

Airline Passenger Satisfaction — Gradient Boosting with LIME-style Explanations

Files:

Generated: 2025-08-22 12:16:58
/mnt/data/airline_satisfaction.csv
/mnt/data/code_airline_lime.py
/mnt/data/lime_report_airline.pdf
/mnt/data/metrics_summary.csv
/mnt/data/local_explanations.csv

Dataset & Modeling Summary

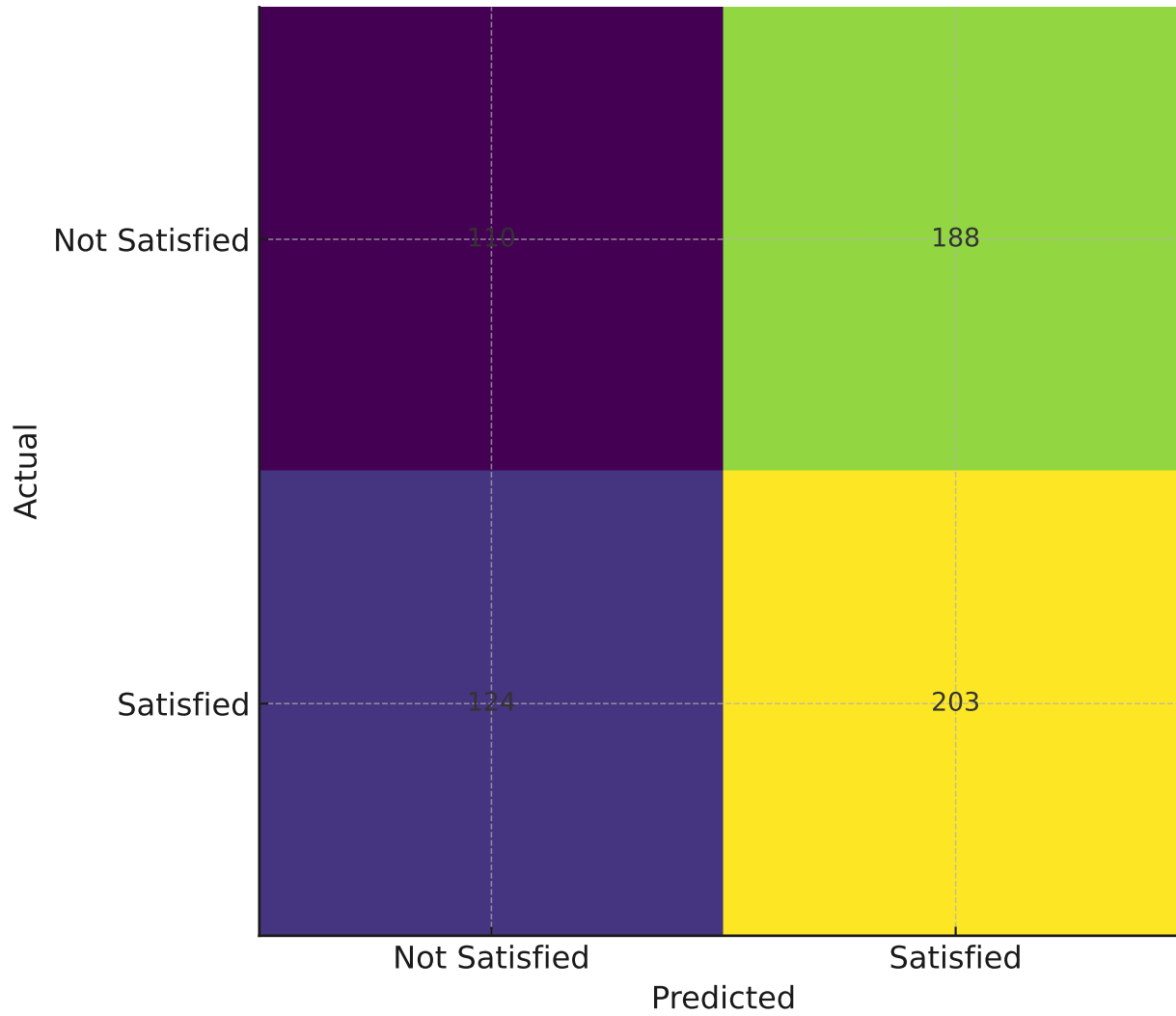
Dataset: Synthetic approximation of the public 'Airline Passenger Satisfaction' schema. Rows: 22
Target: Satisfaction (1=satisfied, 0=not satisfied) Features include demographics (Gender, (Class, Flight Distance, Delays), and service ratings (Wifi, Online boarding, Seat comfort, En board service, etc.). Train/Test split: 75%/25% stratified. Model: GradientBoostingClassifier preprocessing (median imputation + one-hot encoding).

Model Performance

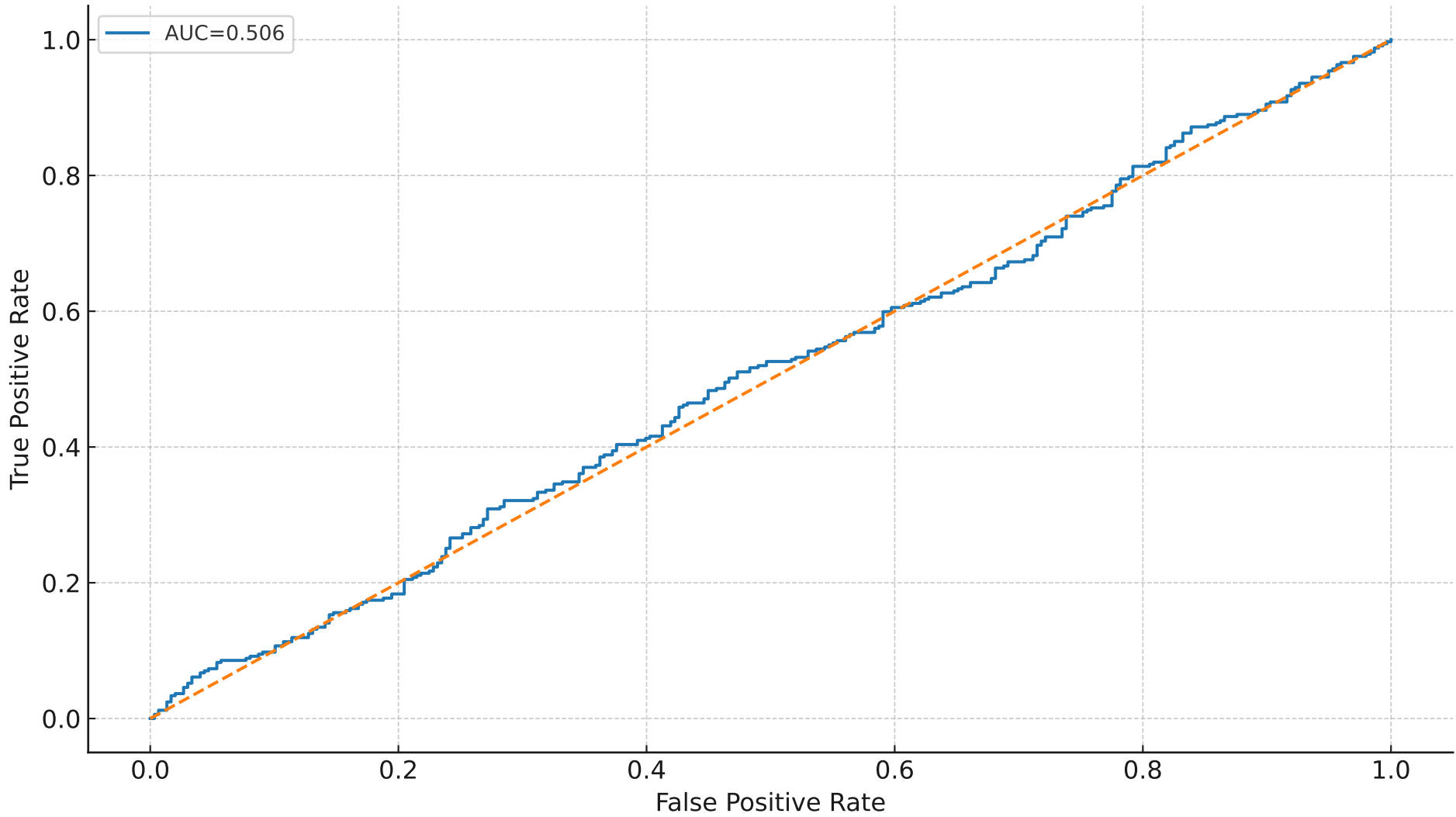
Accuracy: 0.5008 ROC AUC: 0.5057 Classification report:

							precision	recall	f1
accuracy_overall	roc_auc	0		0.470085	0.369128	0.413534	298.0000		0.5
0.519182	0.620795	0.565460	327.0000		0.5008	0.505747	accuracy	0.500800	0.5
0.5008		0.5008	0.505747	macro avg	0.494634	0.494961	0.489497	625.0000	
0.505747	weighted avg	0.495773	0.500800	0.493021	625.0000		0.5008	0.505747	

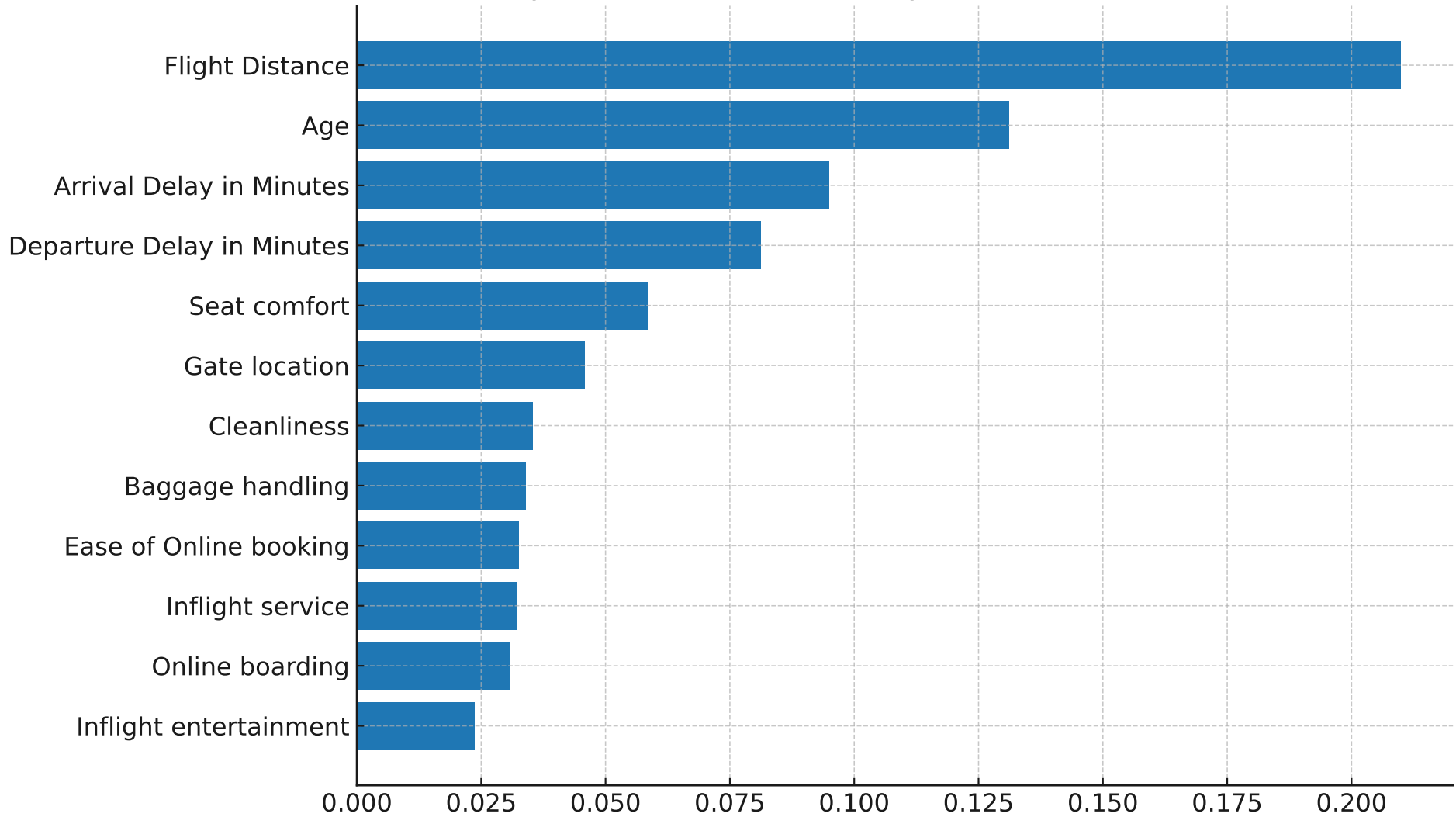
Confusion Matrix



ROC Curve



Top 12 Global Feature Importances (Transformed)

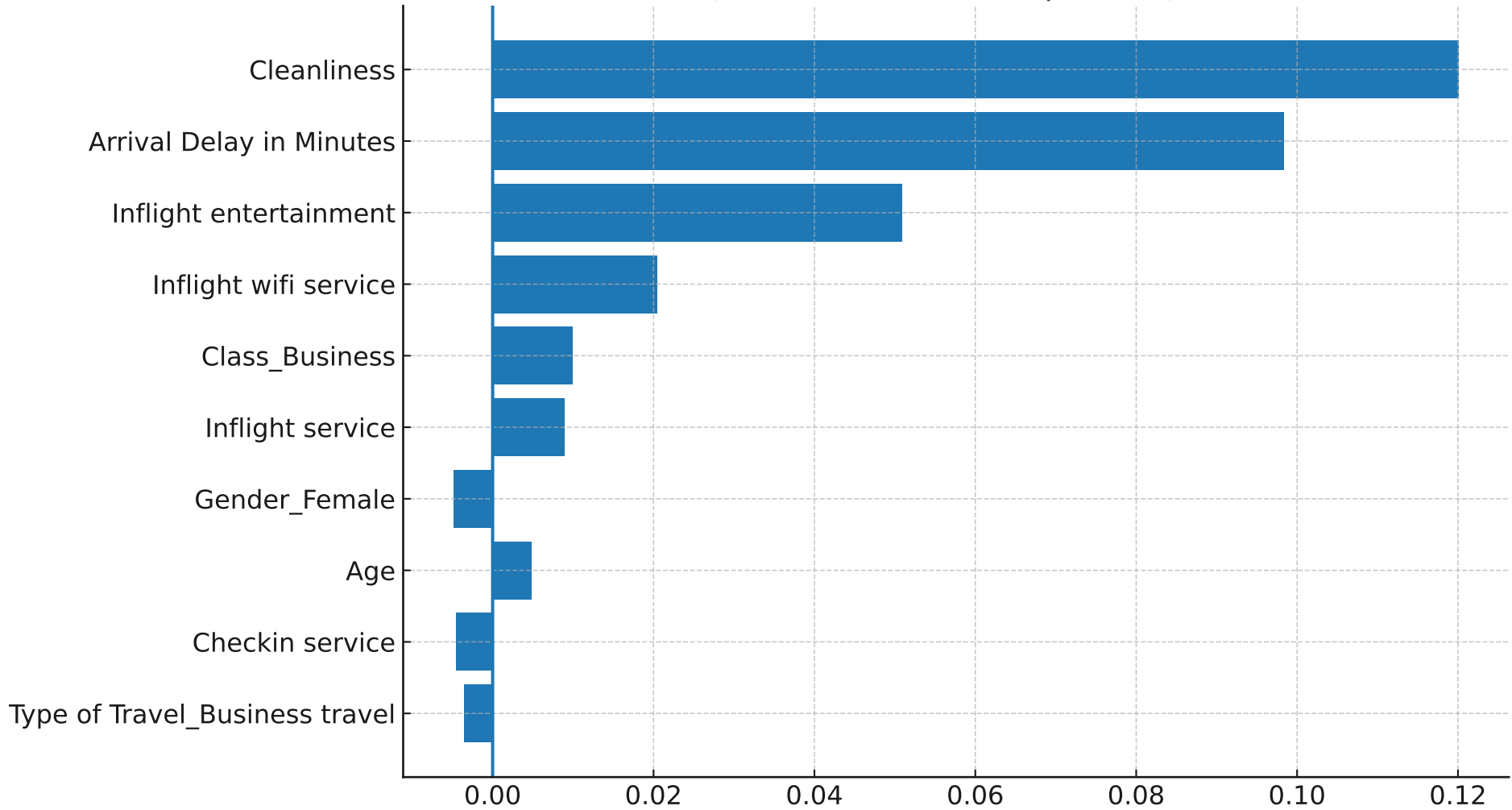


LIME-style Explanation — Most-likely Satisfied

Model probability of satisfaction: 0.791 Local surrogate probability: 0.717 Intercept (local surrogate): 0.7544 Top contributions (feature or category level, signed):

						feature_or_level
centered/active		Cleanliness	0.120087	-2.0		Arrival Delay in Minutes
0.098373	10.0	Inflight entertainment	0.050900	-2.0		
service	0.020446	-2.0	Class_Business	0.009965		
Inflight service	0.008994	-1.0	Gender_Female	-0.004874		
Age	0.004821	10.0	Checkin service	-0.004580		1
Travel_Business travel	-0.003556		1.0	Departure Delay in Minutes	-0.003556	
1.0	Food and drink	0.003161	1.0	On-board service		
-1.0	Flight Distance	-0.000510	-50.0	Customer Type_Loyal Customer		
-0.000368	1.0					

LIME-style Local Contributions — Most-likely Satisfied
Model $p(\text{satisfied})=0.791$ | Local $p=0.717$



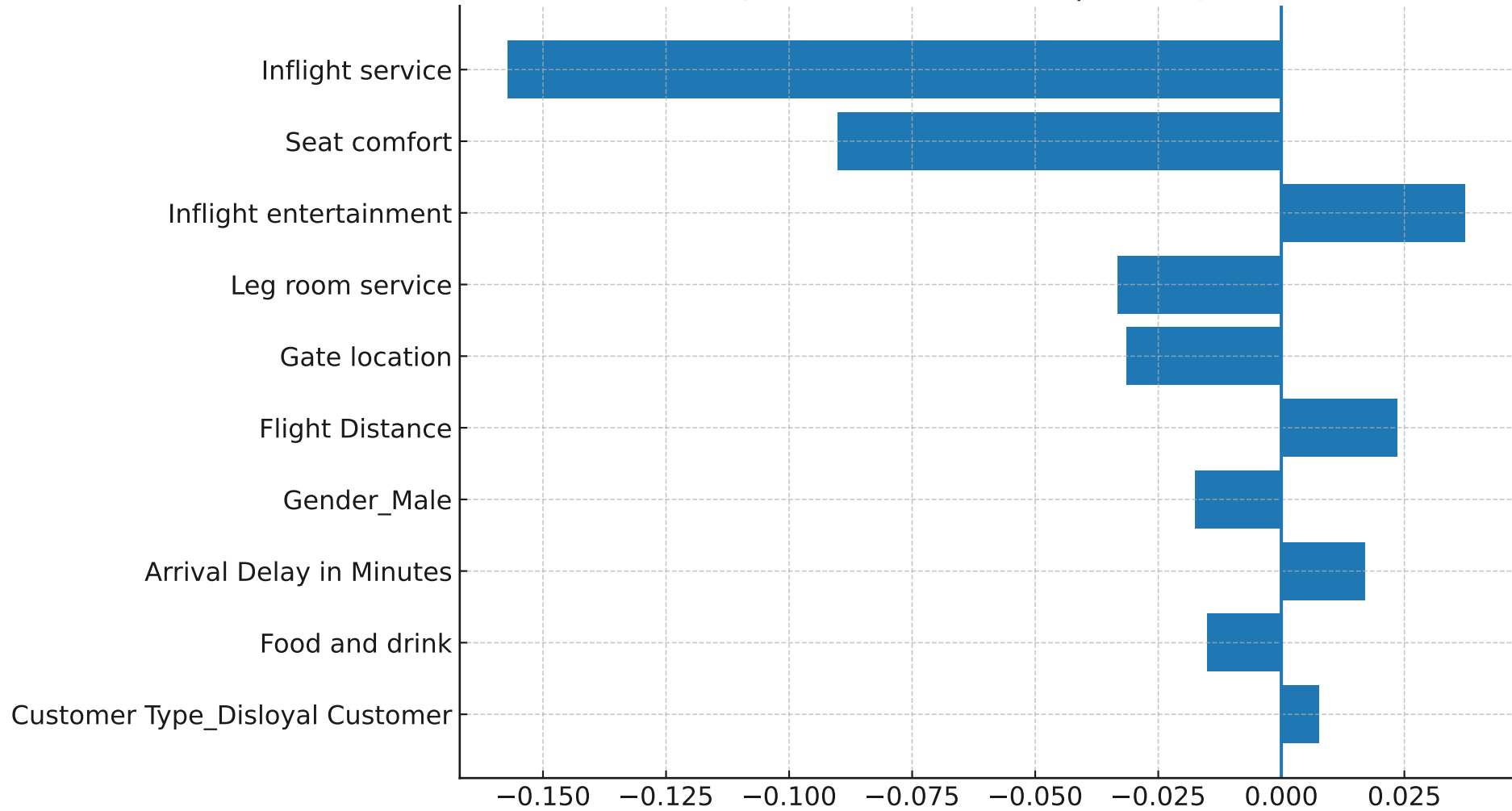
LIME-style Explanation — Most-likely Dissatisfied

Model probability of satisfaction: 0.231 Local surrogate probability: 0.298 Intercept (local surrogate): -0.0103 Top contributions (feature or category level, signed):

				feature_or_level
centered/active		Inflight service	-0.157187	-2.0
-0.090024	-2.0	Inflight entertainment	0.037333	1.0
room service	-0.033155	1.0	Gate location	-0.031408
Flight Distance	0.023472	-664.0	Gender_Male	-0.017477
Arrival Delay in Minutes	0.016918	4.0	Food and drink	-0.006553
-1.0 Customer Type_Disloyal Customer	0.007545	1.0	Checkin service	-3.0
-0.006553	-1.0	Departure Delay in Minutes	0.004074	
Age	0.002880	-3.0	Type of Travel_Personal Travel	-0.002860
Baggage handling	0.002383	1.0		

LIME-style Local Contributions — Most-likely Dissatisfied

Model $p(\text{satisfied})=0.231$ | Local $p=0.298$



LIME-style Explanation — Random Passenger

Model probability of satisfaction: 0.525					Local surrogate probability: 0.520					Intercept (local surrogate): 0.5393				
Top contributions (feature or category level, signed):					feature_or_level					value				
centered/active	Departure Delay in Minutes				-0.045986	10.0				Arrival Delay in Minutes	1.0			
-0.027224	15.0				Online boarding	0.013180				1.0				
Inflight service	-0.012214				-1.0	Flight Distance				-0.009702				
Inflight wifi service	-0.008051				-1.0	Leg room service				-0.0074				
-1.0	Class_Eco				0.006075	1.0				Cleanliness of aircraft	1.0			
-0.004784	1.0				Food and drink	0.004637				-1.0	Customer satisfaction			
Customer	-0.004427				1.0	Seat comfort				0.002430				
Ease of Online booking	0.001622				-1.0	Type of Travel_Personal Travel				-0.001				
1.0	Gender_Female				0.001008	1.0								

LIME-style Local Contributions — Random Passenger
Model $p(\text{satisfied})=0.525$ | Local $p=0.520$

