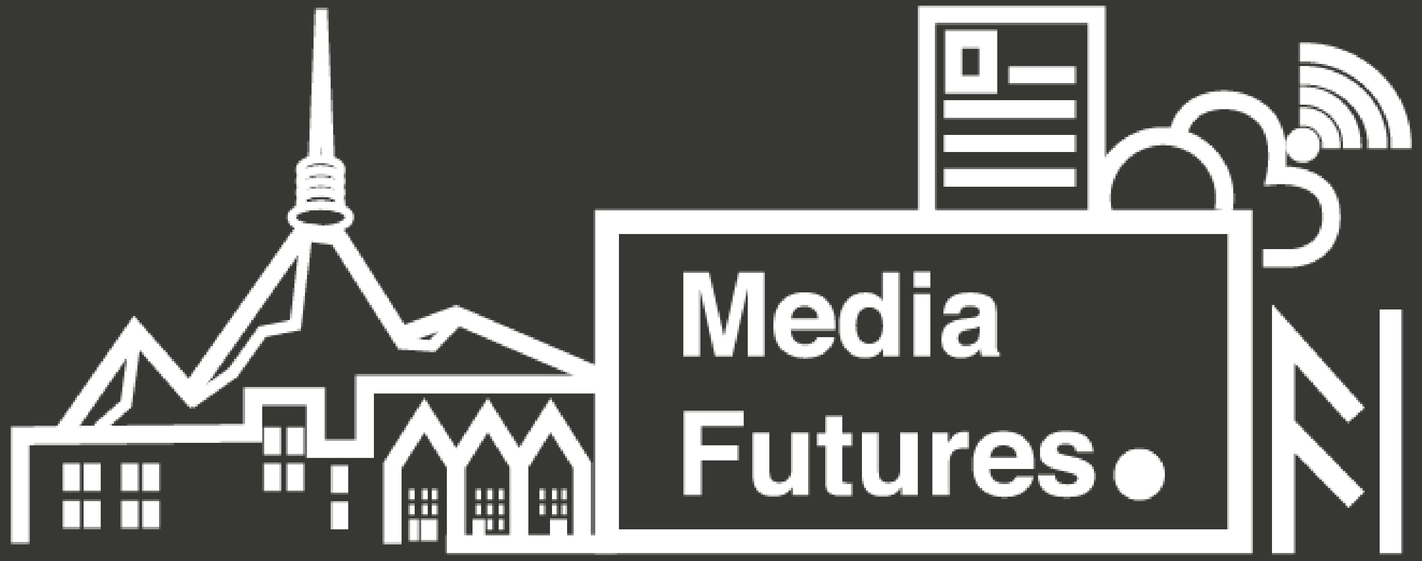


Media Analytics for Personalization in Advertisement

amedia

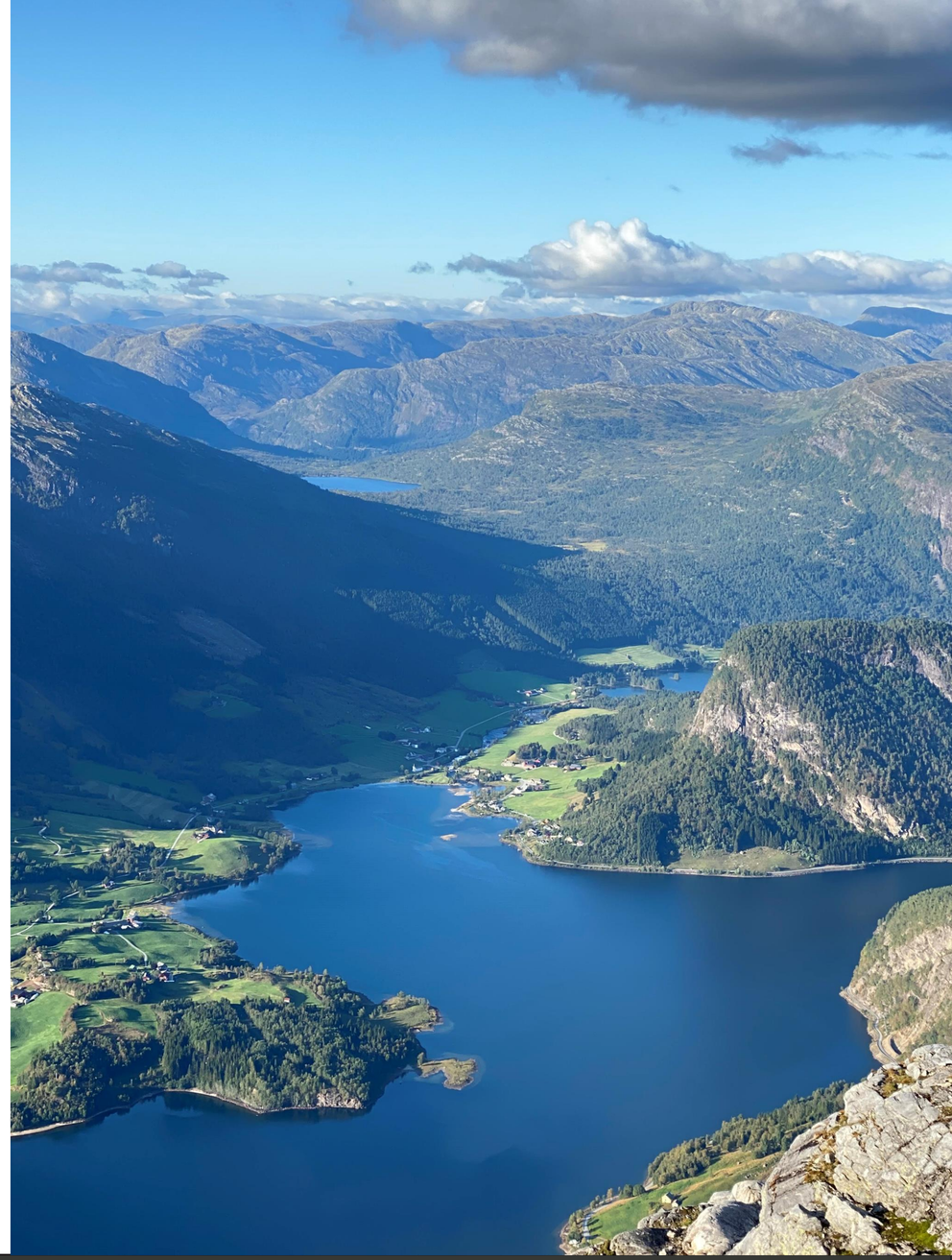
Research Centre for Responsible Media Technology and Innovation
Project number 309339

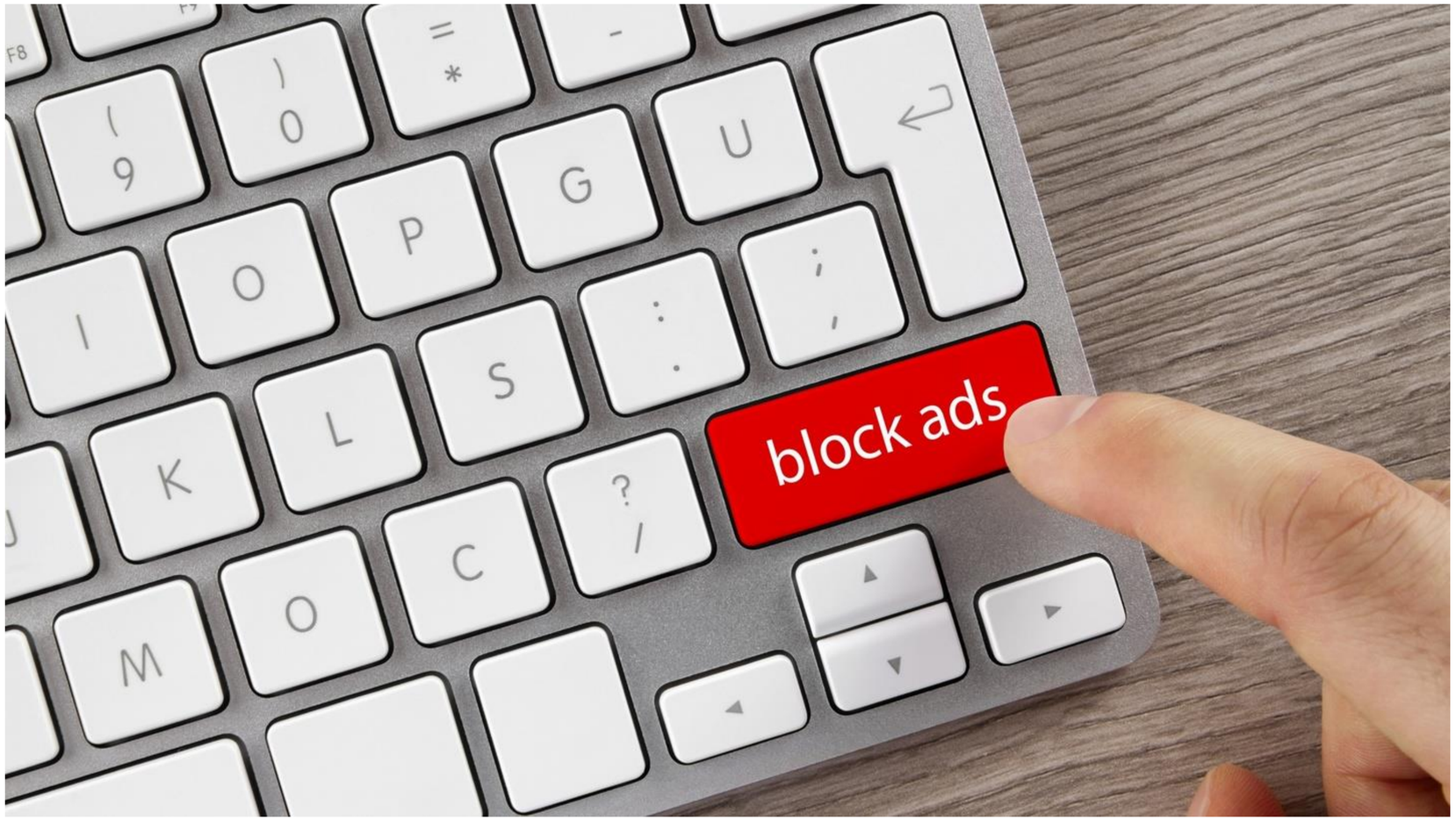
Norwegian Centre for Research-based Innovation

Nasjonalbiblioteket amedia Bergens Tidende HIGHSOFT NORCE IBM NRK Schibsted 2 VIZRT

Who am i?

- Military
- Bachelors’ degree ICT




block ads

Research Questions

1. How to improve the experience of the audience by improving the relevance of contextualized advertisements with better personalization?

2. How machine learning approaches can be employed to improve the personalization of advertisements on media platforms?

Introduction

- Mehdi Elahi - University of Bergen
- Igor Pipkin - **Amedia** AS
- Dataset
  - Real-time data
  - Advertisement images

The Dataset

- Amedia
- 685553 observations
- 19 features
- **Behavioral**
- **Categorical**

age_group	Category	CreativeId	gender	n_impressions_measurable	n_click	ctr
25-29	Kriminalitet og rettsvesen	138336200451	F	121	1	0.008264
25-29	Kriminalitet og rettsvesen	138336209730	F	111	1	0.009009
25-29	Økonomi og næringsliv	138338659766	F	150	1	0.006667
30-34	Kriminalitet og rettsvesen	138336200451	M	179	1	0.005587

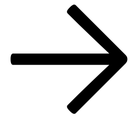
Exploratory Data Analysis

Exploratory Data Analysis

- 680 000 → 100 000
- 100 000 → 700
- **Statistical** robustness
  - Treshold

Not Clicked

Age group	Users
75+	8918
70-74	9426
65-69	10382
60-64	10668
55-59	10848
50-54	11070
45-49	10163
40-44	8669
35-39	7763
30-34	6698
25-29	5549
18-24	3523



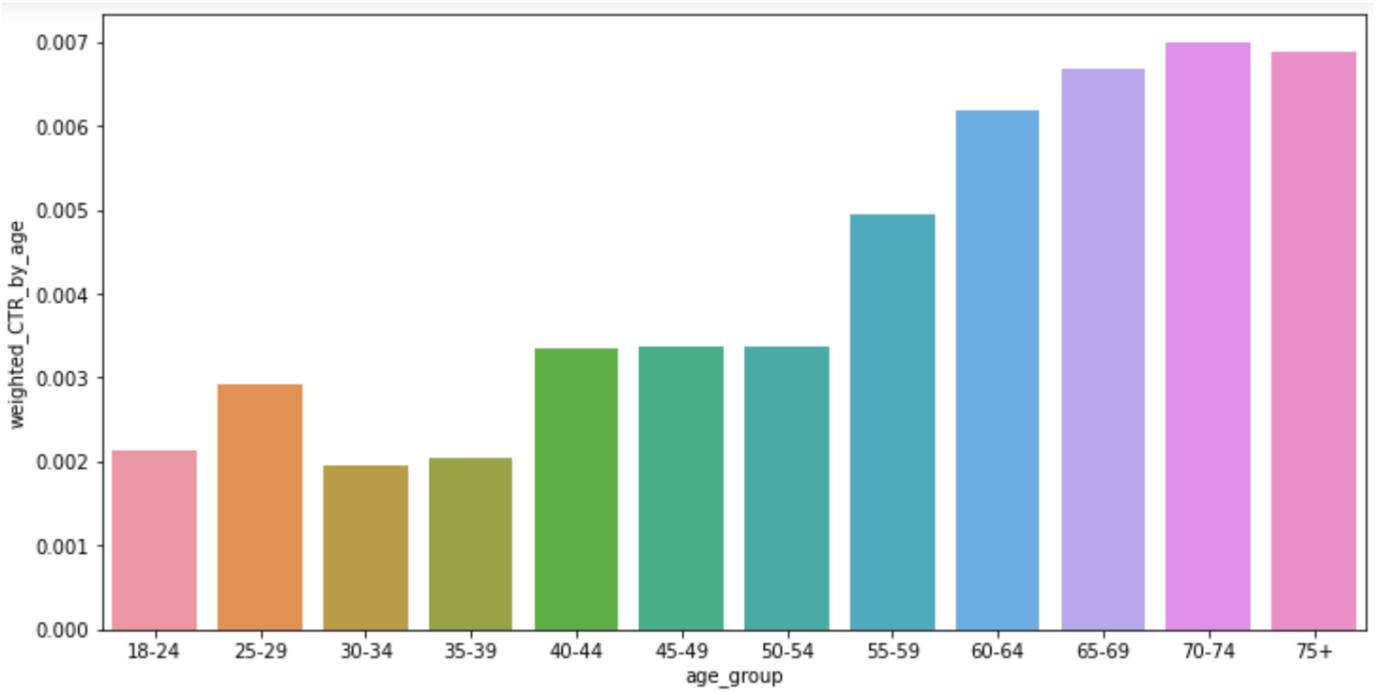
Clicked

Age group	Users
75+	221
70-74	220
65-69	222
60-64	209
55-59	164
50-54	146
45-49	115
40-44	60
35-39	56
30-34	36
25-29	35
18-24	19

Exploratory Data Analysis

- **Click Through Rate**
- Young vs Elder

Age group	CTR by age
18-24	0.002126
25-29	0.002911
30-34	0.001955
35-39	0.002050
40-44	0.003340
45-49	0.003376
50-54	0.003362
55-59	0.004936
60-64	0.006188
65-69	0.006683
70-74	0.006987
75+	0.006869



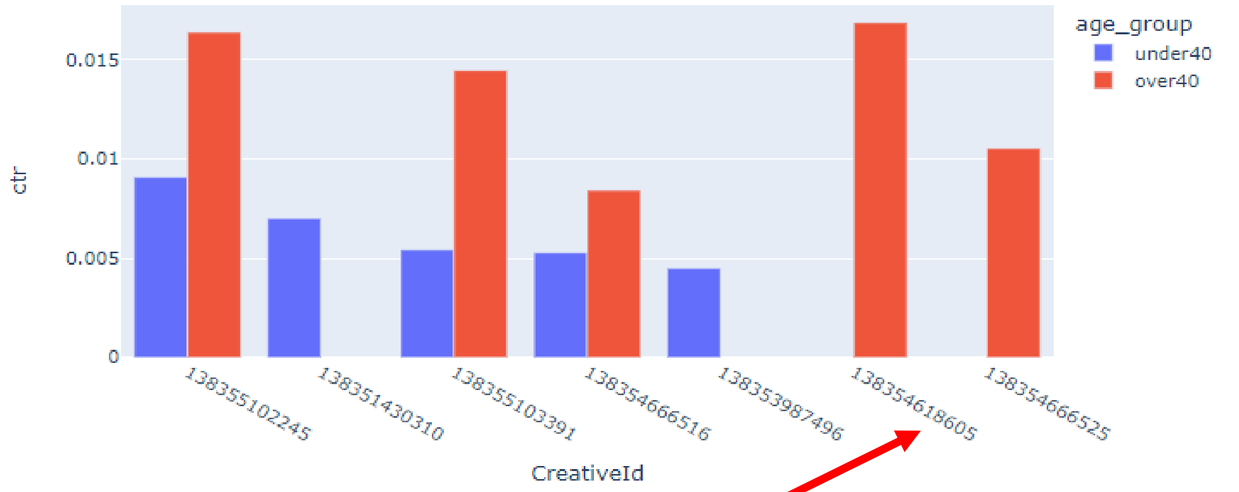
Exploratory Data Analysis

- Most popular **category**
- Why do they **click**?

Age Group	Category	CTR
18-24	Kriminalitet og rettsvesen	0.026901
25-29	Kriminalitet og rettsvesen	0.034223
30-34	Kriminalitet og rettsvesen	0.053122
35-39	Ulykker og naturkatastrofer	0.082453
40-44	Ulykker og naturkatastrofer	0.035858
45-49	Økonomi og næringsliv	0.056067
50-54	Kriminalitet og rettsvesen	0.074141
55-59	Ulykker og naturkatastrofer	0.089934
60-64	Kriminalitet og rettsvesen	0.106361
65-69	Kriminalitet og rettsvesen	0.133932
70-74	Ulykker og naturkatastrofer	0.099463
75+	Kriminalitet og rettsvesen	0.094301

Exploratory Data Analysis

- **Confusion**
  - Advertisements or article?
- Worried
  - Fear
  - Sickness



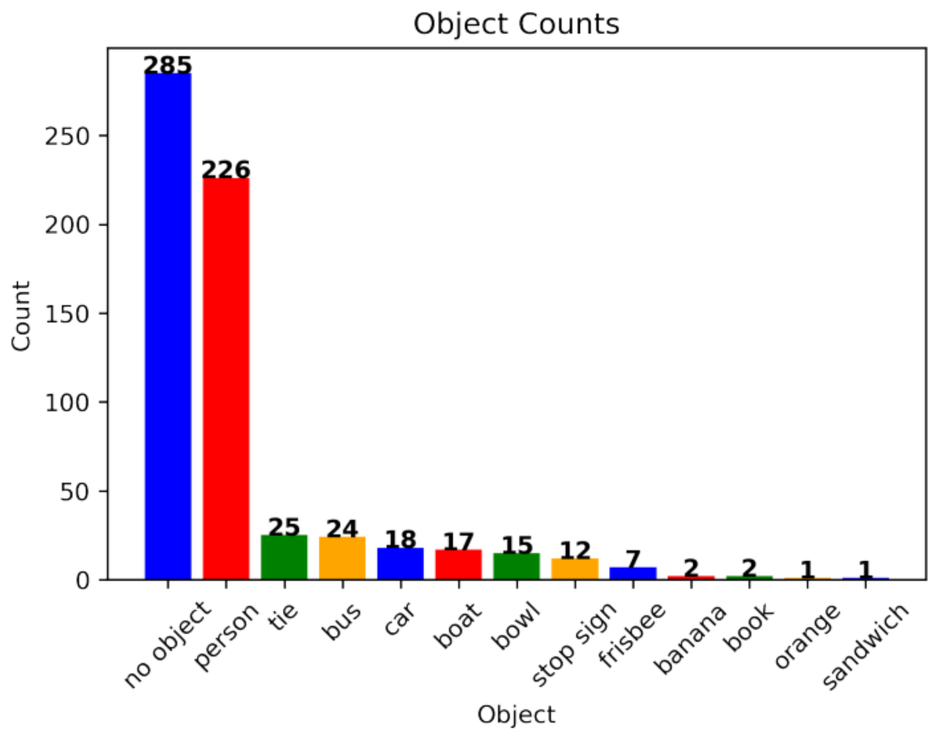
Exploratory Data Analysis

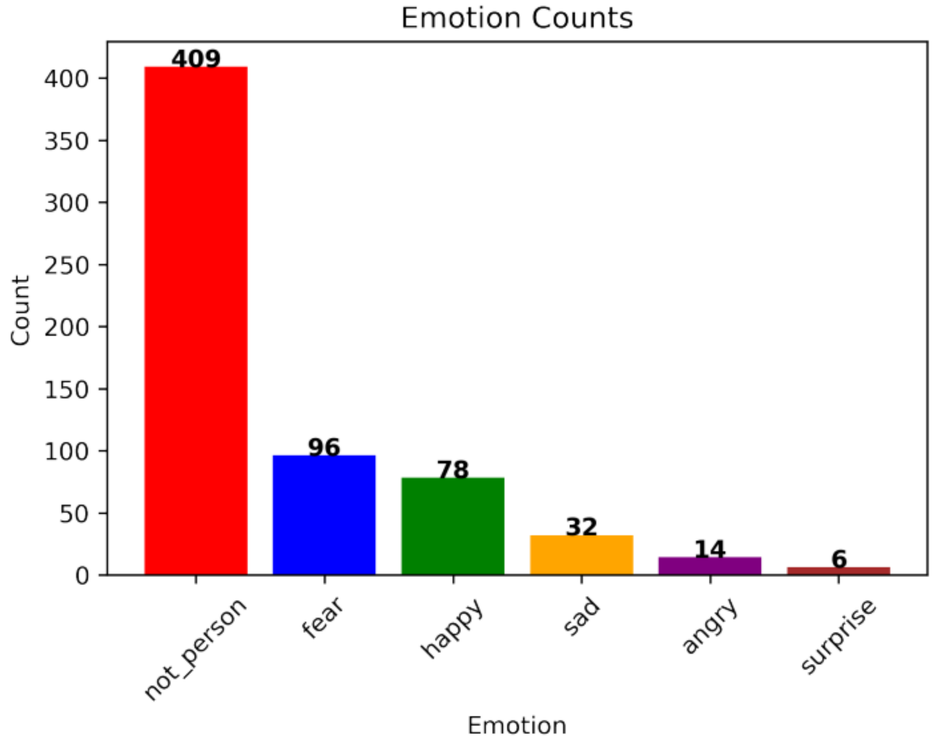
- **Influencing** Factors
  - Emotions
  - Objects

	age_group	CreativeId	n_click	n_impressions_measurable	ctr	emotion
206	under40	138355102245	16	1760	0.009091	happy

Feature Extraction

- **Objects** and **Emotions**
- Expanding dataset





Feature Extraction

- Click **Behavior**

Object	CTR
person	0.010300
banana	0.009437
sandwich	0.008850
book	0.007969
stop sign	0.007793

Emotion	CTR
happy	0.013322
fear	0.009393
sad	0.007576
surprise	0.007375
angry	0.007166

Predictive models

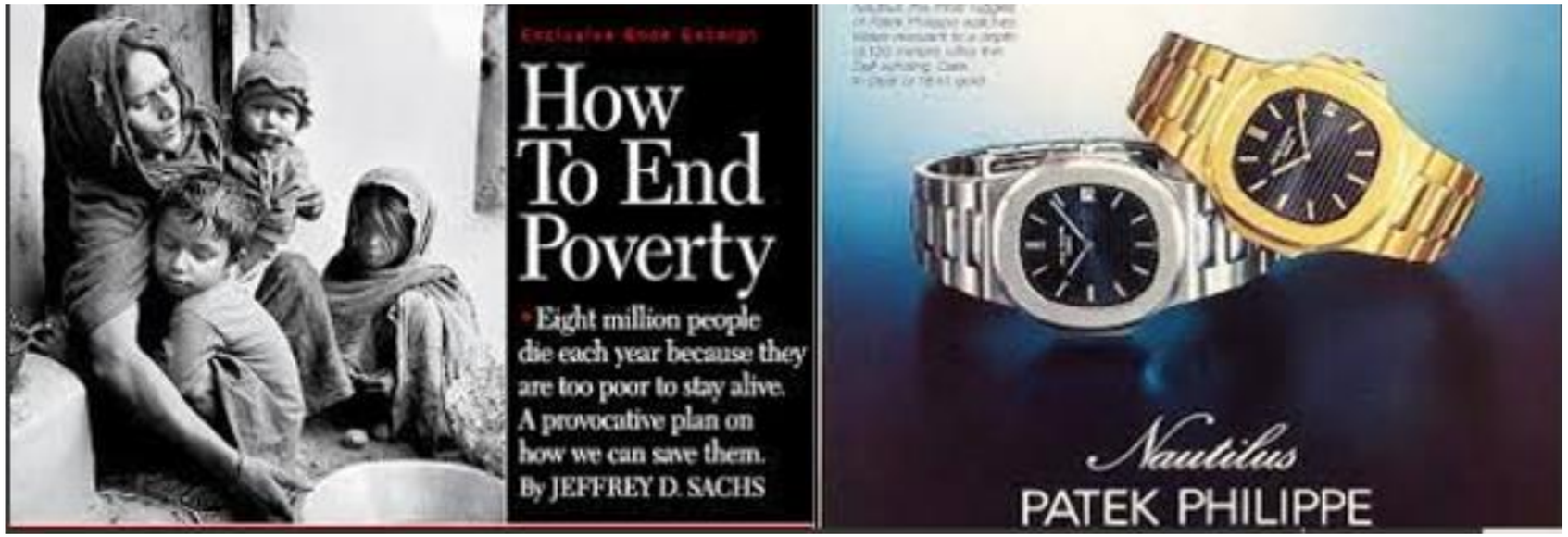
- **Imbalanced** dataset
- Random Forest
- Decision Tree
- The **dataset**

Comparison of Models				
Model	**MSE**	**RMSE**	**MAE**	**R2 Score**
Random Forest	0.12	0.34	0.18	0.93
Decision Tree (baseline)	0.17	0.41	0.15	0.91

Predictive models

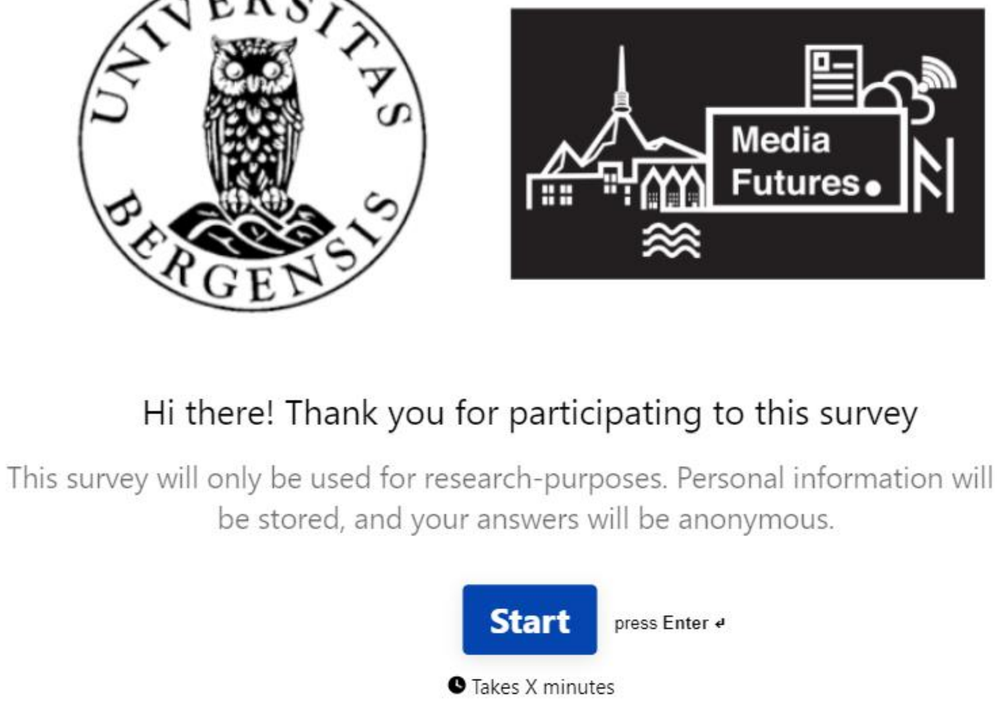
- Feature **Importance**
- **Visibile** advertisements

Feature	Importance
ctr	0.495008
n_impressions_measurable	0.432059
Adviser	0.031267
Category	0.022900
object	0.007995
gender	0.004340
dominant_emotion	0.003519
format	0.001899
industry	0.000687
age_group	0.000327
page_type	0.000000


How To End Poverty
• Eight million people die each year because they are too poor to stay alive. A provocative plan on how we can save them.
By JEFFREY D. SACHS
Nautilus
PATEK PHILIPPE

User-Study

- Typeform & Prolific
- **Qualitative** and **Quantitative**
- 67 Participants



Instructional Manipulation Check

21 → Please press button "2" if you are still paying attention*

Description (optional)

1	2	3	4	5

User Study

3 → Please fill in your age *

Description (optional)

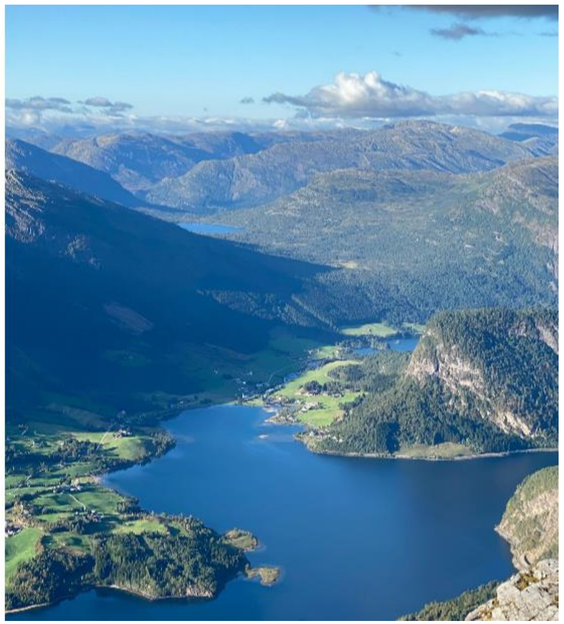
Type or select an option

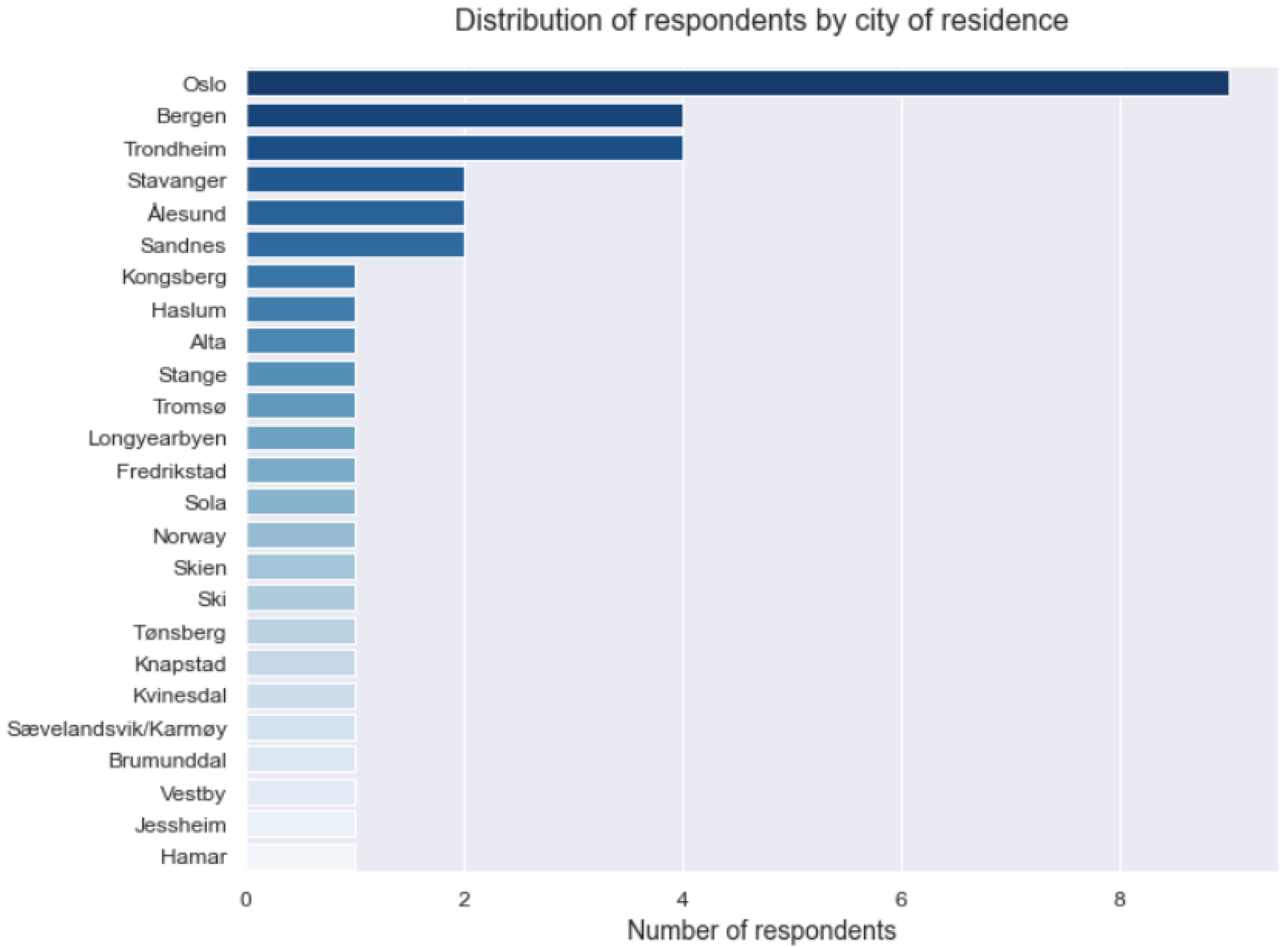
Edit choices 12 options in list

4 → What is your city of residence?

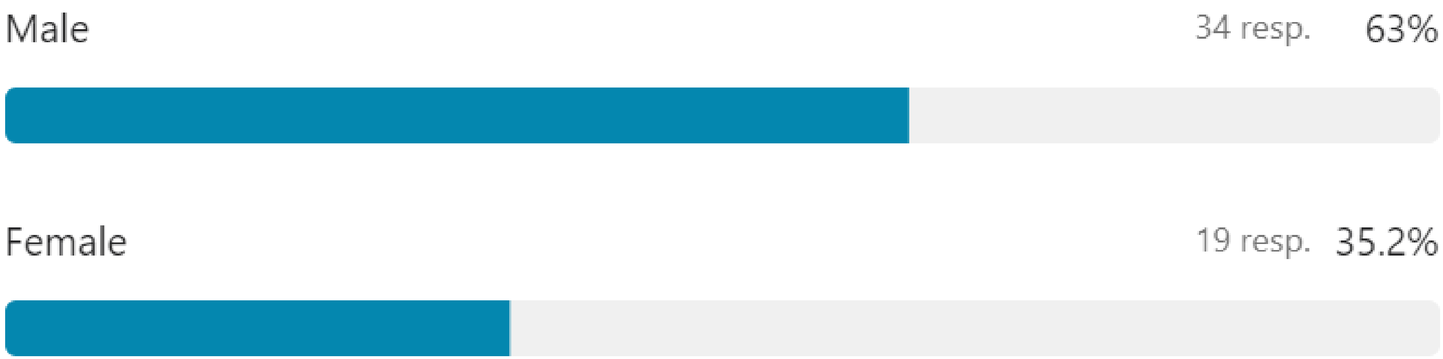
Please write city or town, not country

Type your answer here...

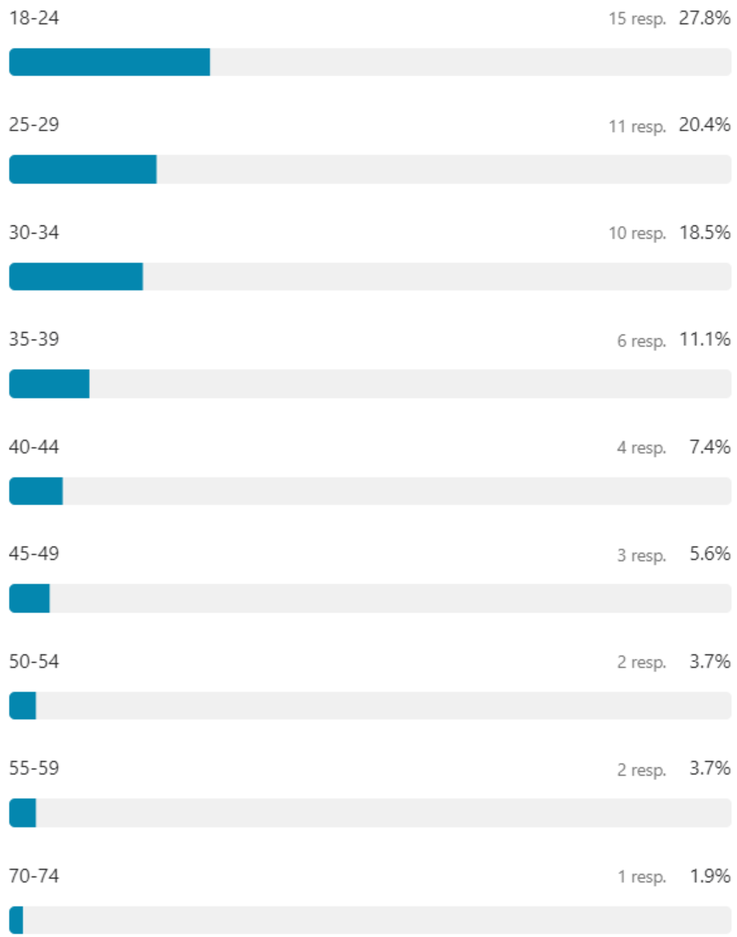



Distribution of respondents by city of residence
Oslo
Bergen
Trondheim
Stavanger
Ålesund
Sandnes
Kongsberg
Haslum
Alta
Stange
Tromsø
Longyearbyen
Fredrikstad
Sola
Norway
Skien
Ski
Tønsberg
Knapstad
Kvinesdal
Sævelandsvik/Karmøy
Brumunddal
Vestby
Jessheim
Hamar
0
2
4
6
8
Number of respondents

User Study Results - Participants

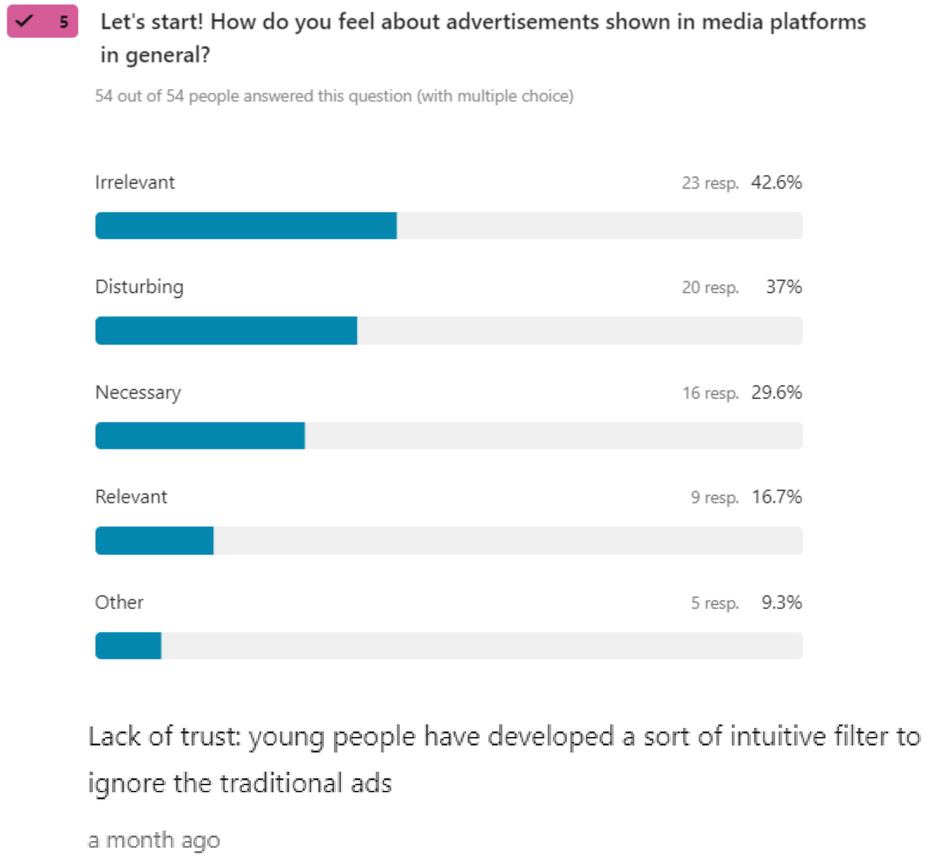


User Study Results - Participants

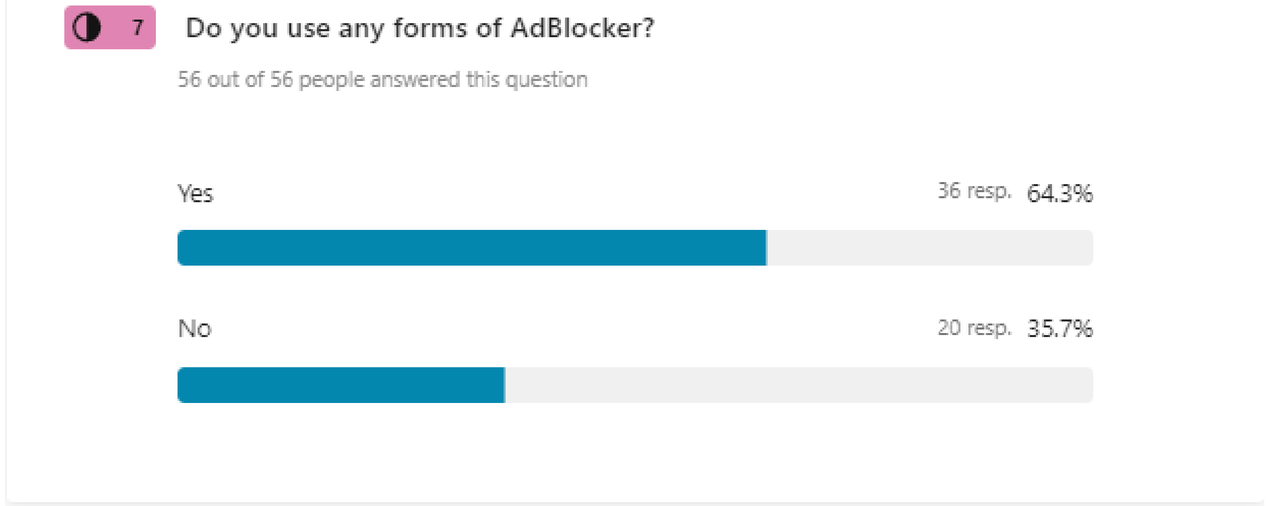


User Study Results

- Necessary
- **Irrelevant**
- «Lack of **trust**»



User Study Results



Sometimes ok

a month ago

Distracting, annoying

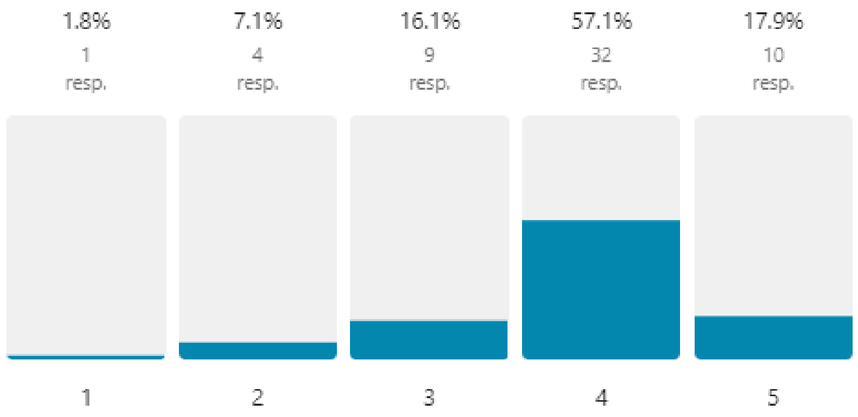
a month ago

Results – Opinion Scales

30 Do you think that emotions in the advertisement play a role in whether people click on advertisement?

Avg. 3.8

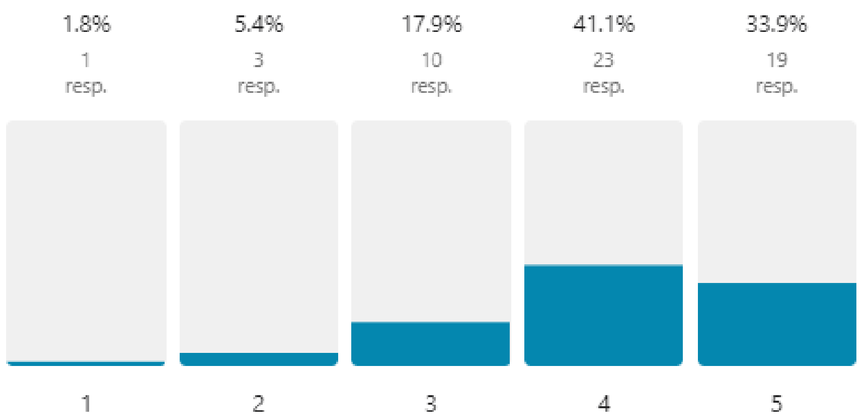
56 out of 56 people answered this question



31 Do you think that people in general are more likely to click on an advertisement if the advertisement is related to the time of the year?

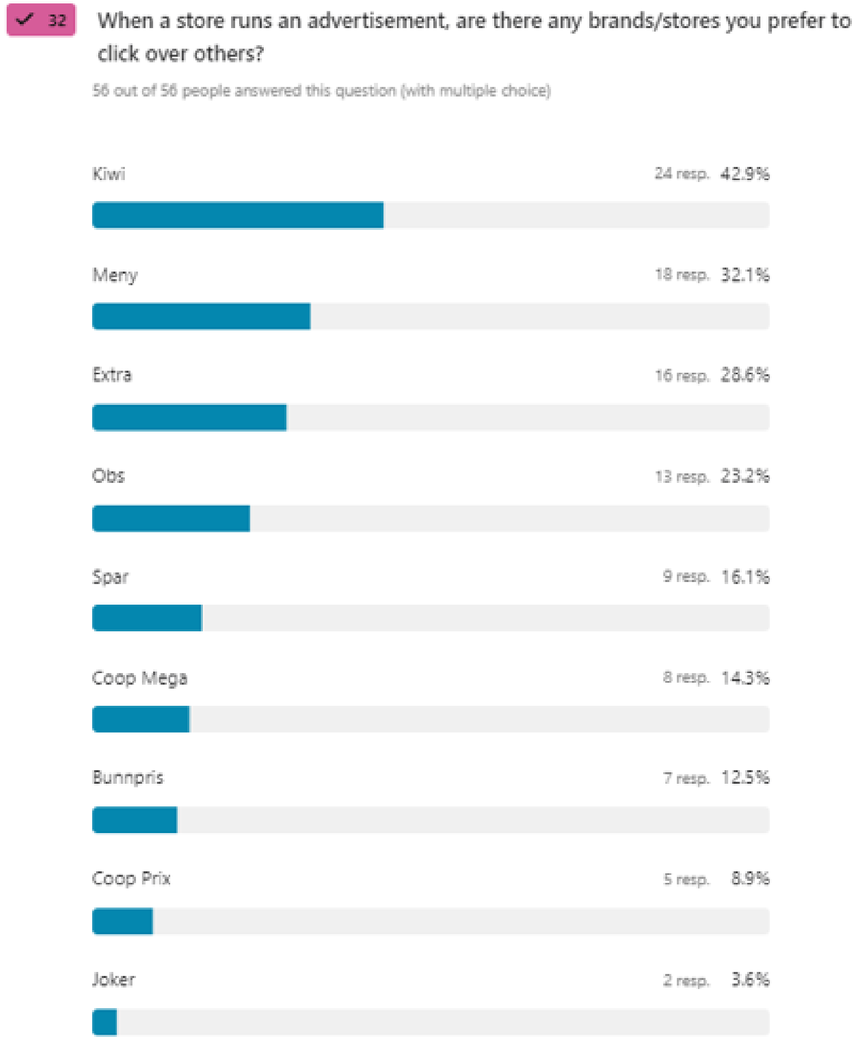
Avg. 4

56 out of 56 people answered this question



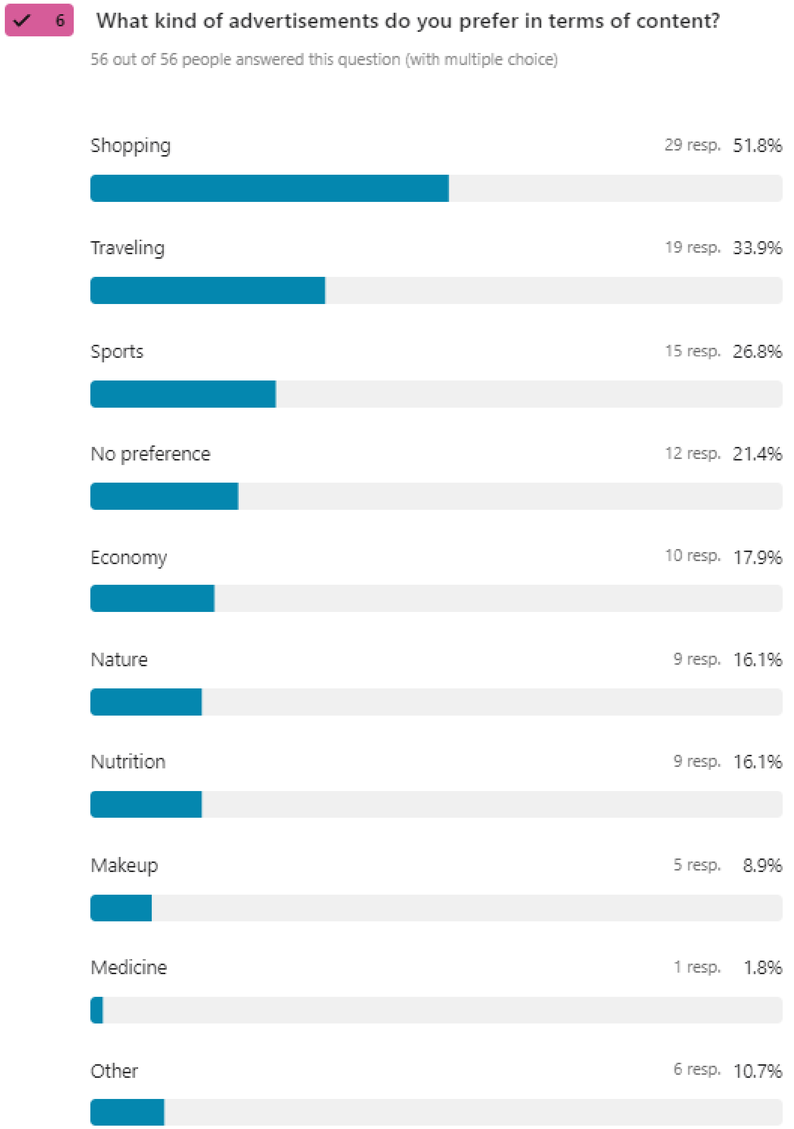
User Study Results

- **Kiwi** and **Meny**



User Study Results

- **Shopping** and **Traveling**



User Study Results

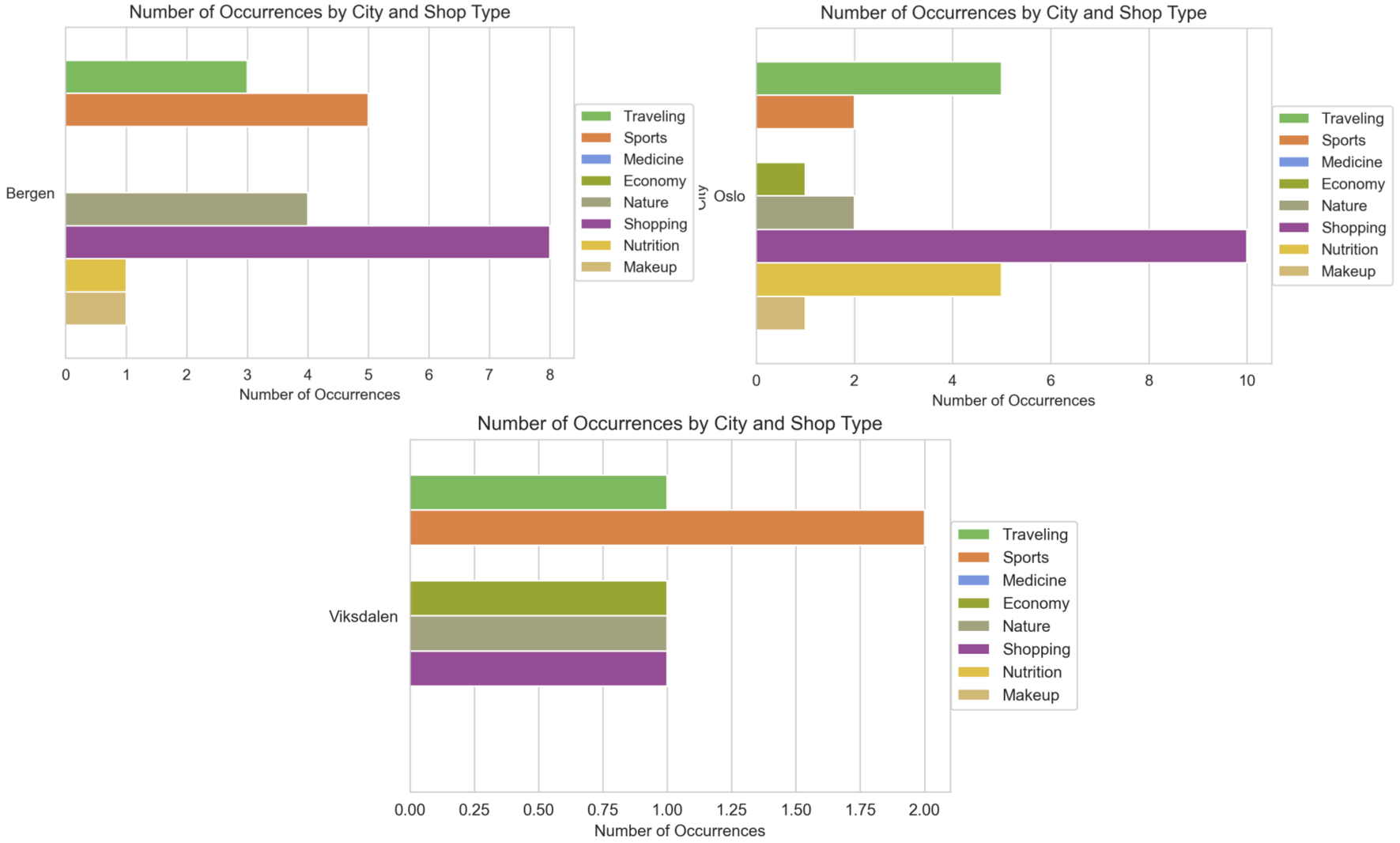
- **Business** Value

Age Group	Most Popular Shop	Most Popular Content
18-24	Kiwi	Shopping
25-29	Kiwi	Sports
30-34	Meny	Shopping
35-39	Kiwi	Shopping
40-44	Extra	Shopping
45-49	Spar	Traveling
50-54	Meny	Shopping
55-59	Extra	Traveling
60-64	Extra	Shopping
70-74	Extra	Traveling

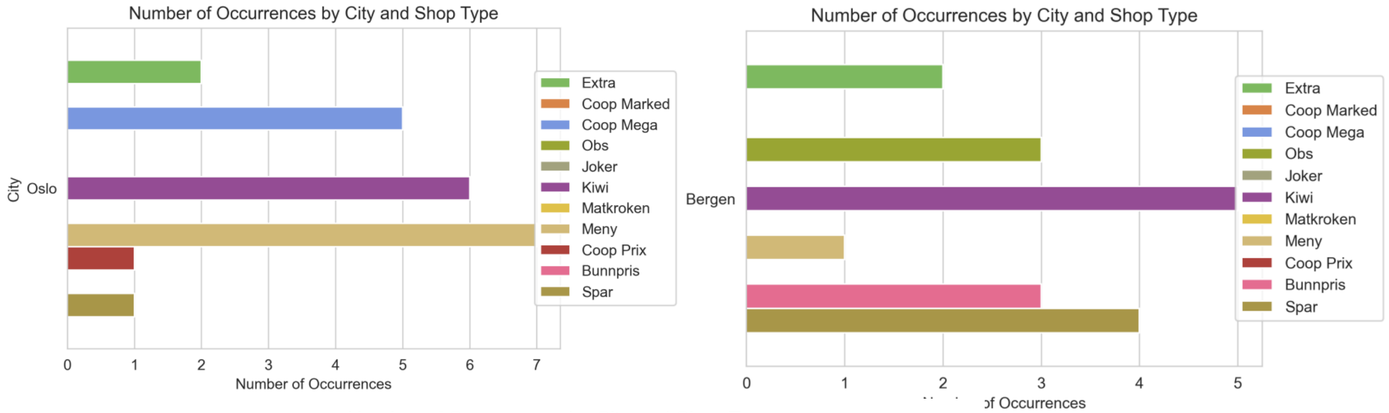
	Most Popular Shop	Most Popular Content	Second Most Popular Interest
Female	Kiwi	Shopping	Nature
Male	Kiwi	Sports	Economy

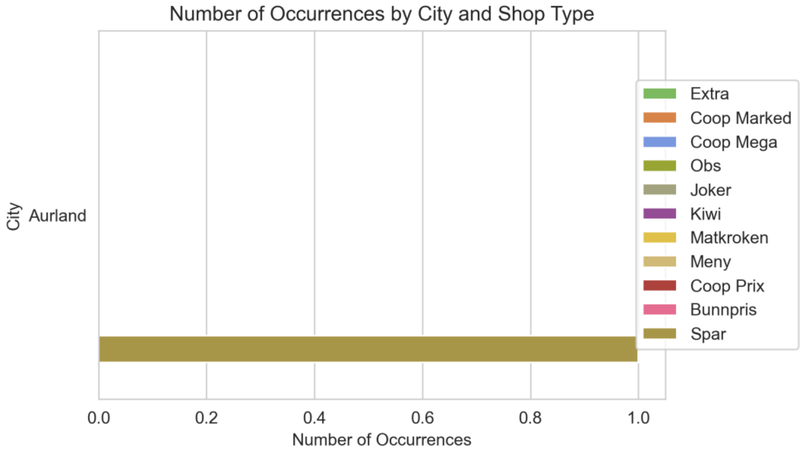
User Study Results

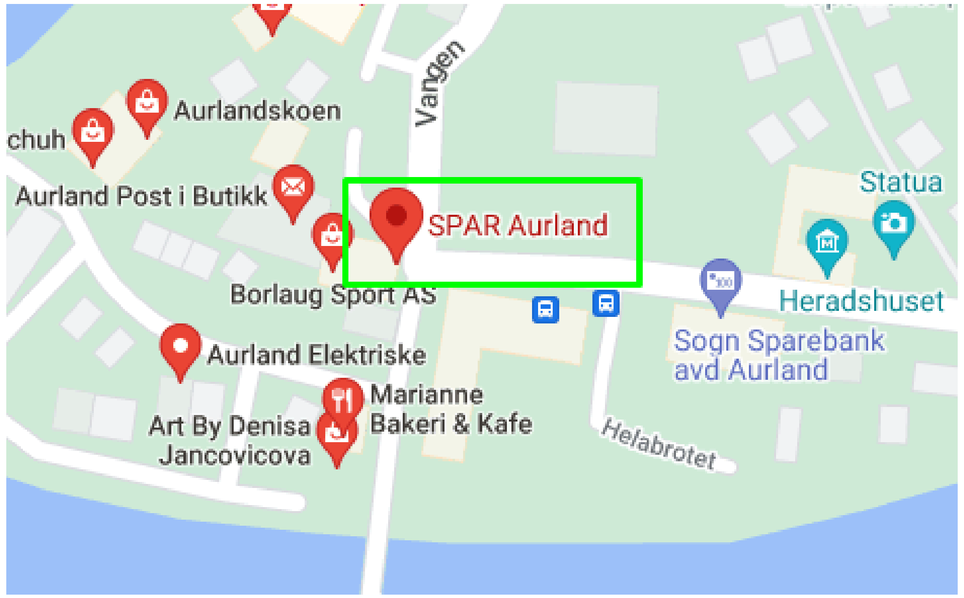
- **Demographic** Factors



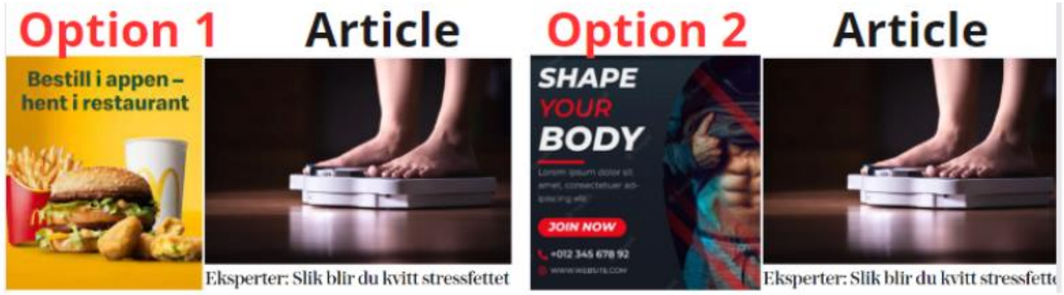
User Study Results







User Study - Examples

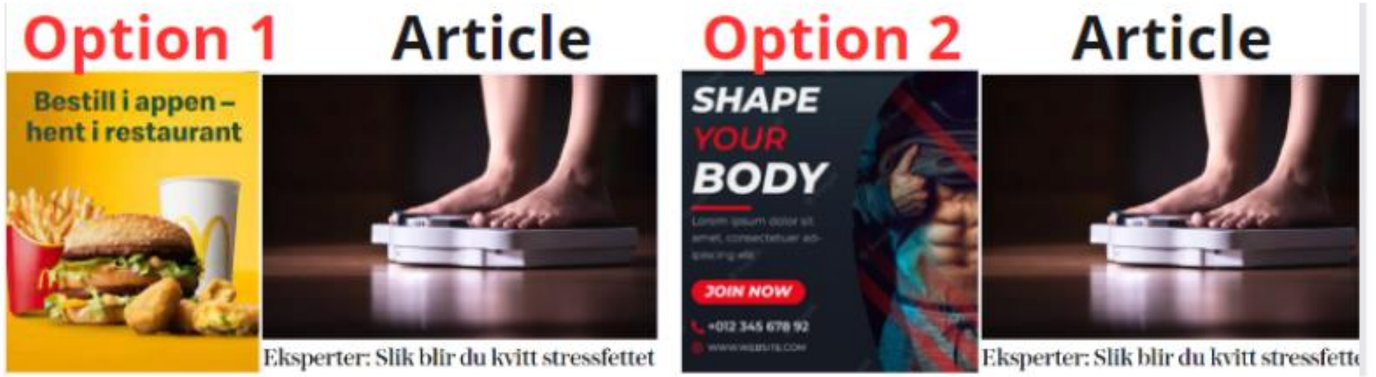


User Study

15 Which one of these advertisements would you rather click?

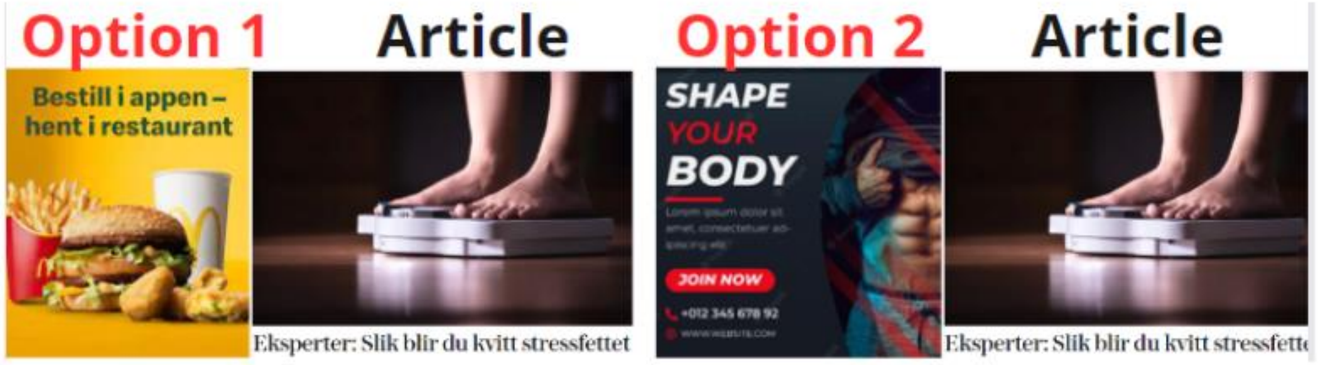
56 out of 56 people answered this question

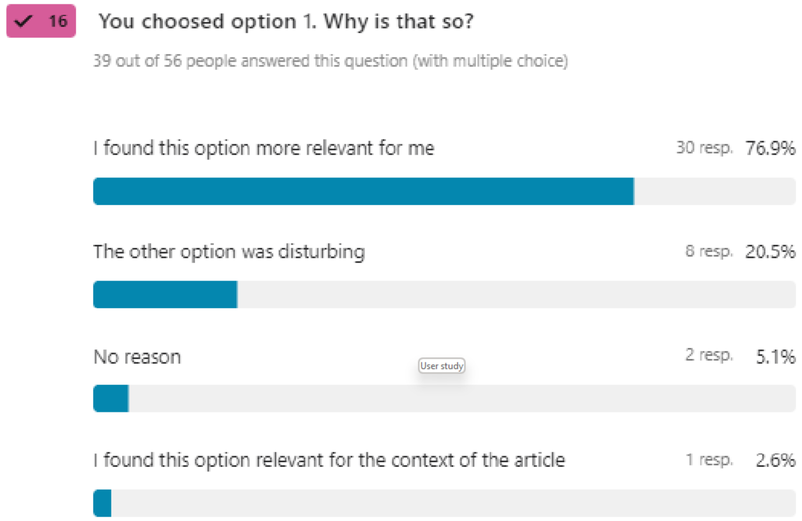
Option 1	39 resp.	69.6%
Option 2	17 resp.	30.4%

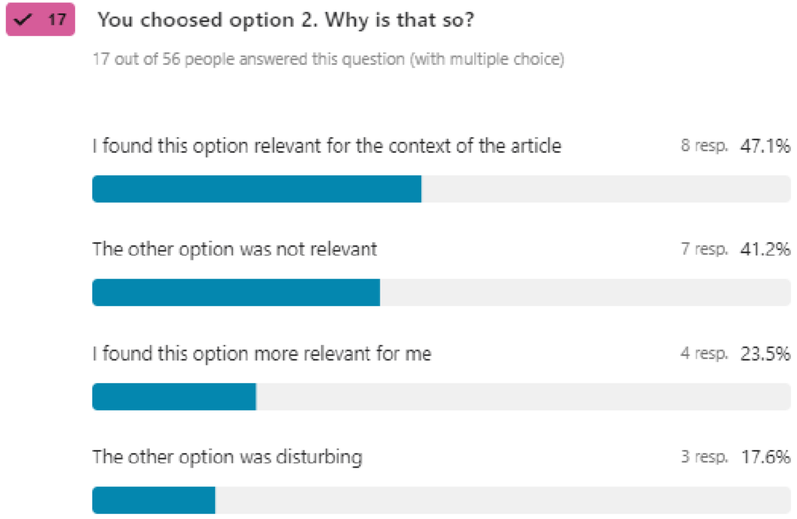


User Study

- Contextualized
  - Disturbing
- Personalized

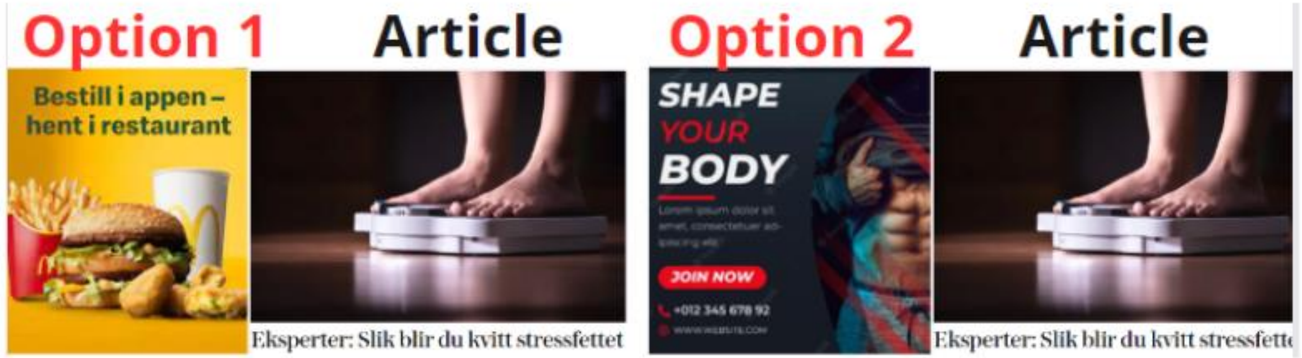






User Study

- Time of day
- **Insecurity**
- Hunger



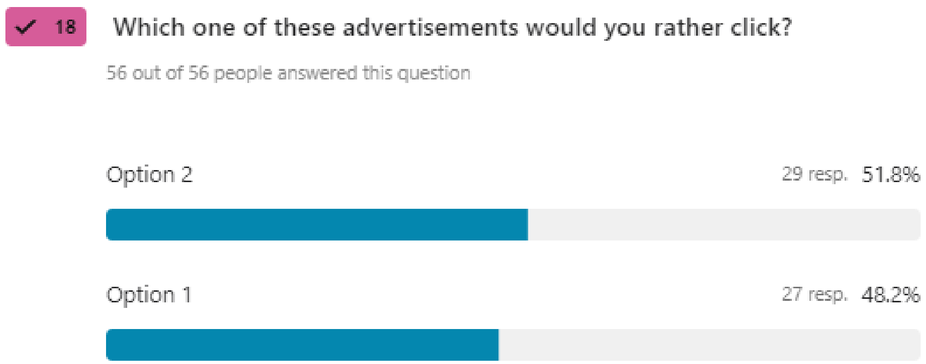
The other option looks and acts as a traditional ad. Trying to play on insecurities and/or sex.

a month ago

Hunger

a month ago

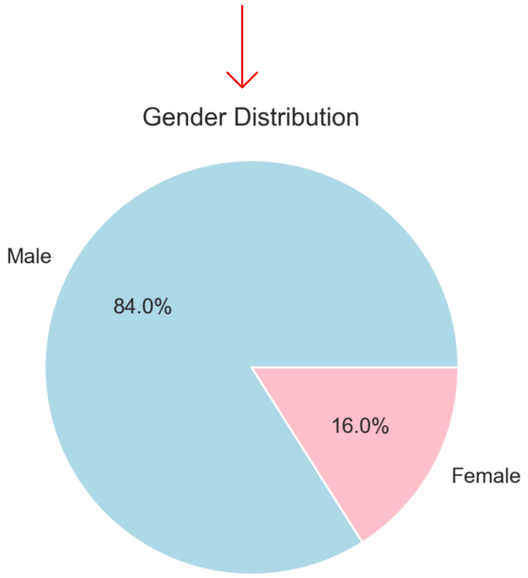
User Study

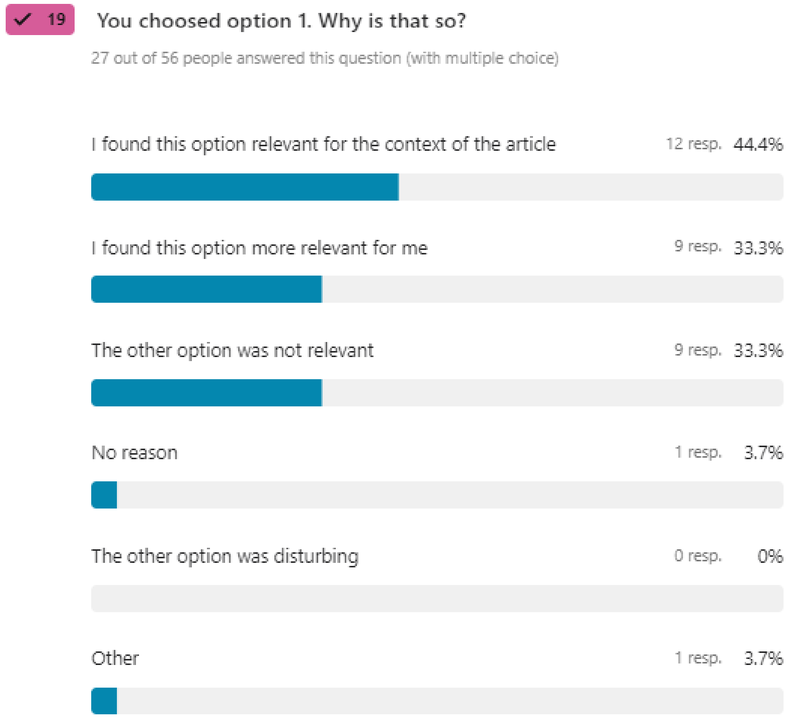

18
Which one of these advertisements would you rather click?
56 out of 56 people answered this question
Option 2
29 resp. 51.8%
Option 1
27 resp. 48.2%

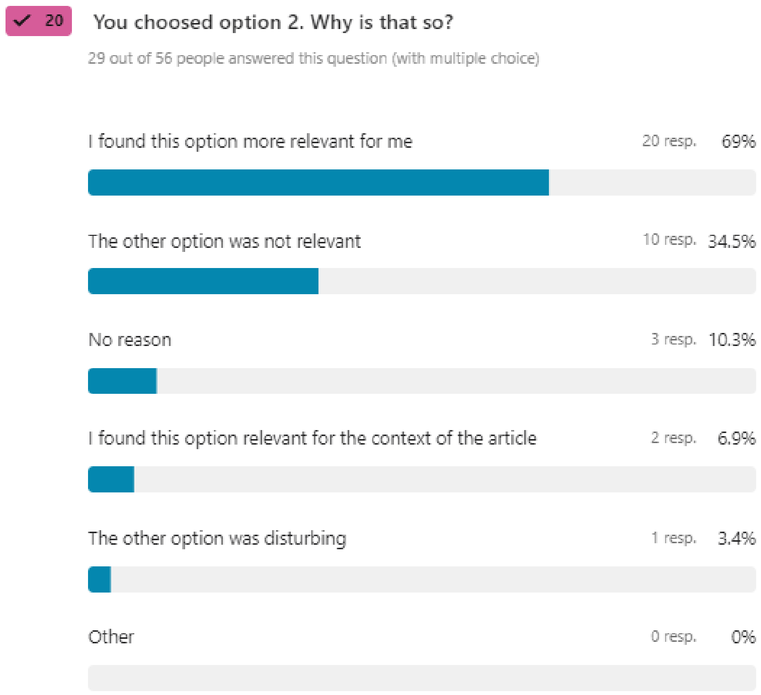
Option 1
Article
Option 2
Article
Se Serie A
med VG+Sport
nes-storspill i målfest – Benfica til
tfinale i Champions League
CARS
THE NEW
VOLVO
EX90
snes-storspill i målfest – Benfica til
rtfinale i Champions League

User Study

- Personalized







User Study

22 Which one of these advertisements would you rather click?

56 out of 56 people answered this question

Option 1	30 resp.	53.6%
Option 2	26 resp.	46.4%

Option 1 Article

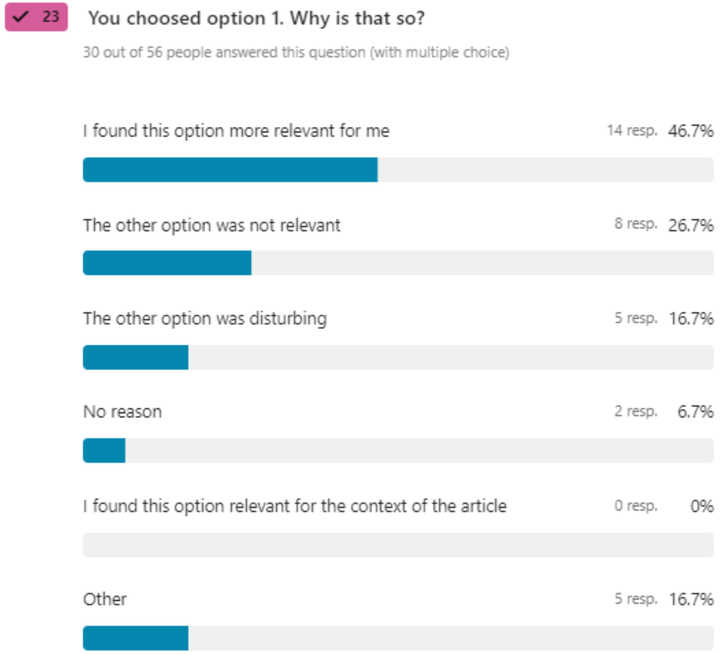
Er 5000 skolejenter blitt forgiftet me gass? - Det luktet som råtne epler.

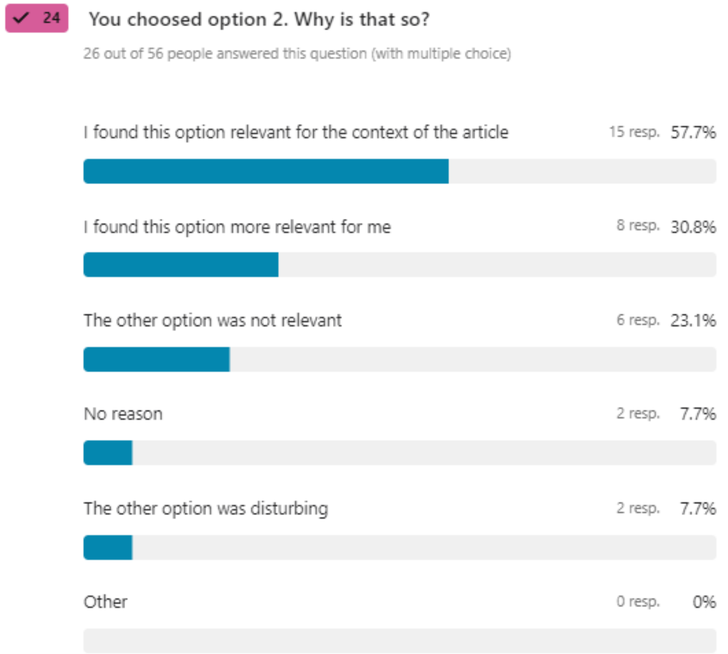
Option 2 Article

Er 5000 skolejenter blitt forgiftet med gass? - Det luktet som råtne epler.

User Study

- Relevance
- Context
- Ethics?





User Study

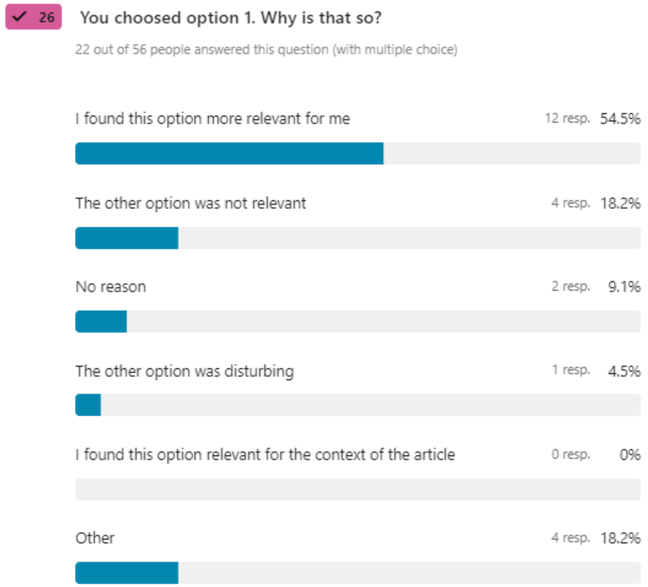
25 Which one of these advertisements would you rather click?

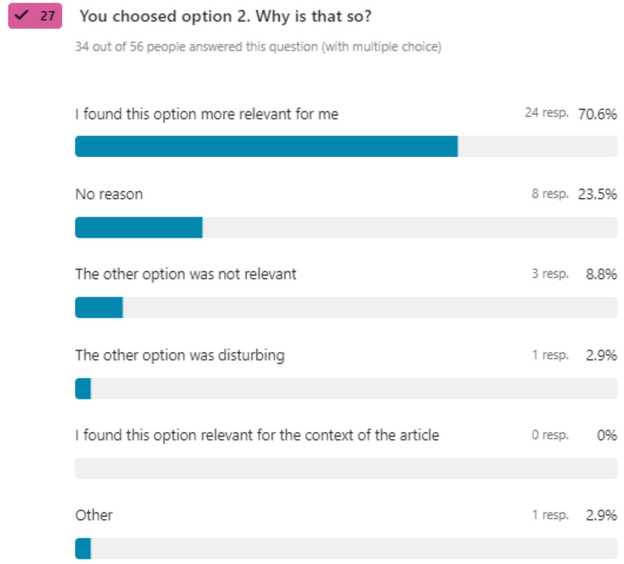
56 out of 56 people answered this question

Option 2	34 resp.	60.7%
Option 1	22 resp.	39.3%

User Study

- Gender stereotypes





User Study

- Personal preferences

I don't like Johnny Depp in option 2. I do like the person in option 1.

12 days ago

What i’ve learned

- **Media** Industry
- User Behavior
  - Demographic and **personality** factors
- Communication and **attention**

Conclusion

- Important industry
- **Young** and **elder** people
- The actual **context**
- Ethical considerations

Media Futures

Thank you

for your attention

Contact information:

Frank Rune Espeseth

fes010@uib.no

Research Centre for Responsible Media Technology and Innovation

Project number 309339

Norwegian Centre for Research-based Innovation