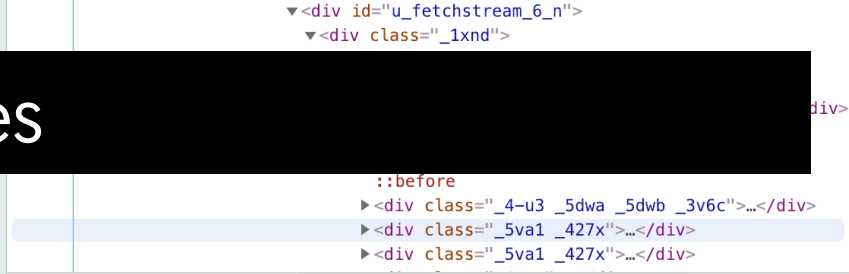



I have no doubt that most social media managers know what they're doing, but a little sense check never hurt anyone

# Transferability to other categories




Facebook pages are (mostly) built with consistent html. Furthermore, the social infrastructure across brands (likes, comments, shares) is also consistent for all brands.

So in terms of acquiring new data for other categories and brands, it would be fairly straightforward to replicate this project again for anything else you can think of

# Risks & Limitations

## It's (not) been emotional

Word counts - even TF-IDF – don't capture sentiment very well.

Future iterations of content analysis could look at sentiment and see if emotion is a useful predictor?

## Neglected Features

Many features were acquired, that although were helpful for EDA, weren't used in any modelling.

Could we look at regression models and see what kinds of content predict social 'success'

## Neglected Channels

There's more to social media than Facebook.

Could we integrate data from Twitter, Instagram, Snapchat?


QUESTIONS?
Mr. Mark Zuckerberg