Marketing Campaign Performance Insights

Improving marketing spend efficiency and targeting

● Outline

- **Understanding the data**

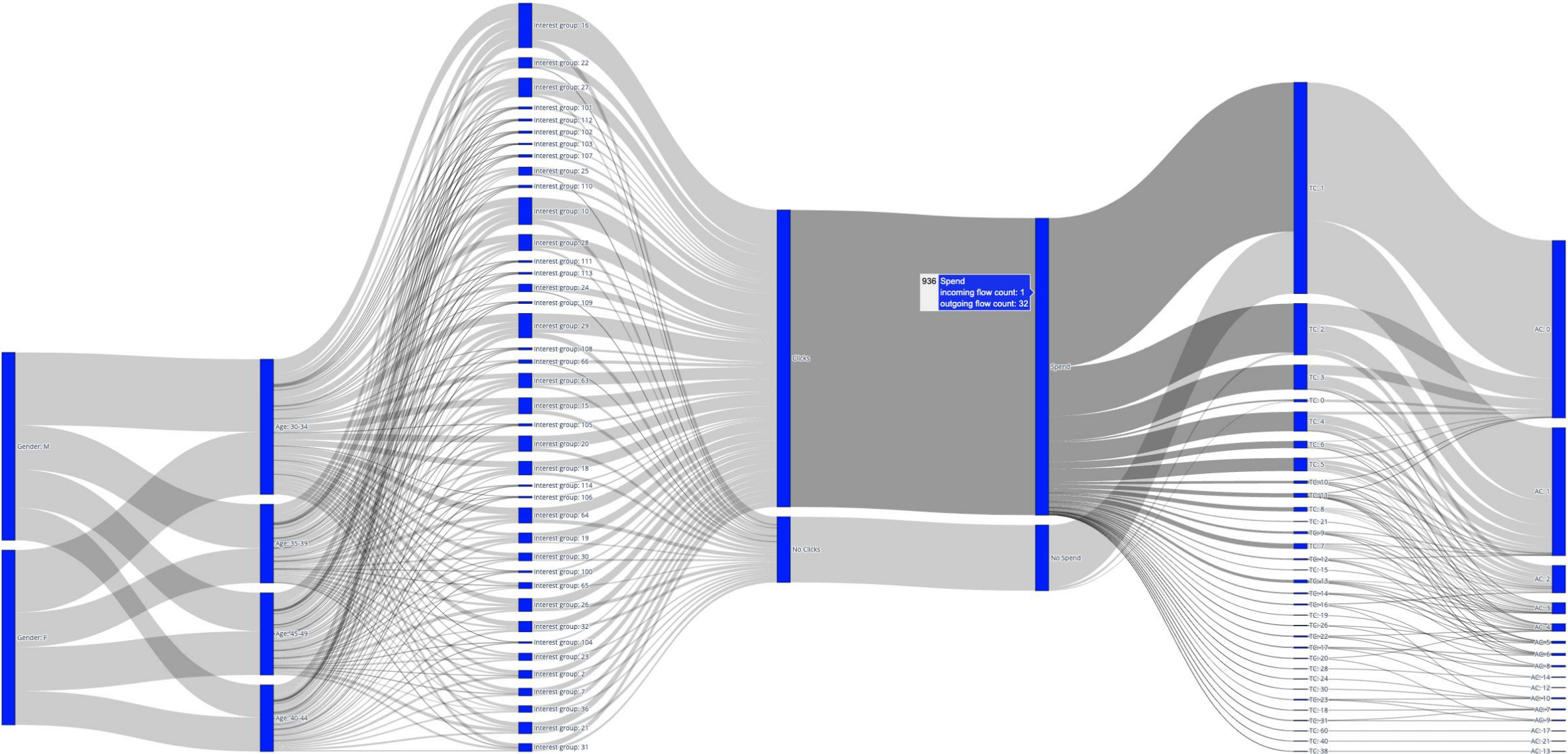- **Simple statistical evaluation**

- **Bayesian approach**

- **Recommendation**

Understanding the data
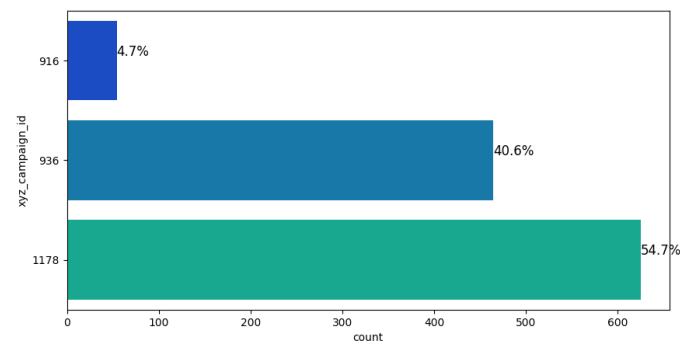
Exploratory analysis

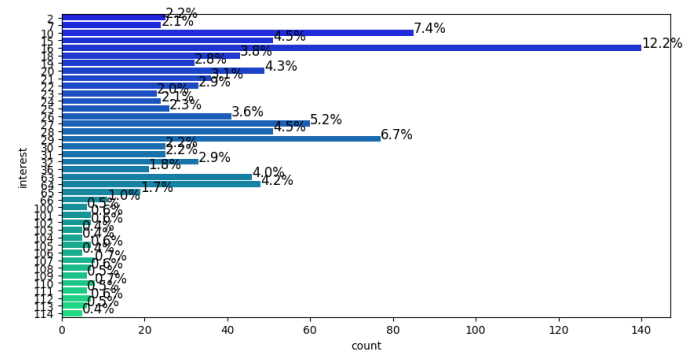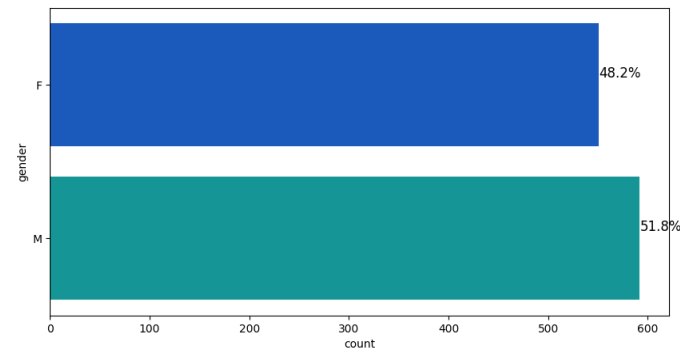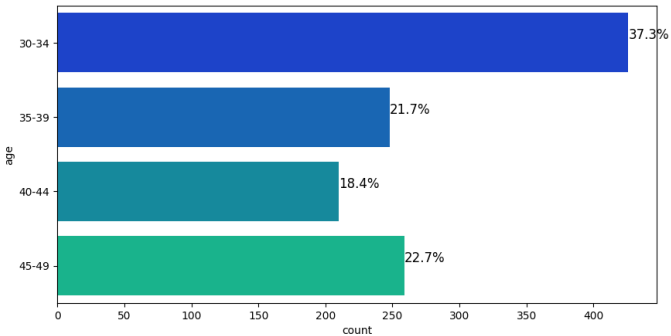# Campaign funnel

3 campaigns, targeting different groups and achieving different results
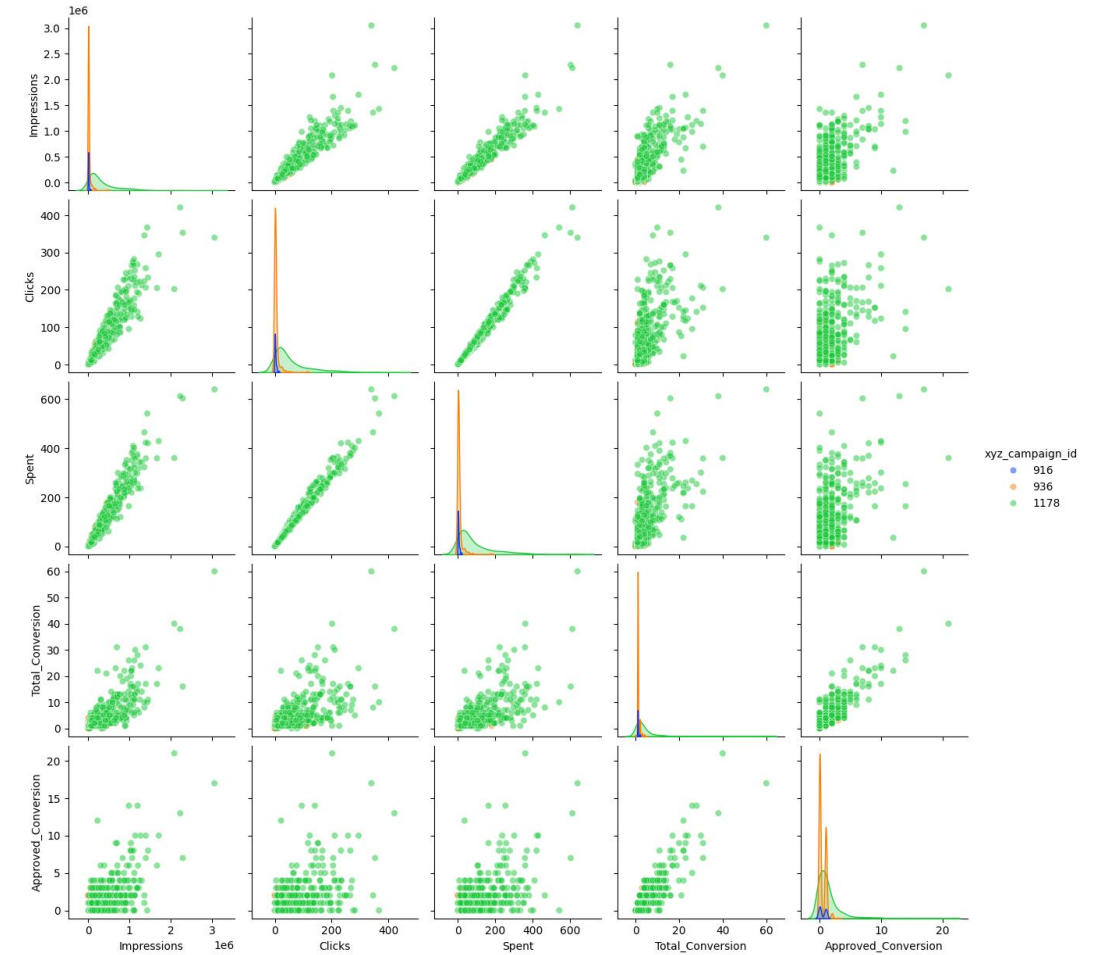
🔴 Variable Distribution

Proportion

Correlation

Strong correlations and collinearity between variables Impressions, Clicks, Spent. With linearity also observed between Toatal_Conversion and Approved_Conversion.

🔴 Variable Distribution

Correlation by age group

Correlation by gender
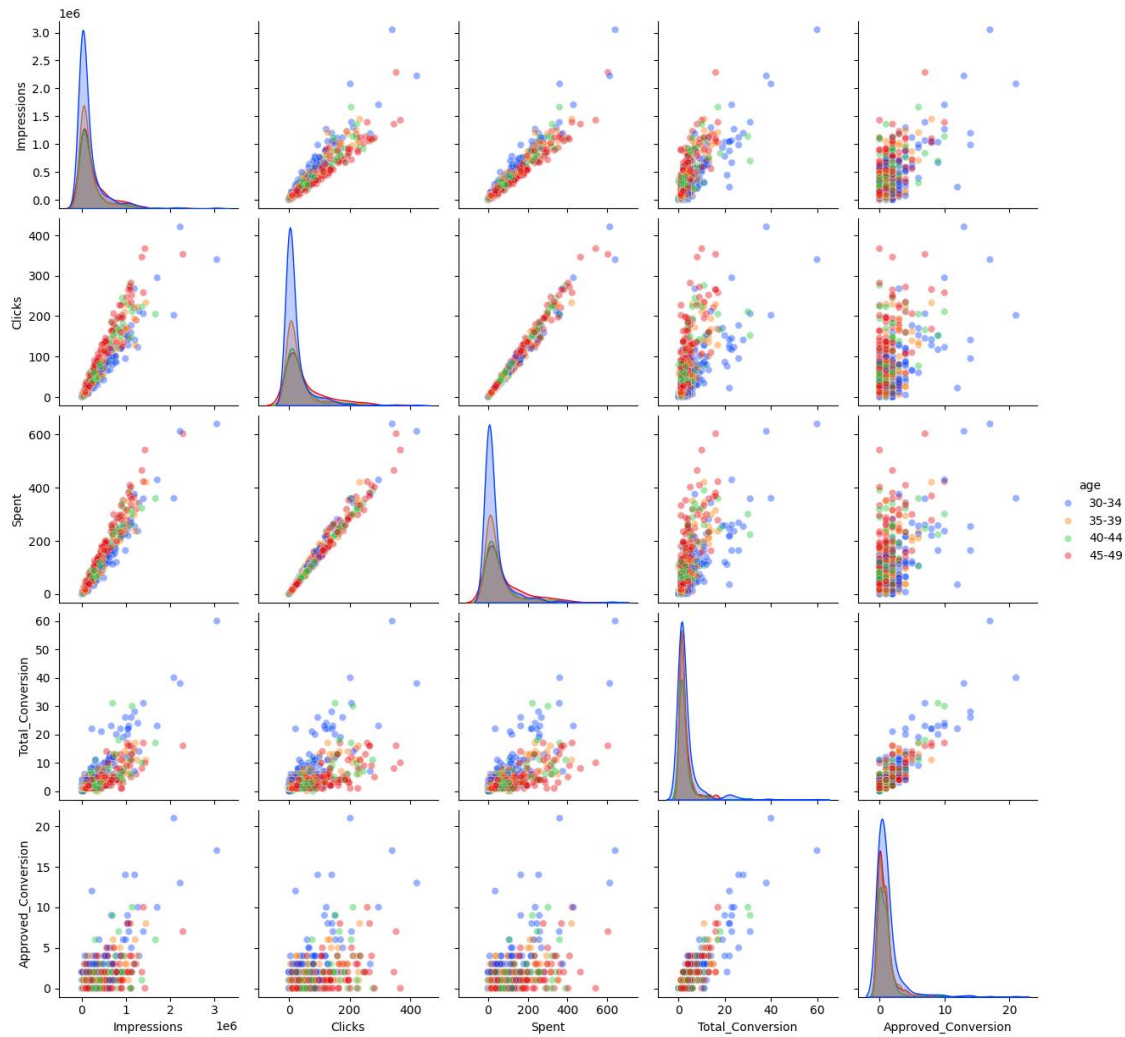
The correlation/interaction is stronger in some age groups than others.
Examples:
• Age group 45-49 has a steeper correlation between impressions and clicks.
• Age group 30-34 has a steeper correlation between clicks and total conversion.

There is more clicks per impression for female compared to male.

Simple statistical evaluation

🔴 Campaign performance statistics

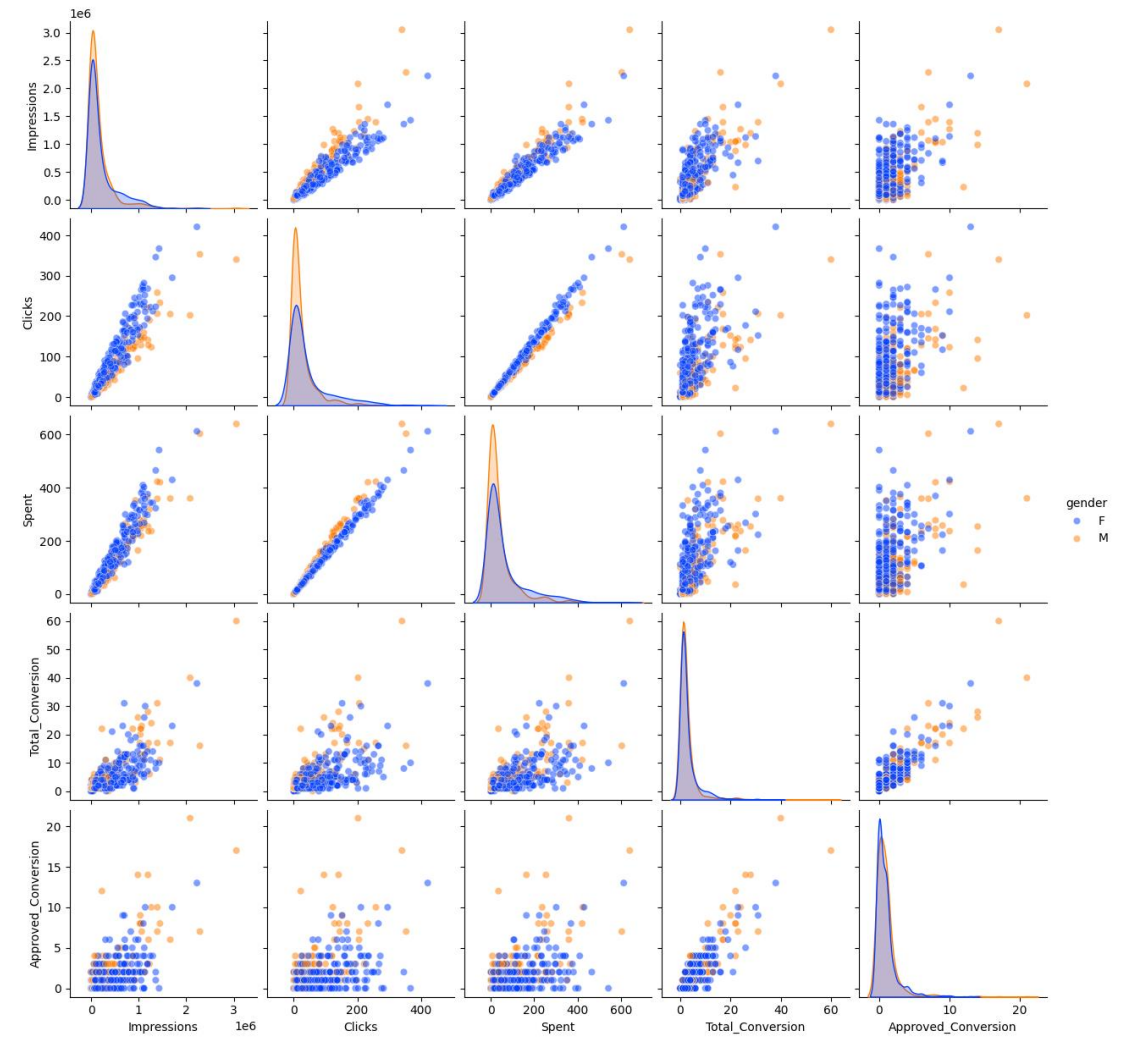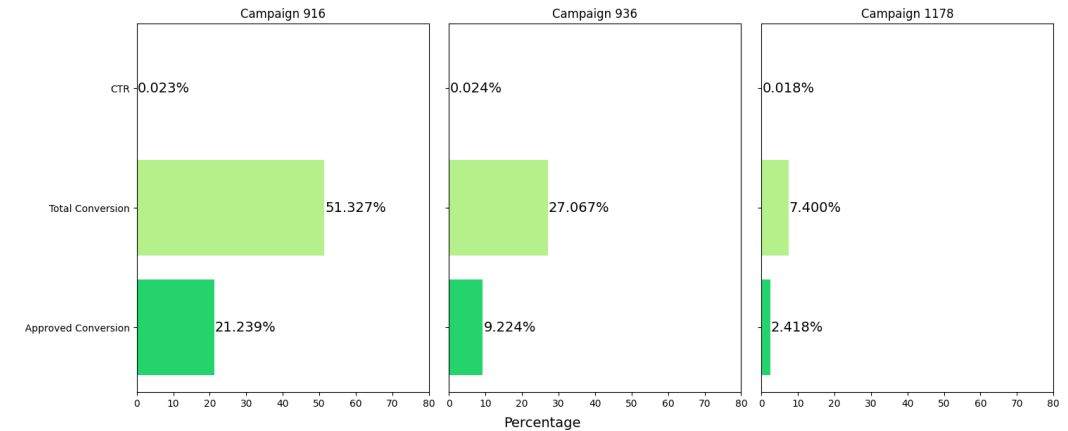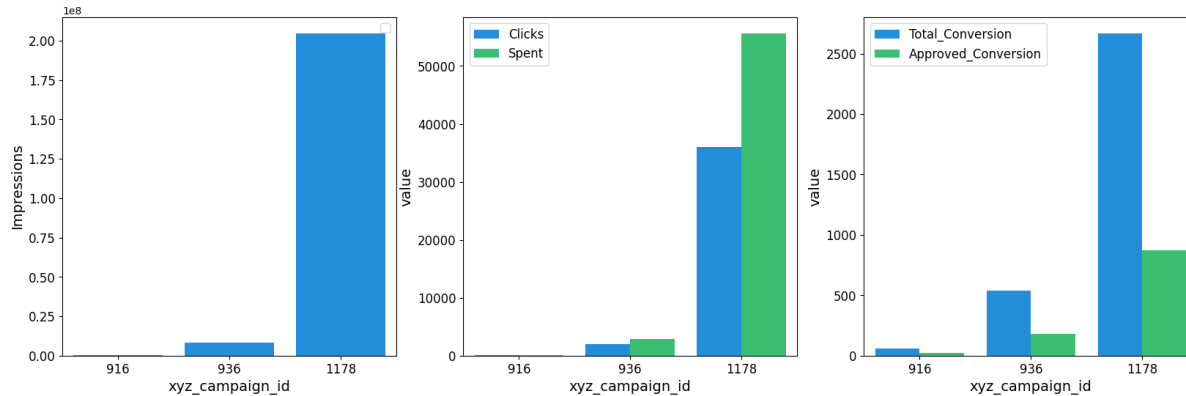Impressions, clicks, spent, conversions by campaign

Campaign 916 | Campaign 936 | Campaign 1178

- Campaign 916 has the highest conversion rate (21.24%), which means it converts clicks into approved conversions more effectively.
- Campaign 936 has a conversion rate of 9.22%, while Campaign 1178 has a lower conversion rate (2.42%).

CTR & CPC

CPC and Cost per Conversion
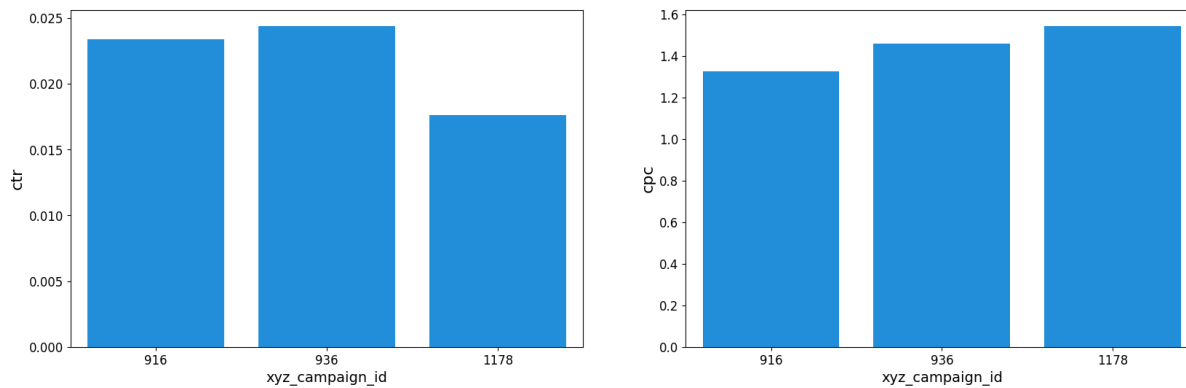
1.CTR (Click-Through Rate):
- Campaign 936 has the highest CTR (0.0244%), followed by Campaign 916 (0.0234%).
- Campaign 1178 has the lowest CTR (0.0176%).

2.CPC (Cost per Click)
- Campaign 916 has the lowest CPC (1.32), followd by Campaign 936 (1.45).
- Campaign 1178 has the highest CPC (1.54%).
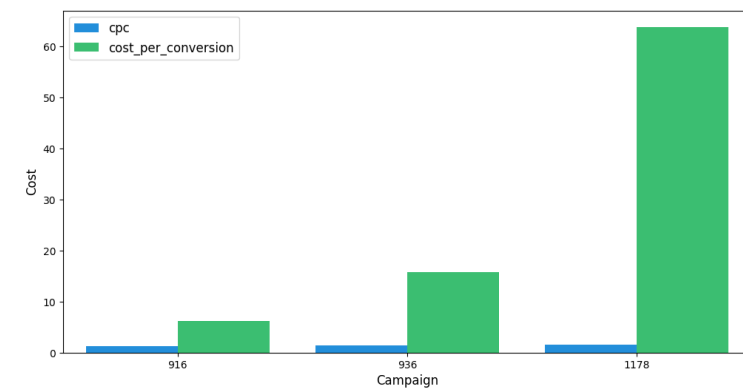
- Campaign 916 has the lowest **CPC** (1.32), followed by Campaign 936 (1.45). Campaign 1178 has the highest CPC (1.54).
- Campaign 916 has the lowest **Cost per Conversion** (6.24), followed by Campaign 936 (15.81). Campaign 1178 has the highest CPC (63.83).

● **Example Scenario (Campaign-based)**

Using the extracted stats i.e. CTR, CPC, and Conversion Rate

- **Total spend**: $58705.23.

- **Total Impressions**: 213434828

- **Total Clicks**: 38165

- **Total Approved Conversion**: 1079

➤ Spending 1000$ on campaign 916 will result in 3226623 Impressions, 755 Clicks, and 160 Approved Conversions

➤ Spending 1000$ on campaign 936 will result in 2810452 Impressions, 686 Clicks, and 63 Approved Conversions

➤ Spending 1000$ on campaign 1178 will result in 3679876 Impressions, 648 Clicks, and 16 Approved Conversions

Spending 58705.229958205 on campaign 916 will result in:189366431 Impressions,

➤ 44310 Clicks, and

➤ 9411 Approved Conversions

🔴 Example Scenario (Target-based)

Extracting stats on target level

Result clipped. Total rows 208.								
xyz_campaign_id	age	interest	Impressions	Clicks	Spent	Total_Conversion	Approved_Conversion	ctr
936	**40-44**	**2**	8415	4	4.530000000999999	4	3	0.047
936	**45-49**	**31**	8660	4	6.340000153	2	1	0.046
916	**45-49**	**21**	2182	1	1.529999971	1	1	0.045
916	**30-34**	**20**	15362	7	10.28000021	2	1	0.045
936	**45-49**	**25**	10194	4	4.590000033	2	1	0.039

100 rows   « ‹ Page 1 ⌄ of 20 › »

Populate What-If Scenario

⌄"Campaigns": [*6 Items*] ⌄"Ages": [*6 Items*] ⌄"Interests": [*6 Items*] ⌄"Budgets": [*6 Items*]

Campaigns	Ages	Interests	Budgets
0: 936	0: 40-44	0: 2	0: 100
1: 936	1: 45-49	1: 31	1: 100
2: 916	2: 45-49	2: 21	2: 100
3: 916	3: 30-34	3: 20	3: 100
4: 936	4: 45-49	4: 25	4: 100
5: 936	5: 40-44	5: 30	5: 100

What-If Scenario output

Campaigns	Ages	Interests	Budgets	Impressions	Clicks	Conversions
936	40-44	2	100	**185130**	**88**	**66**
936	45-49	31	100	**136395**	**63**	**16**
916	45-49	21	100	**141830**	**65**	**65**
916	30-34	20	100	**149231**	**68**	**10**
936	45-49	25	100	**221720**	**87**	**22**
936	40-44	30	100	**160650**	**63**	**126**
	Total:		600	**994956**	**434**	**305**

Bayesian approach

🔴 Bayesian Hierarchical Model

Modeling clicks, spend, and conversation

Clicks (n_clicks_hco), spend (price_hco), and conversions (conversions_hs) are modelled with various distributions, taking observed number of impressions (n_impressions_hco), segments and various priors as inputs
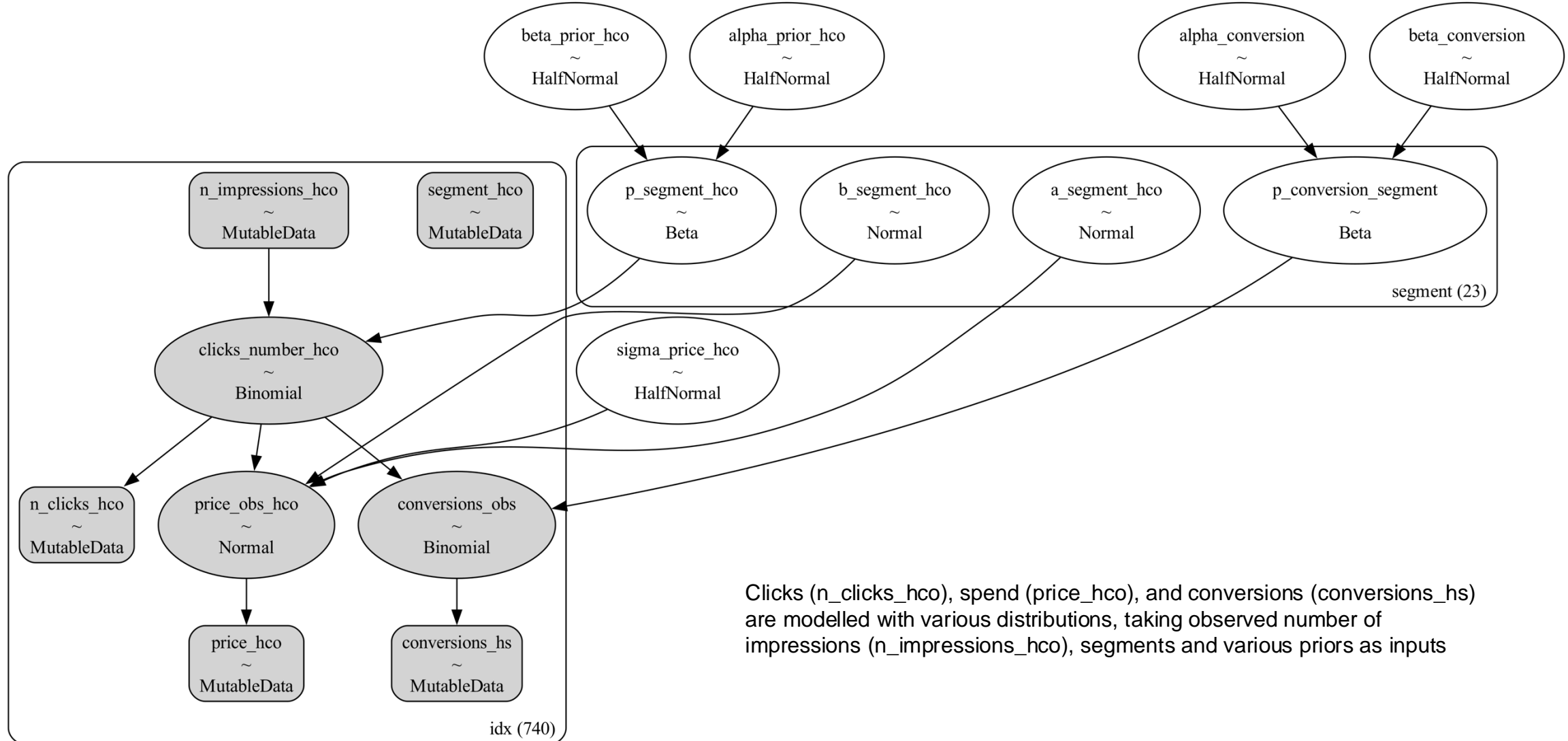
# Conversion probability per campaign and segment
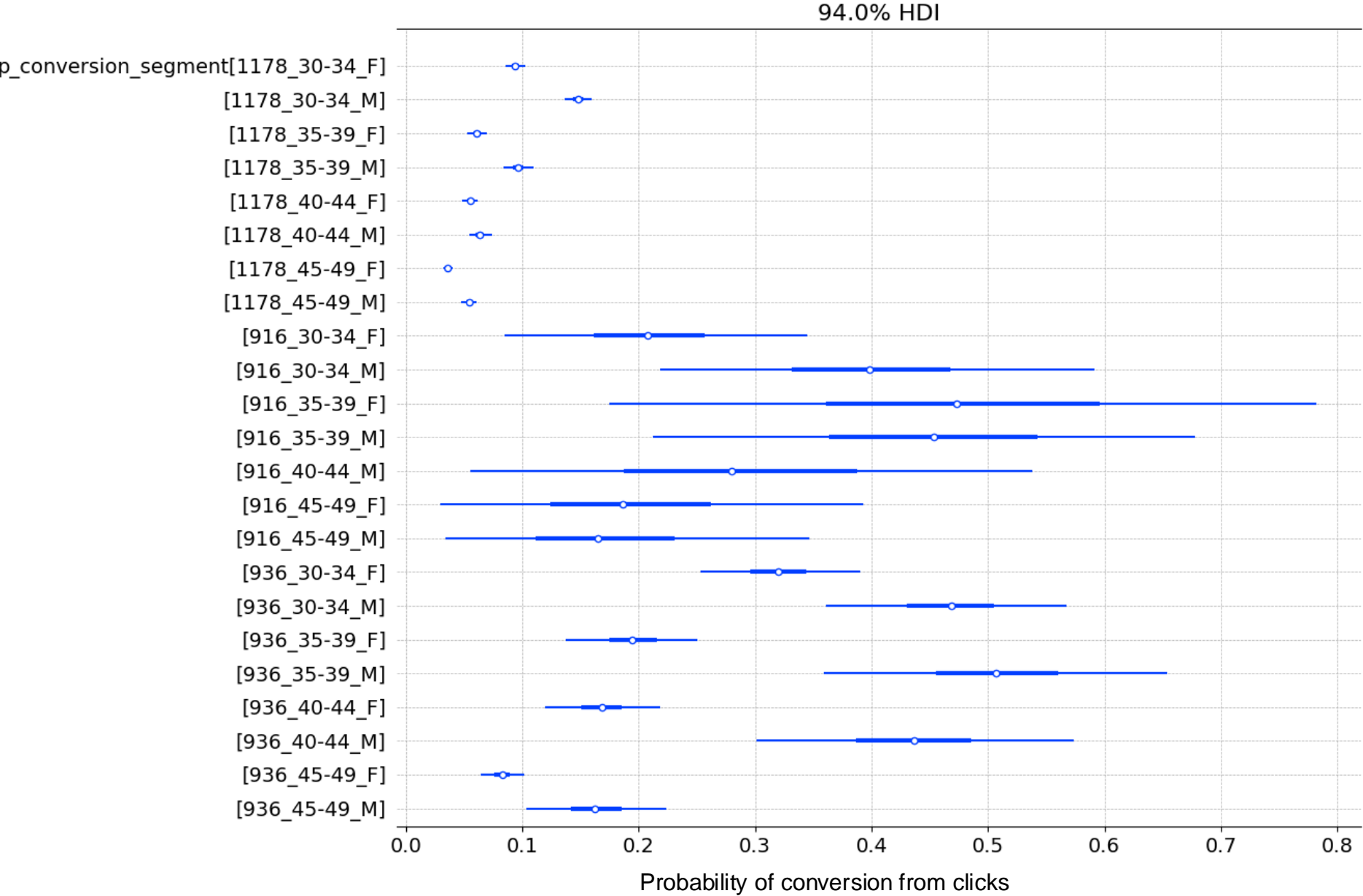
The plot visualizes the posterior distributions of the segment-specific conversion probabilities. Each horizontal line represents a 95% credible interval, with the dots marking the median of the posterior distribution for each segment.

🔴 Out-of-sample prediction

Predicting number of conversions from number of clicks
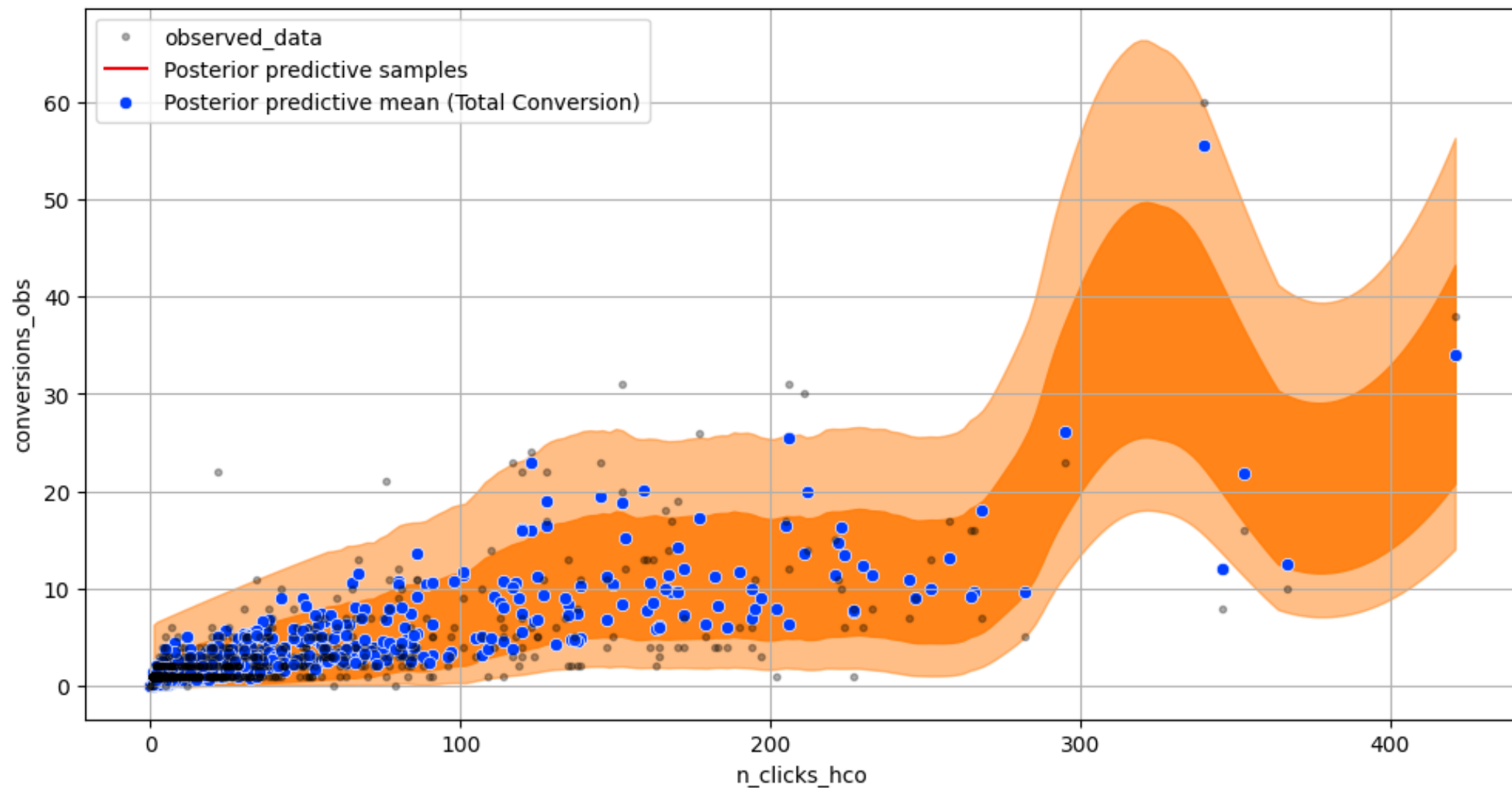
🔴 Predicting clicks and conversions from spend (budget)
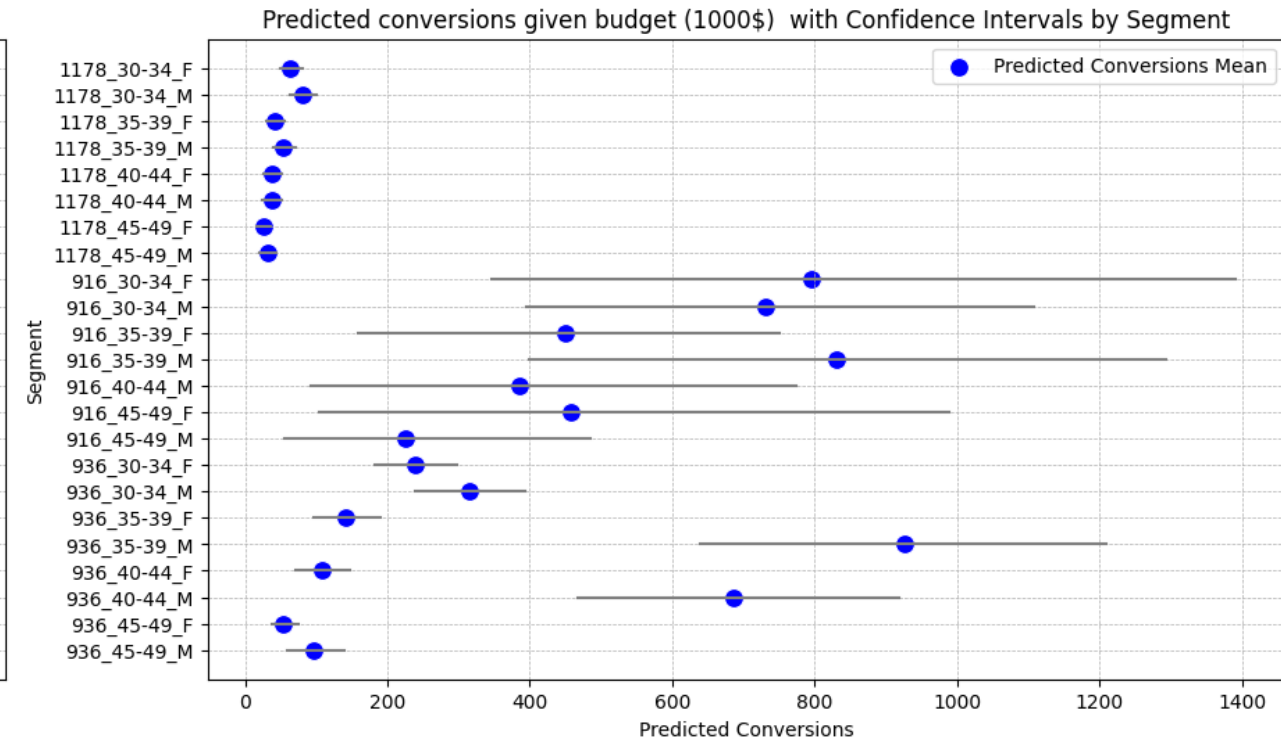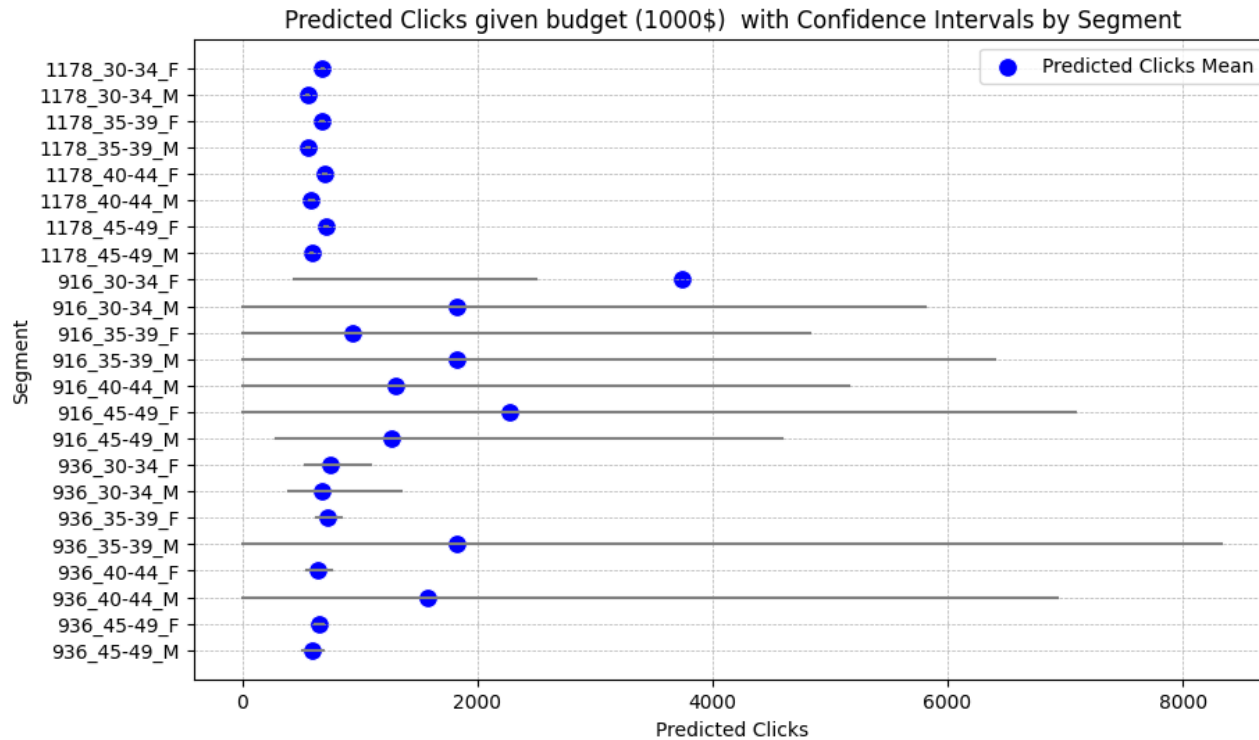
- **maximize clicks**: Clicks can drive product awareness. Investing in campaign 916, targeting 30 to 34 females would result in the highest clicks.
- **maximize conversion**: Using campaign 936 and targeting the 35 to 39 males will results in the highest expected conversion.
- **Segment influence**: campaign, segments (age and gender) have a significant impact on CTR, spend (i.e. Cost per click), and conversion rate
- **Multi-armed bandit**: The campaigns and segments' performance are valid for the currently available data. One should not allocate the full marketing budget to the highest performing campaign and segment. An "explore and exploit" approach should be used, setting aside a reserved budget, to explore the underperforming campaigns and segments

● **Head to Notebook**