



Attribution and Allocation

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[Link to Github](#)



Agenda

01

**Executive
Summary**

02

**Coding and
Output**

03

**Comparison among
Different Models**

04

**Insight and
Reflection**



Executive Summary

- We chose Last Touchpoint Attribution Model
- Under this model, we suggest allocating:
 - \$3000 on social,
 - \$3000 on referral,
 - \$2000 on display,
 - \$2000 on email,
 - \$1000 on paid_search
- And we will get 5520 conversions in total

Coding and Output

Marginal CAC

Under 5
models

Last_Touchpoint			
	T1	T2	T3
Display	1.89	3.45	7.81
Referral	0.83	1.12	1.70
Social	1.60	2.30	4.65
Email	3.56	3.65	10.00
Paid_search	5.68	5.85	7.46

First_Touchpoint			
	T1	T2	T3
Display	2.30	3.44	6.94
Referral	0.66	0.83	1.86
Social	2.11	2.87	6.29
Email	3.79	7.25	4.63
Paid_search	7.75	12.20	8.55

Last_nondirect Touchpoint			
	T1	T2	T3
Display	1.89	3.45	7.75
Referral	0.83	1.12	1.69
Social	1.60	2.29	4.67
Email	3.56	3.65	9.90
Paid_search	5.68	5.85	7.46

Linear			
	T1	T2	T3
Display	2.28	3.51	8.19
Referral	0.66	0.88	1.58
Social	2.06	2.96	5.78
Email	3.98	5.23	7.20
Paid_search	7.81	9.11	9.88

Position-based			
	T1	T2	T3
Display	2.17	3.49	7.62
Referral	0.70	0.92	1.68
Social	1.92	2.73	5.53
Email	3.81	5.01	6.79
Paid_search	7.10	8.47	8.78

Average CAC

Under
Last_Touch
point model

Paid_search			
	cum_spend	cum_conv	average_CAC
t1	1000	176	5.68
t2	2000	347	5.76
t3	3000	481	6.24

Referral			
	cum_spend	cum_conv	average_CAC
t1	1000	1211	0.83
t2	2000	2107	0.95
t3	3000	2696	1.11

Display			
	cum_spend	cum_conv	average_CAC
t1	1000	528	1.89
t2	2000	818	2.44
t3	3000	946	3.17

Social			
	cum_spend	cum_conv	average_CAC
t1	1000	625	1.60
t2	2000	1060	1.89
t3	3000	1275	2.35

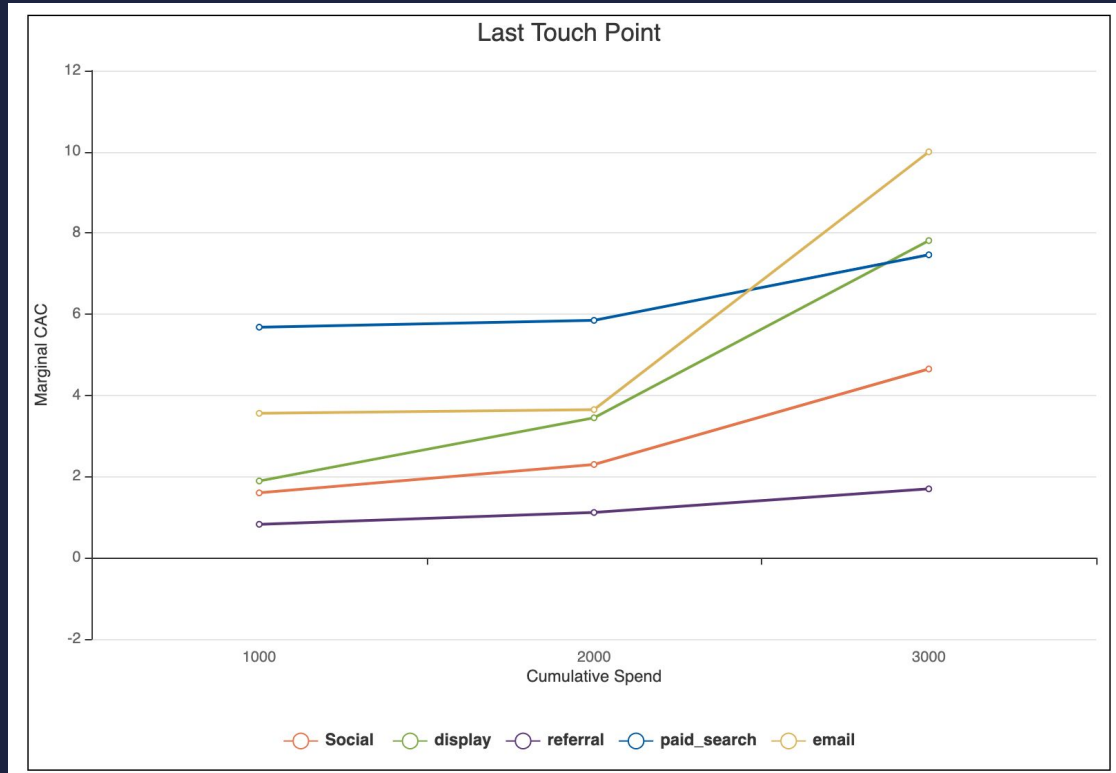
Email			
	cum_spend	cum_conv	average_CAC
t1	1000	281	3.56
t2	2000	555	3.60
t3	3000	655	4.58

(Last Touchpoint Attribution Model)

- Under this model, we suggest allocating \$3000 on social, \$3000 on referral, \$2000 on display, \$2000 on email, \$1000 on paid_search
- We will get 5520 conversions in total

Last_Touchpoint							
last_touch_point attribution model		— implied CAC					
		marginal_CAC_t1		marginal_CAC_t2		marginal_CAC_t3	Total Spend
social	1000	1.600	1000	2.299	1000	4.651	3000
display	1000	1.893	1000	3.448	0	7.813	2000
referral	1000	0.826	1000	1.116	1000	1.698	3000
paid_search	1000	5.681	0	5.848	0	7.463	1000
email	1000	3.559	1000	3.650	0	10.000	2000
last_touch_point attribution model		— number of conversions					
		# of conversion		# of conversion		# of conversion	#conversion
social	1000	625.0	1000	435.0	1000	215.0	1275.0
display	1000	528.3	1000	290.0	0	0.0	818.3
referral	1000	1210.7	1000	896.1	1000	588.9	2695.6
paid_search	1000	176.0	0	0.0	0	0.0	176.0
email	1000	281.0	1000	274.0	0	0.0	555.0
							Total
							5519.9

Visualization of marginal CAC of 5 different channels



Comparison

Three Attribution Models

We compared the marginal CAC, optimal allocation and number of conversions and found out that the total numbers of conversion are relatively the same

Last_Touchpoint						
last_touch_point attribution model		— implied CAC			Total Spend	
		marginal_CAC_t1	marginal_CAC_t2	marginal_CAC_t3		
social	1000	1.600	2.299	4.651		3000
display	1000	1.893	3.448	7.813		2000
referral	1000	0.826	1.116	1.698		3000
paid_search	1000	5.681	5.848	7.463		1000
email	1000	3.559	3.650	10.000		2000
last_touch_point attribution model		— number of conversions			#conversion	
		# of conversion	# of conversion	# of conversion		
social	1000	625.0	435.0	215.0		1275.0
display	1000	528.3	290.0	0.0		818.3
referral	1000	1210.7	898.1	588.9		2695.6
paid_search	1000	176.0	0.0	0.0		176.0
email	1000	281.0	274.0	0.0		555.0
Total						5519.9

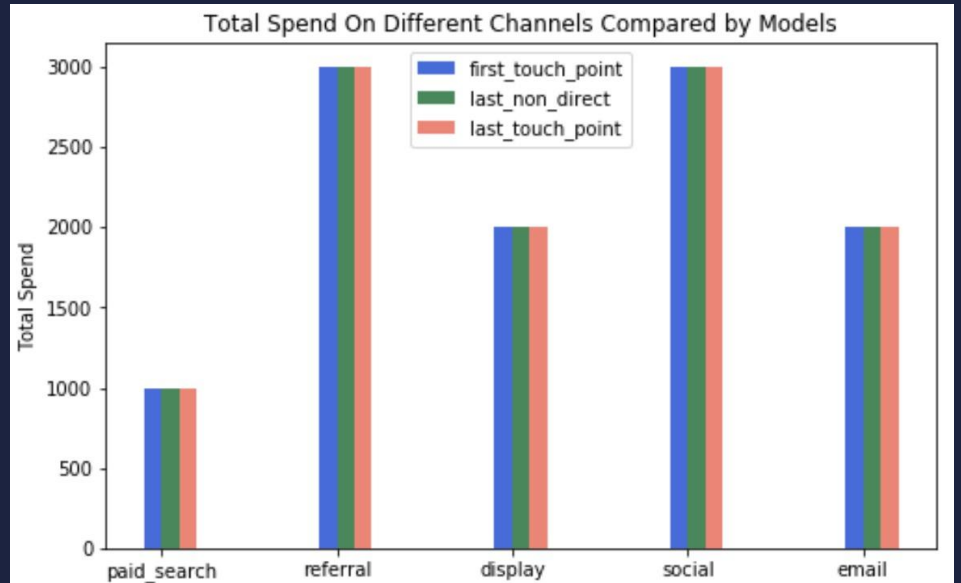
First_Touchpoint						
first_touch_point attribution model		— implied CAC				
		marginal_CAC_t1	marginal_CAC_t2	marginal_CAC_t3		
display	1000	2.299	3.436	6.944		2000
referral	1000	0.658	0.833	1.859		3000
social	1000	2.105	2.874	6.289		3000
email	1000	3.788	7.246	4.630		2000
paid_search	1000	7.752	12.195	8.547		1000
First_touch_point attribution model		— number of conversions			#conversion	
		# of conversion	# of conversion	# of conversion		
display	1000	435.0	291.0	0.0		726.0
referral	1000	1519.0	1200.0	538.0		3257.0
social	1000	475.0	348.0	159.0		982.0
email	1000	264.0	0.0	216.0		480.0
paid_search	1000	129.0	0.0	0.0		129.0
Total						5574.0

Last_nondirect						
Last_nondirect_attribution model		— implied CAC				
		marginal_CAC_t1	marginal_CAC_t2	marginal_CAC_t3		
display	1000	1.894	3.448	7.752		2000
referral	1000	0.825	1.117	1.692		3000
social	1000	1.600	2.299	4.673		3000
email	1000	3.559	3.650	9.901		2000
paid_search	1000	5.682	5.848	7.463		1000
Last_nondirect_attribution model		— number of conversions			#conversion	
		# of conversion	# of conversion	# of conversion		
display	1000	528.0	290.0	0.0		818.0
referral	1000	1212.0	895.0	591.0		2698.0
social	1000	625.0	436.0	214.0		1275.0
email	1000	281.0	274.0	0.0		555.0
paid_search	1000	176.0	0.0	0.0		176.0
Total						5522.0

Comparison

Three Attribution Models

We visualized the optimal budget allocation on different channels by three models (Last_Touchpoint; First_Touchpoint; Last_nondirect) and found out the allocation strategy are the same.



Comparison

Between Marginal CAC and Average CAC

Calculating the optimal allocation based on average CAC, we found that the optimal allocation result generated by marginal CAC relatively gives a greater number of conversions compared to the average CAC.

Last_Touchpoint						
last_touch_point	attribution model	— implied CAC				Total Spend
		marginal_CAC_t1	marginal_CAC_t2	marginal_CAC_t3		
social	1000	1.600	1000	2.299	1000	4.651
display	1000	1.893	1000	3.448	0	7.813
referral	1000	0.826	1000	1.116	1000	1.668
paid_search	1000	5.681	0	5.848	0	7.463
email	1000	3.559	1000	3.650	0	10.000
last_touch_point	attribution model	— number of conversions	# of conversion	# of conversion	# of conversion	#conversion
social	1000	625.0	1000	435.0	1000	215.0
display	1000	528.3	1000	290.0	0	0.0
referral	1000	1210.7	1000	896.1	1000	588.9
paid_search	1000	176.0	0	0.0	0	0.0
email	1000	281.0	1000	274.0	0	0.0
						Total
						5519.9

Paid_search				
	cum_spend	cum_conv	average_CAC	# of Conv
t1	1000	176	5.68	
t2	2000	347	5.76	
t3	3000	481	6.24	
Referral				
	cum_spend	cum_conv	average_CAC	
t1	1000	1211	0.83	
t2	2000	2107	0.95	
t3	3000	2696	1.11	2696
Display				
	cum_spend	cum_conv	average_CAC	
t1	1000	528	1.89	
t2	2000	818	2.44	
t3	3000	946	3.17	946
Social				
	cum_spend	cum_conv	average_CAC	
t1	1000	625	1.60	
t2	2000	1060	1.89	
t3	3000	1275	2.35	1275
Email				
	cum_spend	cum_conv	average_CAC	
t1	1000	281	3.56	
t2	2000	555	3.60	555
t3	3000	655	4.58	
				Total
				5472

Insight and Reflection

- By comparing the optimal allocation distribution and final conversions under these three models, we can assume that which model to choose doesn't make big difference to the final result (number of conversions or allocation strategy)
- But what we can tell from this is that for this D2C business, the most effective advertising channels are social and referral .