



E-commerce Product Categorization Using ML and Deep Learning

This presentation explores the use of machine learning and deep learning to automate product categorization in e-commerce, a crucial aspect of improving user experience, product discoverability, and search functionality.



2 Contributors

Search Problems with Manual Product Categorization

Manual Tagging Limits Search

Manual product tagging hurts search. Mistakes in tagging make products hard to find, frustrating customers and losing sales.

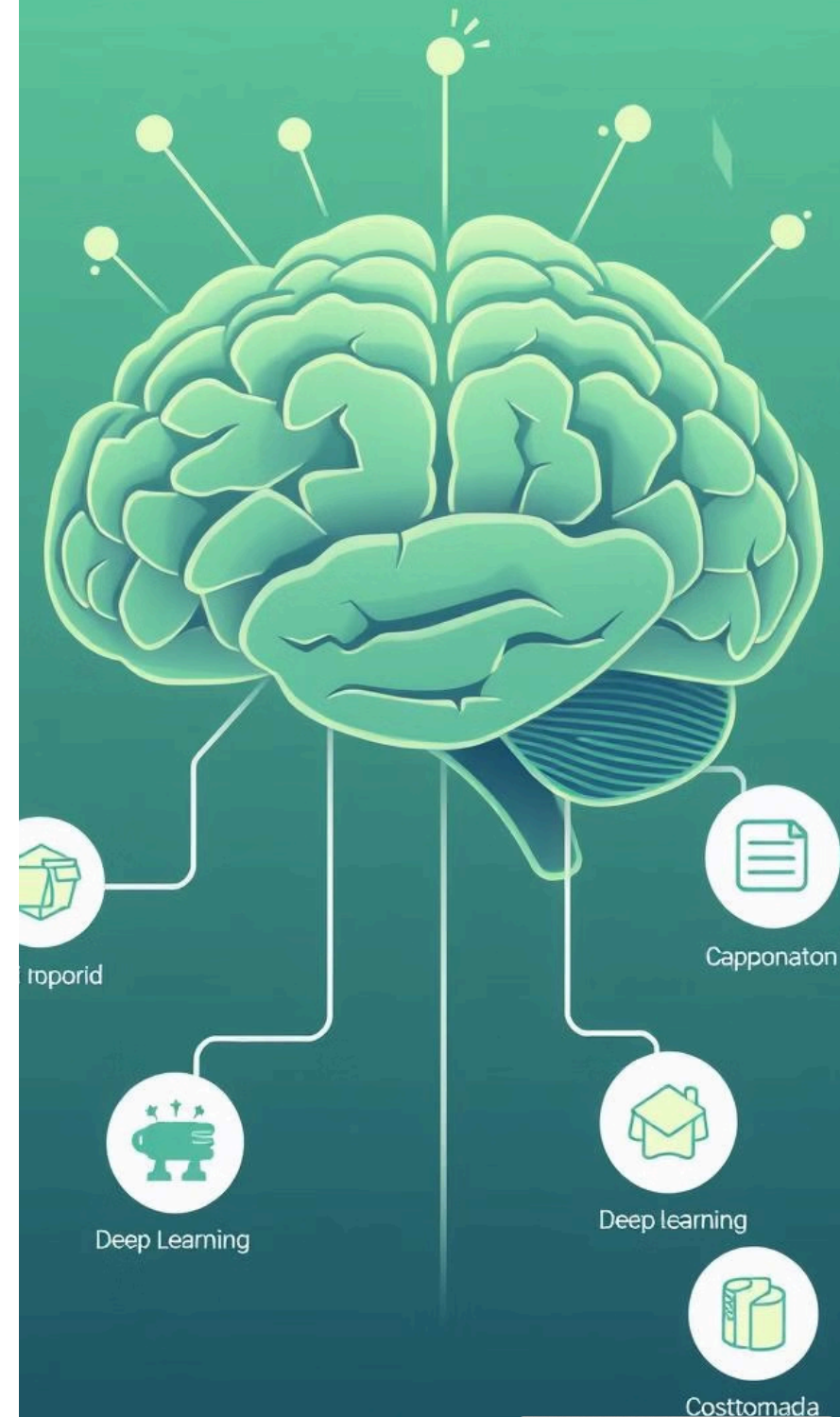
Inaccurate and Slow Searches

Manual tagging makes searches inaccurate and slow. Updates are slow, making search results outdated and irrelevant.

Poor E-commerce Performance

Bad search results mean unhappy customers, fewer sales, and less loyalty. We need a better system for product discovery.

- 1 Embark on the data journey by loading the dataset
- 2 Uncover hidden gems through exploratory data analysis for valuable business insights
- 3 Craft a data masterpiece using NLTK for preprocessing and feature engineering
- 4 Translate words into numerical representations using techniques like TF-IDF or word2Vec
- 5 Divide and conquer with train-test split using stratified sampling
- 6 Train and unleash the power of various machine learning and deep learning models
- 7 Fine-tune for perfection using hyperparameter tuning
- 8 Crystal ball time – get our predictions
- 9 May the best model win – compare and crown the top performer



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Word	Value
11. bear	316
11. bear	279
11. bear	274
30.00e	82
110.00e	64
60.00e	17
50.00e	17
10.00e	45
30.00e	14
10.00e	35

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A pie chart illustrating the frequency of app usage. The chart is divided into four segments with the following percentages: 80%, 80%, 45%, and 75%.

Frequency	Percentage
80%	80%
80%	80%
45%	45%
75%	75%

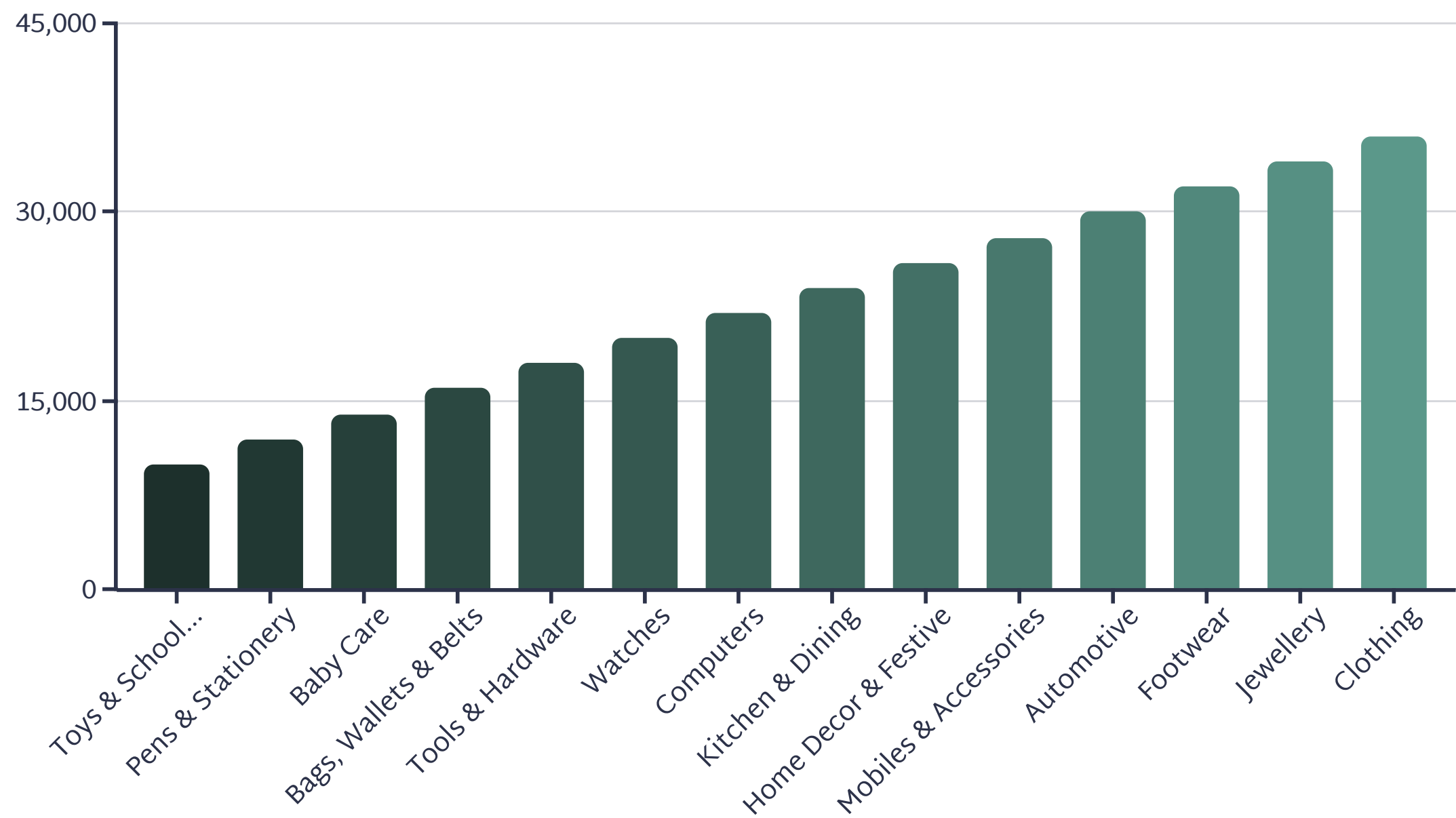
Year	Percentage
2005	25%
2007	28%
2009	28%
2011	35%
2013	40%
2015	45%
2017	42%
2019	48%

The chart displays the weekly number of people vaccinated against COVID-19 in the UK (represented by bars) and the cumulative total of vaccinations (represented by a line). The x-axis shows the timeline from March 2020 to March 2021. The y-axis measures the number of people, with a scale break between 400,000 and 800,000. The cumulative total shows a consistent upward trend, while the weekly vaccination numbers fluctuate, with a notable peak in early 2021.

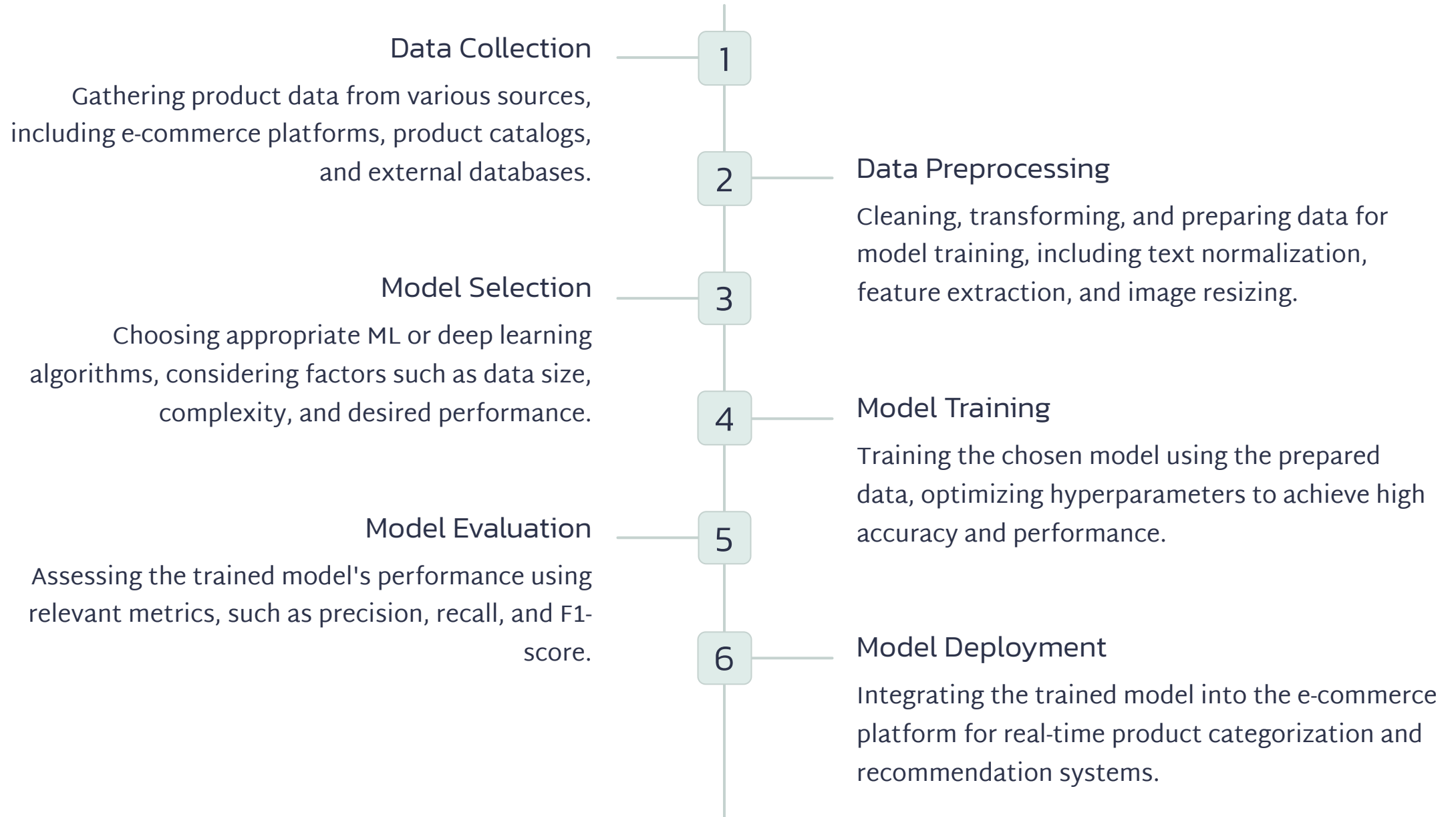
Week	Weekly Vaccinations (Approx.)	Cumulative Vaccinations (Approx.)
1	150,000	150,000
2	150,000	300,000
3	150,000	450,000
4	150,000	600,000
5	150,000	750,000
6	150,000	900,000
7	150,000	1,050,000
8	150,000	1,200,000
9	150,000	1,350,000
10	150,000	1,500,000
11	150,000	1,650,000
12	150,000	1,800,000
13	150,000	1,950,000
14	150,000	2,100,000
15	150,000	2,250,000
16	150,000	2,400,000
17	150,000	2,550,000
18	150,000	2,700,000
19	150,000	2,850,000
20	150,000	3,000,000
21	150,000	3,150,000
22	150,000	3,300,000
23	150,000	3,450,000
24	150,000	3,600,000
25	150,000	3,750,000
26	150,000	3,900,000
27	150,000	4,050,000
28	150,000	4,200,000
29	150,000	4,350,000
30	150,000	4,500,000
31	150,000	4,650,000
32	150,000	4,800,000
33	150,000	4,950,000
34	150,000	5,100,000
35	150,000	5,250,000
36	150,000	5,400,000
37	150,000	5,550,000
38	150,000	5,700,000
39	150,000	5,850,000
40	150,000	6,000,000
41	150,000	6,150,000
42	150,000	6,300,000
43	150,000	6,450,000
44	150,000	6,600,000
45	150,000	6,750,000
46	150,000	6,900,000
47	150,000	7,050,000
48	150,000	7,200,000
49	150,000	7,350,000
50	150,000	7,500,000
51	150,000	7,650,000
52	150,000	7,800,000
53	150,000	7,950,000
54	150,000	8,100,000
55	150,000	8,250,000
56	150,000	8,400,000
57	150,000	8,550,000
58	150,000	8,700,000
59	150,000	8,850,000
60	150,000	9,000,000
61	150,000	9,150,000
62	150,000	9,300,000
63	150,000	9,450,000
64	150,000	9,600,000
65	150,000	9,750,000
66	150,000	9,900,000
67	150,000	10,050,000
68	150,000	10,200,000
69	150,000	10,350,000
70	150,000	10,500,000
71	150,000	10,650,000
72	150,000	10,800,000
73	150,000	10,950,000
74	150,000	11,100,000
75	150,000	11,250,000
76	150,000	11,400,000
77	150,000	11,550,000
78	150,000	11,700,000
79	150,000	11,850,000
80	150,000	12,000,000
81	150,000	12,150,000
82	150,000	12,300,000
83	150,000	12,450,000
84	150,000	12,600,000
85	150,000	12,750,000
86	150,000	12,900,000
87	150,000	13,050,000
88	150,000	13,200,000
89	150,	

Made with Gamma

Frequency counts of the product category



Methodology



Challenges Faced

Class Imbalance

Addressing the issue of uneven representation of product categories in the dataset.

Text Feature Conversion

Converting textual product descriptions into numerical features using word embedding techniques.

Hierarchical Categorization

Effectively handling the complex, multi-level structure of product categories.

Model Selection and Training

Model	Training Result (%)	Test Result (%)
Random Classifier	99.99	96.06
Sequential	97.65	98.08

Evaluation Metrics and Final Results

Golden model with Maximum test accuracy is the sequential model deep learning

98.08%

Accurate product categorization.



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Business Impacts



Improved User Experience

Enhanced product discoverability and navigation lead to a more satisfying online shopping experience.



Enhanced Search Functionality

More accurate search results improve customer satisfaction and conversion rates.



Increased Revenue

Improved user experience and search functionality drive sales growth and increased revenue.

Best Practices and Future Trends in E-commerce Product Categorization

1

Data Quality

Ensure accurate and consistent product data for optimal model performance.

2

Continuous Improvement

Regularly monitor and refine categorization models to adapt to changing product trends and market dynamics.

3

Personalized Categorization

Tailoring categorization systems to individual customer preferences and browsing history.

4

Multi-lingual Support

Developing models capable of handling product information in multiple languages.