

Supplementary Material

Sellers eligibility by Amazon's algorithm: An empirical study based on classification algorithms and decision rules

Álvaro Gómez-Losada^{1,2}, Gualberto Asencio-Cortés³, Néstor Duch-Brown¹

¹ European Commission, Joint Research Centre (JRC), Seville, Spain.

² Department of Statistics and Operations Research, University of Seville, Seville, Spain.

³ Data Science & Big Data Lab, Universidad Pablo de Olavide, ES-41013 Seville, Spain.

Contents

- SM.1. Most relevant rules when predicting the change of seller at the Buy-Box.
- SM.2. Most relevant rules when predicting the seller at the Buy-Box.

SM.1. Most relevant rules when predicting the change of seller at the Buy-Box.

Table S1. Analyzed rules at category of products. Coverage: Similarly to a leaf, n is the number of cases covered by the rule and m , if it appears, shows how many of them do not belong to the class predicted by the rule. The rule's accuracy is estimated by the Laplace ratio $(n - m + 1)/(n + 2)$. The lift is the result of dividing the rule's estimated accuracy by the relative frequency of the predicted class in the data set. P or PP: specific rule for a product (or products). The identification of product(s) is (are) omitted by privacy concerns.

Category	Rule	Coverage (n/m)	Lift	Accuracy	Features and values
Automotive	1	69/4	10.3	0.930	PP, $rPrice > 0$, $rPriceCumMax > 13.82$
	2	24/1	10.2	0.923	$stock \leq 0$, $rPrice \leq -0.05$
Baby	1	12	26.6	0.929	$opinions > 1247$, $rPrice > 6.22$
	2	10	26.3	0.917	$stock \leq 0$, $rPrice \leq -2.7$, $rPriceCumMin > -46.22$
Beauty	1	43/3	7.0	0.911	P, $bestseller > 0$, $rPrice \leq -0.02$
	2	9	7.0	0.909	P, $opinions \leq 145$, $rPrice \leq -0.02$
Electronics	1	69	3.3	0.986	P, $opinions > 625$, $opinions \leq 634$
	2	85/2	3.2	0.966	$amChoice > 0$, $rPrice > 13.98$, $rPriceCumMax > 31.11$
Garden	1	24	9.0	0.962	$stock \leq 0$, $rPrice \leq -4.08$
	2	30/3	8.2	0.875	$rank > 15$, $rPrice \leq -4.08$
Grocery	1	15	20.6	0.941	$rPrice > 6.53$
	2	5	18.8	0.857	$rPrice > -1.08$, $rPrice \leq -0.04$
Hpc	1	15	5.2	0.941	PP, $fulfilled \leq 0$, $rPrice \leq -0.02$
	2	9	5.0	0.909	PP, $amChoice < 0$, $rPrice \leq -0.02$, $rPriceCumMax \leq 4.01$
Industrial	1	50/5	4.9	0.885	$rPrice \leq -2.29$, $rPriceCumMin \leq -8.96$
	2	65/14	4.3	0.776	$rPrice > 2.93$
Jewelry	1	14	13.3	0.938	$stock \leq 0$, $rPrice > -49.95$, $rPrice \leq -0.04$
	2	9/1	11.6	0.818	$stock \leq 0$, $rPrice \leq -0.04$
Kitchen	1	34/1	10.4	0.944	$prodRating \leq 4.8$, $rPrice > 16.62$
	2	42/2	10.3	0.932	$amChoice < 0$, $rPrice > 6.67$, $rPriceCumMin > 13.1$
Lightning	1	14	8.1	0.938	$rPrice \leq -21.13$
	2	11	8.0	0.923	$rPrice > 31.86$
Luggage	1	48/7	11.8	0.840	$rPrice \leq -9.09$
	2	44/9	11.0	0.783	$rPrice > 12.02$
Musical instruments	1	243/29	3.3	0.878	PP, $rPriceCumMin > -47.66$, $rPriceCumMin \leq 14.31$
	2	40/5	3.2	0.857	$opinions \leq 537$, $rPrice > 2.4$, $rPriceCumMin > -27.88$
Office	1	12/1	20.6	0.857	$amChoice \leq 0$, $rPrice \leq -4.03$,
	2	22/4	19.0	0.792	$stock \leq 0$, $rPrice \leq -0.26$
PC	1	18	4.5	0.950	P, $rPrice \leq -0.01$, $rPriceCumMin \leq -7.12$
	2	17	4.5	0.947	P, $rank \leq 14$, $rPrice \leq -2.13$
Pet supplies	1	9	11.8	0.909	$rPrice \leq -0.03$, $rPriceCumMin > -0.24$
	2	226/56	9.7	0.750	$rPrice \leq 0$
Software	1	58/1	8.3	0.967	P, $prodRating > 3.7$, $rPriceCumMin \leq -39.82$
	2	43/1	8.2	0.956	P, $prodRating > 3.7$, $fulfilled > 0.956$, $rPrice > -0.03$, $rPriceCumMin \leq -11.48$
Sports	1	24	3.9	0.962	$stock \leq 0$, $rPrice \leq -0.03$, $rPriceCumMin > -18.05$
	2	11	3.7	0.923	$opinions > 844$, $rank \leq 16$
Tools	1	151/27	4.8	0.817	$opinions > 455$, $opinions \leq 474$, $rPrice \leq -0.25$, $rPriceCumMin > -2.06$
	2	111/22	4.7	0.796	PP, $rPrice > 0$
Toys	1	59	6.1	0.984	$fulfilled \leq 0$, $rPrice \leq -18.34$
	2	43	6.1	0.978	$opinions < 81$, $stock > 0$, $rPrice \leq -18.34$
Videogames	1	7	7.1	0.889	P, $opinions \leq 839$, $rPrice > 0$, $rPriceCumMin > 15.47$
	2	6	7.0	0.875	P, $bestseller \leq 0$, $rPrice \leq -0.02$, $rPriceCumMin \leq -2.74$
Watches	1	63/1	4.5	0.969	$rPrice > 57.32$
	2	26	4.4	0.964	P, $rPrice \leq -0.01$, $rPriceCumMax \leq 0.45$

SM.2. Most relevant rules when predicting the seller at the Buy-Box.

Table S2. Analyzed rules at category of products. Coverage: Similarly to a leaf, n is the number of cases covered by the rule and m , if it appears, shows how many of them do not belong to the class predicted by the rule. The rule's accuracy is estimated by the Laplace ratio $(n - m + 1) / (n + 2)$. The lift is the result of dividing the rule's estimated accuracy by the relative frequency of the predicted class in the data set. P or PP: specific rule for a product (or products). The identification of product(s) is (are) omitted by privacy concerns.

Category	Rule	Coverage (n/m)	Lift	Accuracy	Features and values
Automotive	1	2	1216.9	0.750	P, $stock \leq 0$
	2	2	1216.9	0.750	P, $fulfilled \leq 0$
Baby	1	3	465.9	0.800	$opinions > 0, fulfilled > 0, stock \leq 0$
	2	3	436.8	0.750	$opinions \leq 2334, fulfilled \leq 0, stock \leq 0$ $rPrice \leq 13.98, rPriceCumMax > 15.4$
Beauty	1	2/1	2553	0.500	P, $fulfilled \leq 0$
	2	3/2	2026.4	0.400	P, $prodRating > 4.4, fulfilled > 0$ $rPriceCumMax > 12.0$
Electronics	1	1	9373.3	0.667	P, $fulfilled \leq 0,$ $rPrice > -0.65, rPriceCumMax \leq 8.71$
	2	2	5272.5	0.750	P, $fulfilled > 0$
Garden	1	2	482.2	0.750	$opinions > 215, fulfilled \leq 0$
	2	3	342.9	0.800	P, $fulfilled > 0$
Grocery	1	2	451.9	0.750	$prodRating \leq 4.1, opinions \leq 205, fulfilled \leq 0$
	2	4	251.0	0.833	P, $fulfilled \leq 0, stock \leq 0$
Hpc	1	2/1	2614.5	0.500	P, $rPrice > 0.69$
	2	2/1	2614.5	0.500	P, $prodrating \leq 4.4, bestseller \leq 0,$ $rPriceCumMin \leq -8.07$
Industrial	1	2	572.2	0.750	P
	2	3	406.9	0.800	P, $fulfilled \leq 0$
Jewelry	1	2	724.9	0.750	$prodRating > 4.6, opinions > 18, fulfilled \leq 0$
	2	2	724.9	0.750	P, $opinions \leq 18, fulfilled \leq 0$
Kitchen	1	1	1764.0	0.667	P
	2	2	992.2	0.750	P, $opinions \leq 209, fulfilled > 0$
Lightning	1	2	883.1	0.75	P, $opinions \leq 225, fulfilled \leq 0$
	2	2	992.2	0.750	P, $opinions > 36$
Luggage	1	3	555.2	0.800	P, $fulfilled \leq 0, rank \leq 20$
	2	3	555.2	0.800	P, $opinions \leq 127, fulfilled \leq 0$
Musical instruments	1	1	1904.7	0.667	P
	2	2	1071.4	0.750	P, $fulfilled \leq 0$
Office	1	2	640.5	0.750	$opinions \leq 403, fulfilled \leq 0, stock \leq 20$
	2	2	640.5	0.750	$opinions > 403, fulfilled \leq 0, rank \leq 34, stock > 0$
PC	1	1	14766.0	0.667	P, $fulfilled \leq 0$
	2	2	8305.9	0.750	P, $fulfilled \leq 0$
Pet supplies	1	2	2000.3	0.75	P, $fulfilled \leq 0, stock > 0$
	2	3	1422.4	0.800	P, $fulfilled \leq 0, stock \leq 0$
Software	1	1	3698.7	0.667	P
	2	2	2080.5	0.750	P, $opinions \leq 33, fulfilled \leq 0$
Sports	1	1	928.0	0.667	P, $fulfilled > 0$
	2	2	348.0	0.750	P, $prodRating > 4.4, 35 < rank \leq 37$
Tools	1	3/2	984.4	0.400	$opinions \leq 3, fulfilled \leq 0, rPriceCumMax \leq 23.46$
	2	3/2	984.4	0.750	P, $opinions > 466, rPrice \leq -9.95$
Toys	1	1	4205.3	0.667	P
	2	1	4205.3	0.667	P, $fulfilled > 0$
Videogames	1	1	7798.0	0.667	P, $fulfilled \leq 0$
	2	1	4386.4	0.750	P, $fulfilled \leq 0$
Watches	1	2	4379.2	0.750	P, $fulfilled \leq 0, stock \leq 0$
	2	2	2919.5	0.750	$fulfilled \leq 0, bestseller > 1, stock \leq 0, rPriceCumMin > -22.58$