PET PRODUCT AUTO-SUBCATEGORIZATION BY REVIEW ANALYSIS

MILESTONE REPORT

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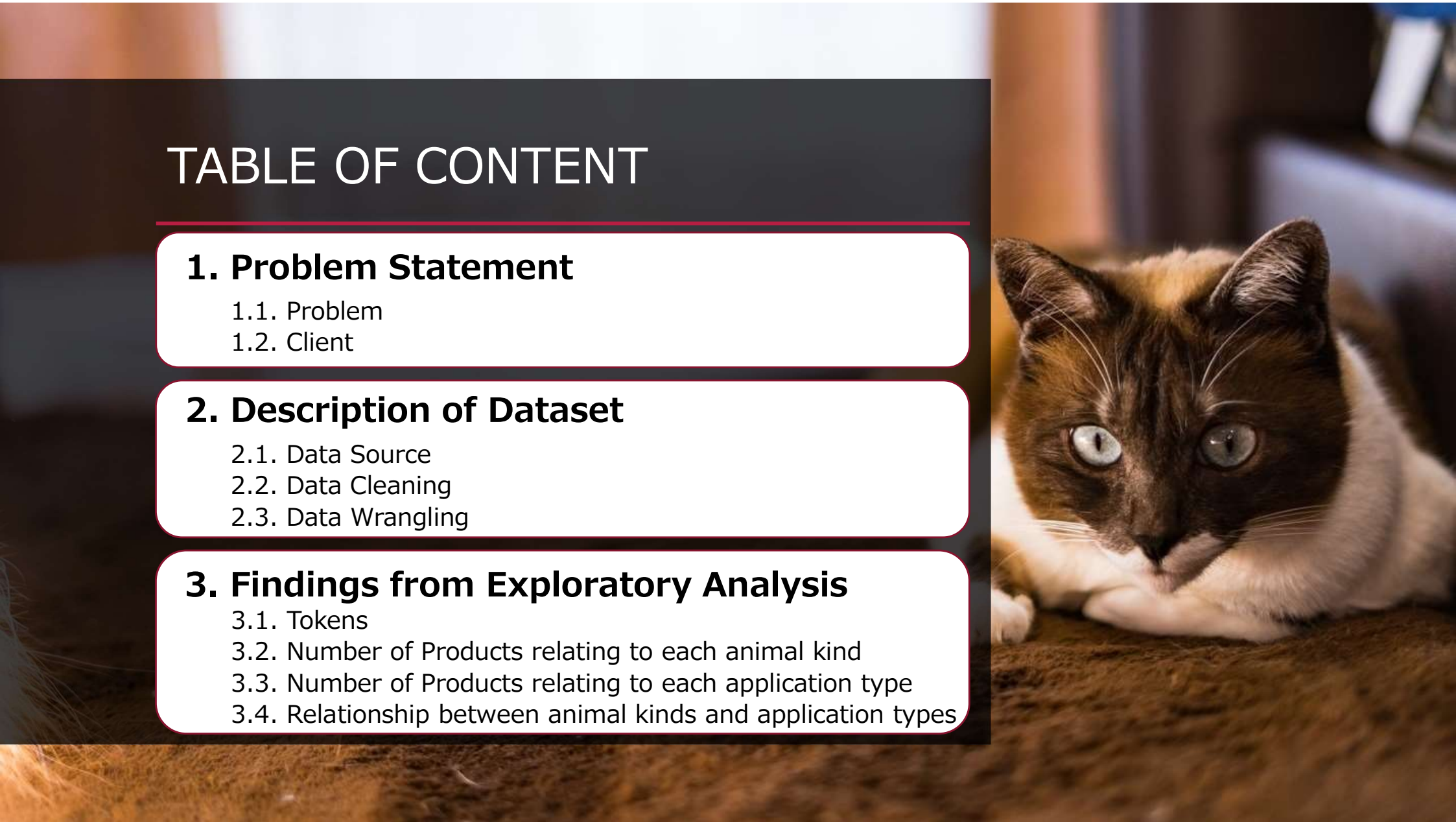
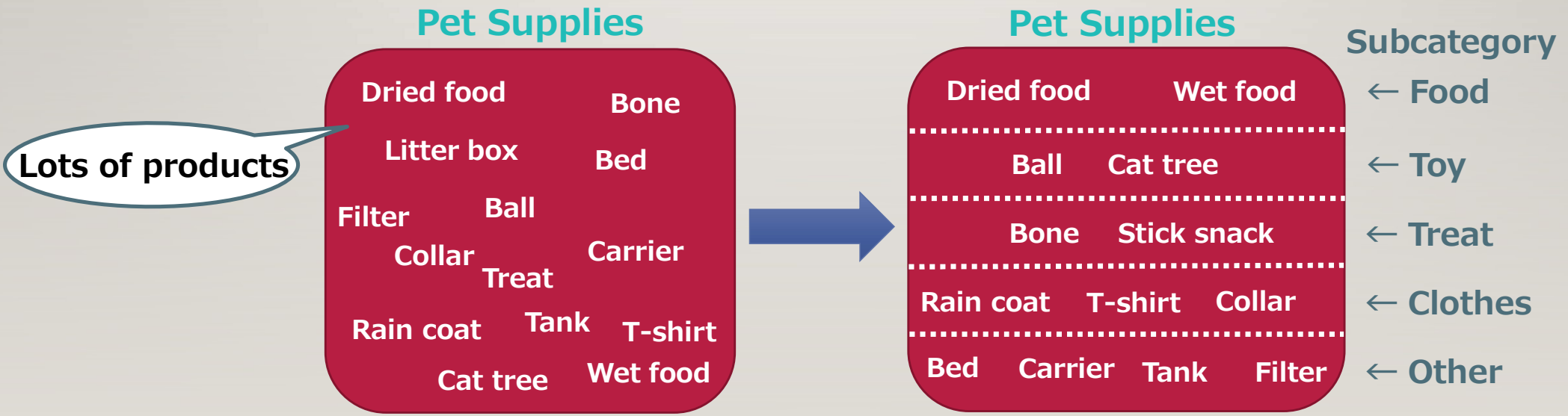


1. PROBLEM STATEMENT

1.1. PROBLEM

E-commerce companies set up categories for their products (e.g. Clothing, Beauty, Books, Pet Supplies, etc.)

If the number of products in a category has been growing…



Goal: Making a system automatically subcategorizing products by the reviews

1.2. CLIENT

E-commerce companies

By subcategorizing the products:

- **Improving analysis of trends and customer needs**
- **Increasing customer satisfaction by easy access to a product they want**

2. DESCRIPTION OF DATASET

2.1. DATA SOURSE

From AWS

Amazon Pet Supplies reviews in the US (gz file) from AWS (1995 – 2015)
https://s3.amazonaws.com/amazon-reviews-pds/tsv/amazon_reviews_us_Pet_Products_v1_00.tsv.gz

	marketplace	product_id	product_title	product_category	review_body	review_date
0	US	510387886	(8-Pack) EZwhelp Belly Band/Wrap	Pet Products	Best belly bands on the market! These are a g...	2015-08-31
1	US	912374672	Warren Eckstein's Hugs & Kisses Vitamin Minera...	Pet Products	My dogs love Hugs and Kisses. However, the la...	2015-08-31
2	US	902215727	Tyson's True Chews Premium Jerky - 12 ounce Ch...	Pet Products	I have been purchasing these for a long time. ...	2015-08-31

Focused on the data collected during 2014-2015 in the US.

2.2. DATA CLEANING

1. Extracting necessary columns
2. Extracting data collected in 2014 or 2015
3. Removing columns having a single value
4. Dropping with missing values and duplicate data

- 1,697,225 observations (reviews)
- 128,995 products

	product_id	product_title	review_body
0	510387886	(8-Pack) EZwhelp Belly Band/Wrap	Best belly bands on the market! These are a g...
1	912374672	Warren Eckstein's Hugs & Kisses Vitamin Minera...	My dogs love Hugs and Kisses. However, the la...
2	902215727	Tyson's True Chews Premium Jerky - 12 ounce Ch...	I have been purchasing these for a long time. ...
3	568880110	Soft Side Pet Crate, Navy/Tan	It is extremely well constructed, it is easy t...
4	692846826	EliteField 3-Door Folding Soft Dog Crate, Indo...	Worked really well. Very pleased with my purc...

2.3. DATA WRANGLING 1

1. Removing short and long reviews
   Fewer than 30 characters ··· less information
   more than 760 characters ··· too much information

2. Adjusting the number of reviews per product
   Dataset 1: 2 to 5 reviews / product
   Dataset 2: 5 reviews / product
   Dataset 2: 5 reviews / product

How many reviews per product would be enough to subcategorize a product??
Not sure. Try 3 patterns!

3. Merging reviews to the same product in one
   (For the next step, tokenization)

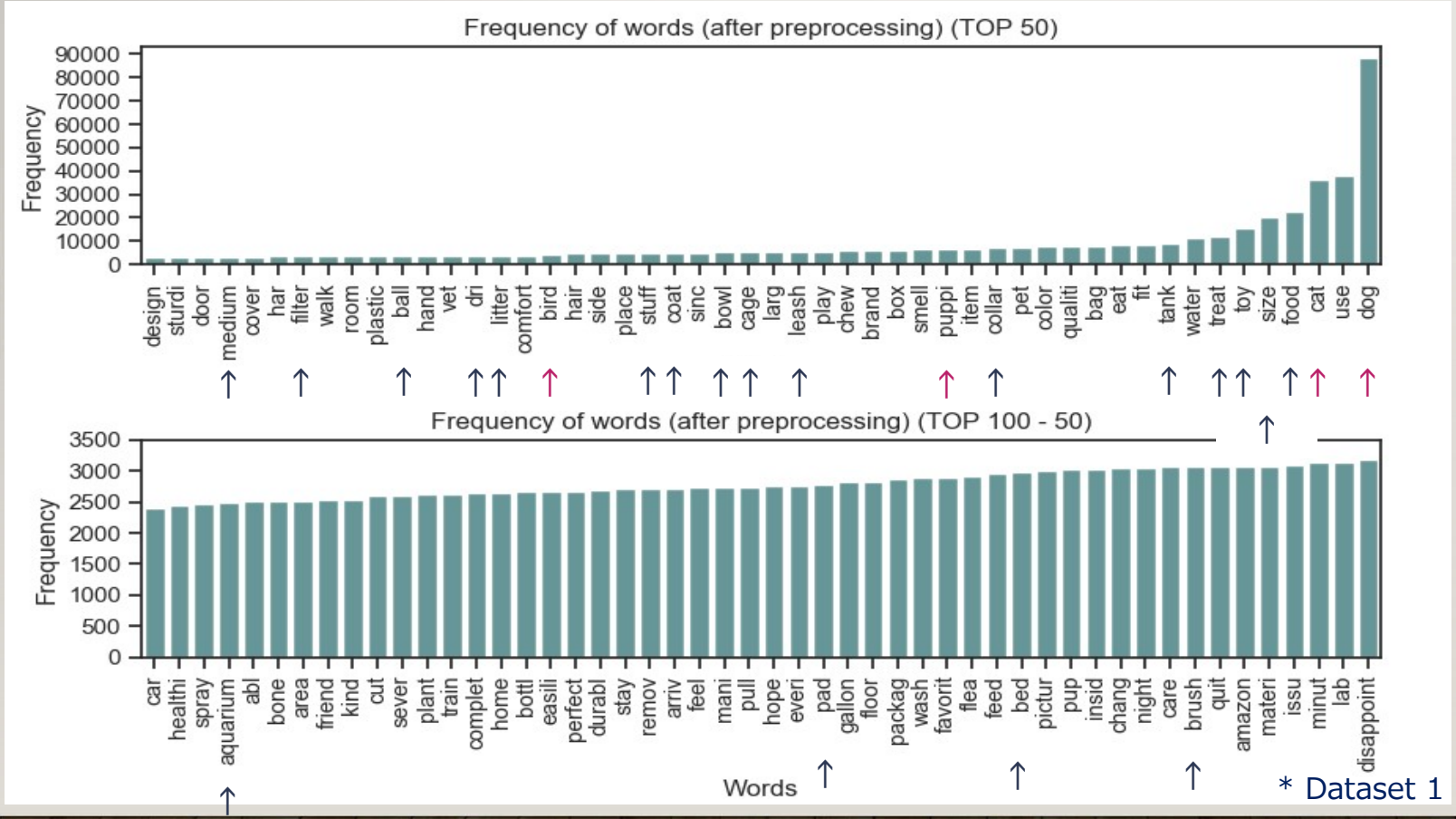
2.3. DATA WRANGLING 2

4. Tokenization
5. Removing
   - Non-alphabet words
   - Stop words
6. Stemming and lemmatization
7. Removing
   - Non-noun words
   - Words appearing 5 times or less
8. Removing products having 4 tokens or less

Dataset	Reviews / product	Total reviews	Total products	Total tokens (unique)
Original	various	1,697,225	128,977 (100%)	-
1	2 to 5	245,565	61,770 (48%)	8,032
2	5	161,765	32,295 (25%)	6,385
3	10	195,570	19,557 (15%)	6,840

3. FINDINGS FROM EXPLORATORY ANALYSIS

3.1. TOKENS 1



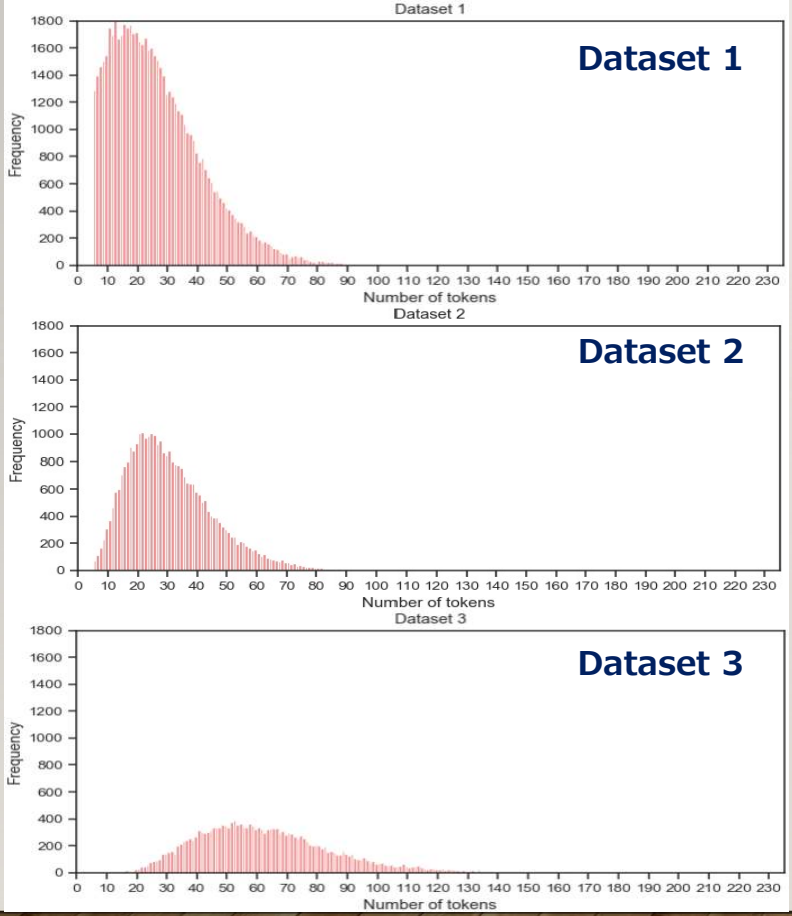
* Dataset 1

↑ **Animal kinds**

↑ **Application types**

Will be a significant clue to subcategorize products

3.1. TOKENS 2



Dataset	Min	25%	50%	75%	90%	Max	Mean	SD
1	5	14	23	35	47	119	26.2	15.8
2	5	20	28	39	50	130	30.5	14.6
3	9	46	59	76	94	234	62.5	24.0

The more reviews per product,
the more tokens per product

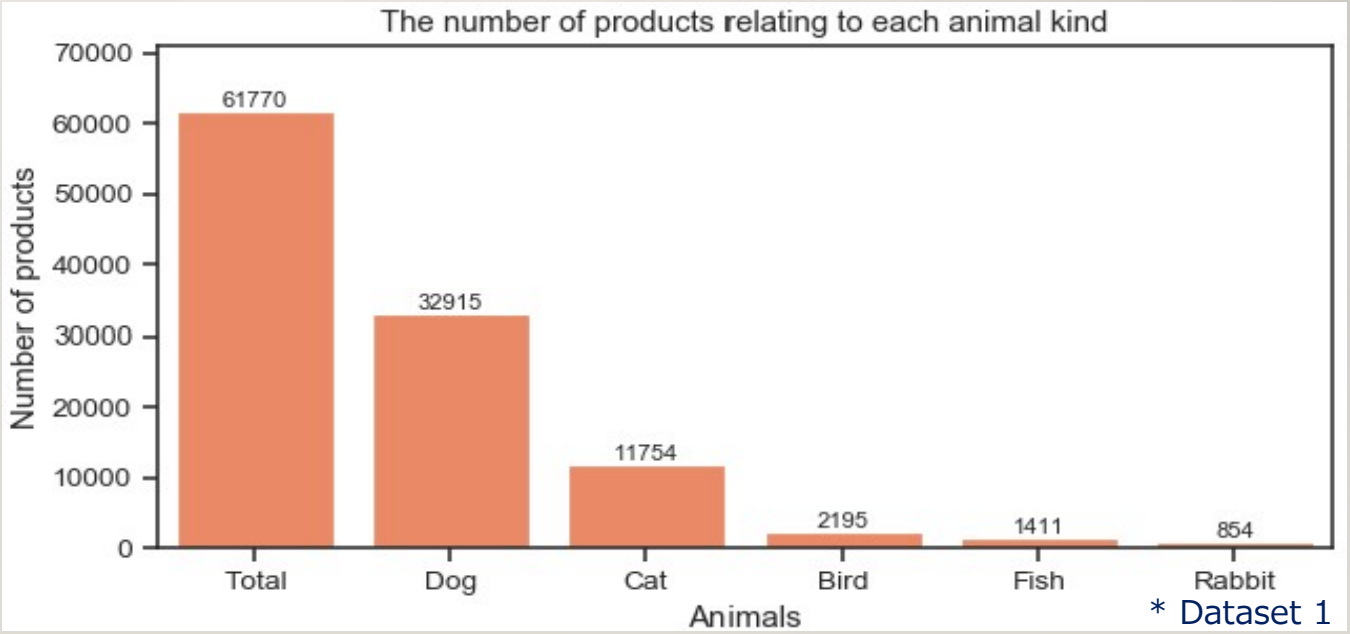
The number of tokens per product

3.2. NUMBER OF PRODUCTS RELATING TO EACH ANIMAL KIND

Categories: Dog, Cat, Bird, Fish, Rabbit
(e.g. Product having 'dog' as a token → Dog category)

The keywords for each category

Categories	Keywords
Dog	dog, puppi, doggi
Cat	cat, kitti, kitten
Bird	bird, chick
Fish	fish
Rabbit	rabbit, bunni



* Dataset 1

Dog and Cat were the largest two categories

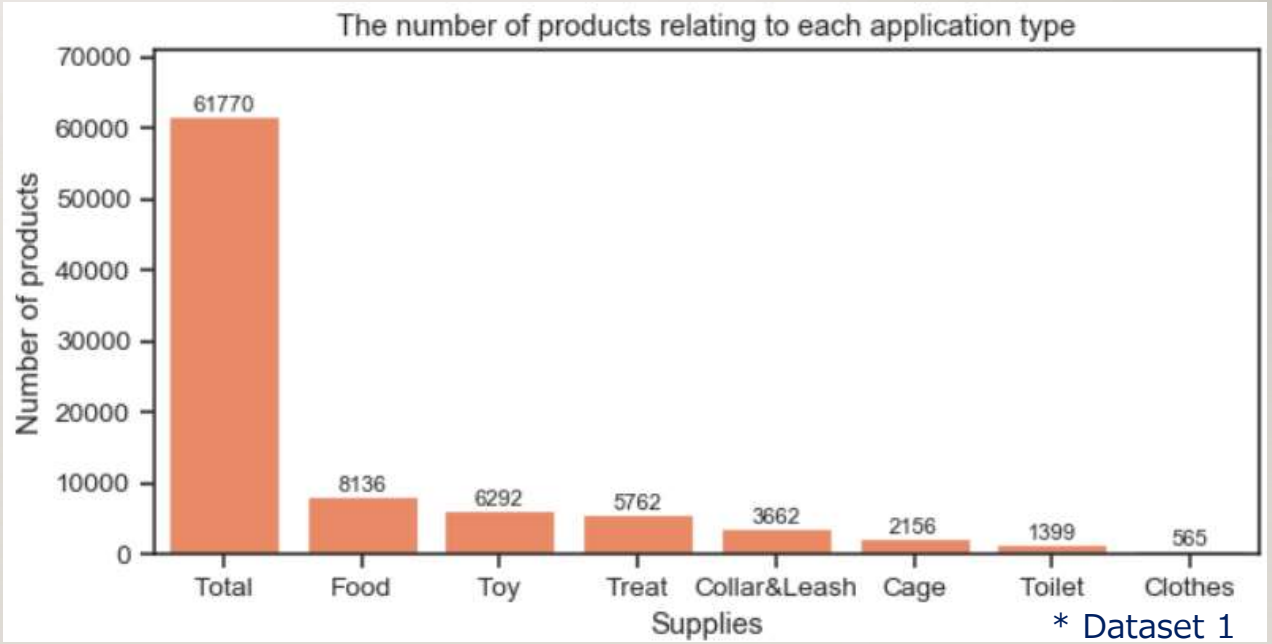
3.3. NUMBER OF PRODUCTS RELATING TO EACH APPLICATION TYPE

Categories: Toy, Food, Treat, Collar & Leash, Clothes, Cage, Toilet

(e.g. Product having 'toy' as a token → Toy category)

The keywords for each category

Categories	Keywords
Toy	toy, tunnel, ball, rope, stuff
Food	food, dri, wet
Treat	treat, snack, cooki
Collar & Leash	collar, leash
Clothes	shirt, coat, sweater, costum
Cage	cage, crate, carrier, kennel
Toilet	litter, pad

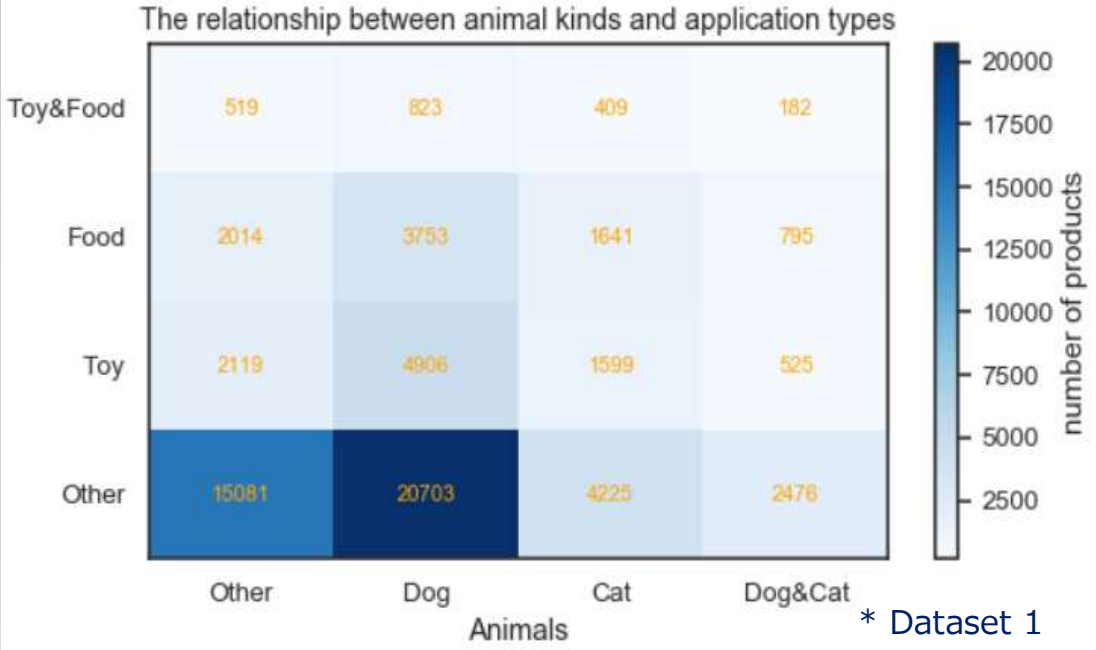


* Dataset 1

Toy and Food were the largest two categories, but relatively spread

3.4. RELATIONSHIP BETWEEN ANIMAL KINDS AND APPLICATION TYPES

Categories: [Dog, Cat] × [Toy, Food]
(e.g. Product having 'dog' and 'toy' as a token → Dog & Toy category)



* Dataset 1

- **Food and Toy for dogs** were the largest two categories
- Many products are in **Other for dogs** or **Other for the other animals**

Products will be categorized more precisely in the modeling part of this project.


THANK YOU
END