Book Genre Classification Using Covers and Metadata

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Task & Motivation

Goal:

Classifying book genres based on the book's cover, title and description.

Motivation:

➢ Simplify cataloging and boost sales
➢ Help in the book design process

Task:

Combining cover images with metadata like titles and book description using multimodal neural networks. I.e. training a joint model of CNN and text embedding.
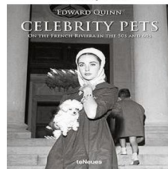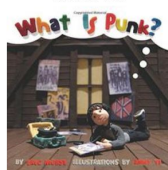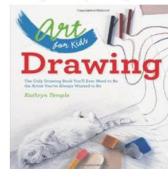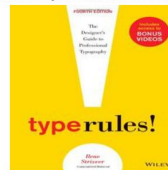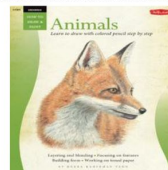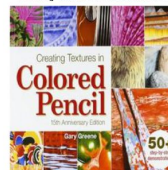
Dataset Overview

Dataset:

https://github.com/uchidalab/book-dataset

- without descriptions
- Categories: 29
- Books: 46,226

Train and Test Split:

- 90% Train (1,430 books per cat.): 41,470
- 10% Test (164 books per cat.): 4,756

Webscraped amazon.com for populating the dataset with book descriptions using Selenium

Word Frequency

Word Frequency in Book Titles

Word Frequency in Book Descriptions

Average Description Word Count by Category
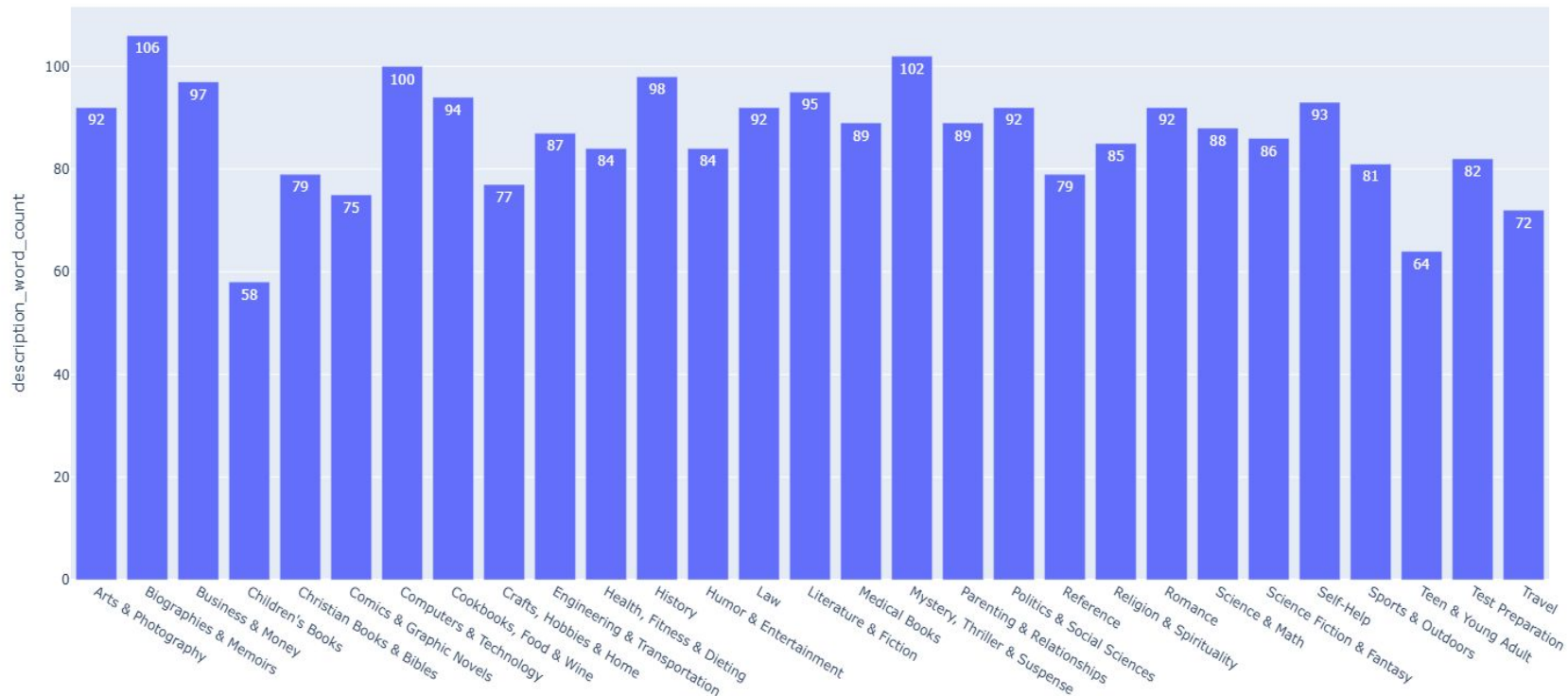
t-SNE Visualization of USE Embeddings (Title / Description)
Colored by Category
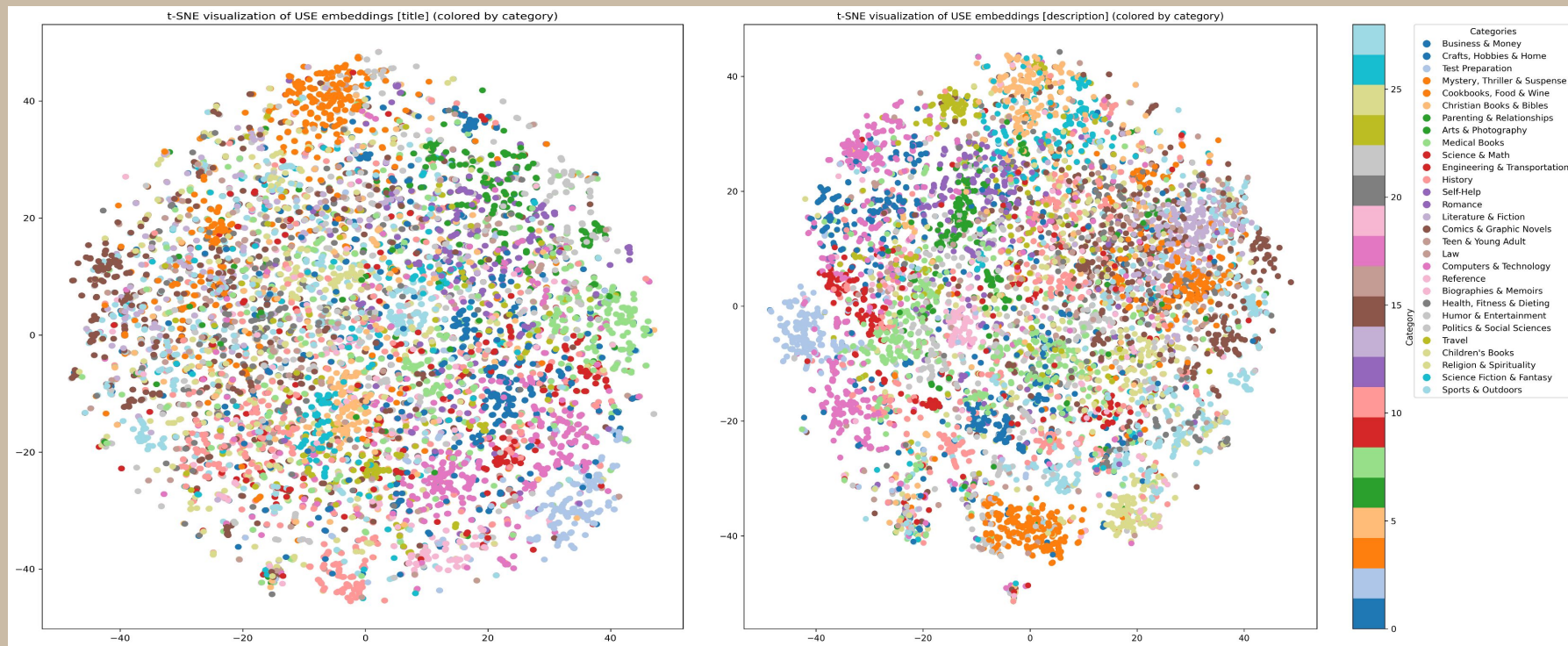
t-SNE Visualization of ResNet_50 Embeddings (Book Covers)
Colored by Category

t-SNE visualization of Image embeddings (colored by category)

Data pipeline

Title + Description

Remove stopwords

Compute USE / BERT embeddings

Resize Images (224,224,3)

Test-Train Split

90% Training Data

10% Testing Data
164 / category

Test-Val Split

90% Training Data
1287 / category

10% Validation Data
143 / category
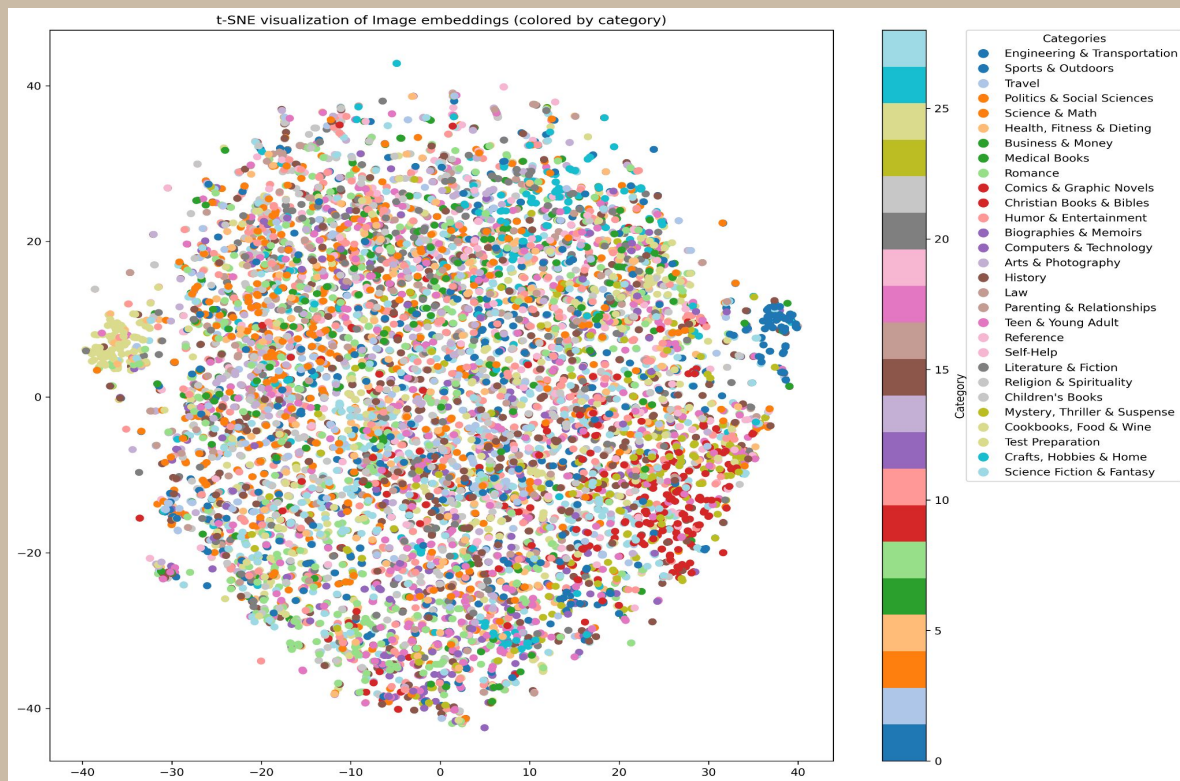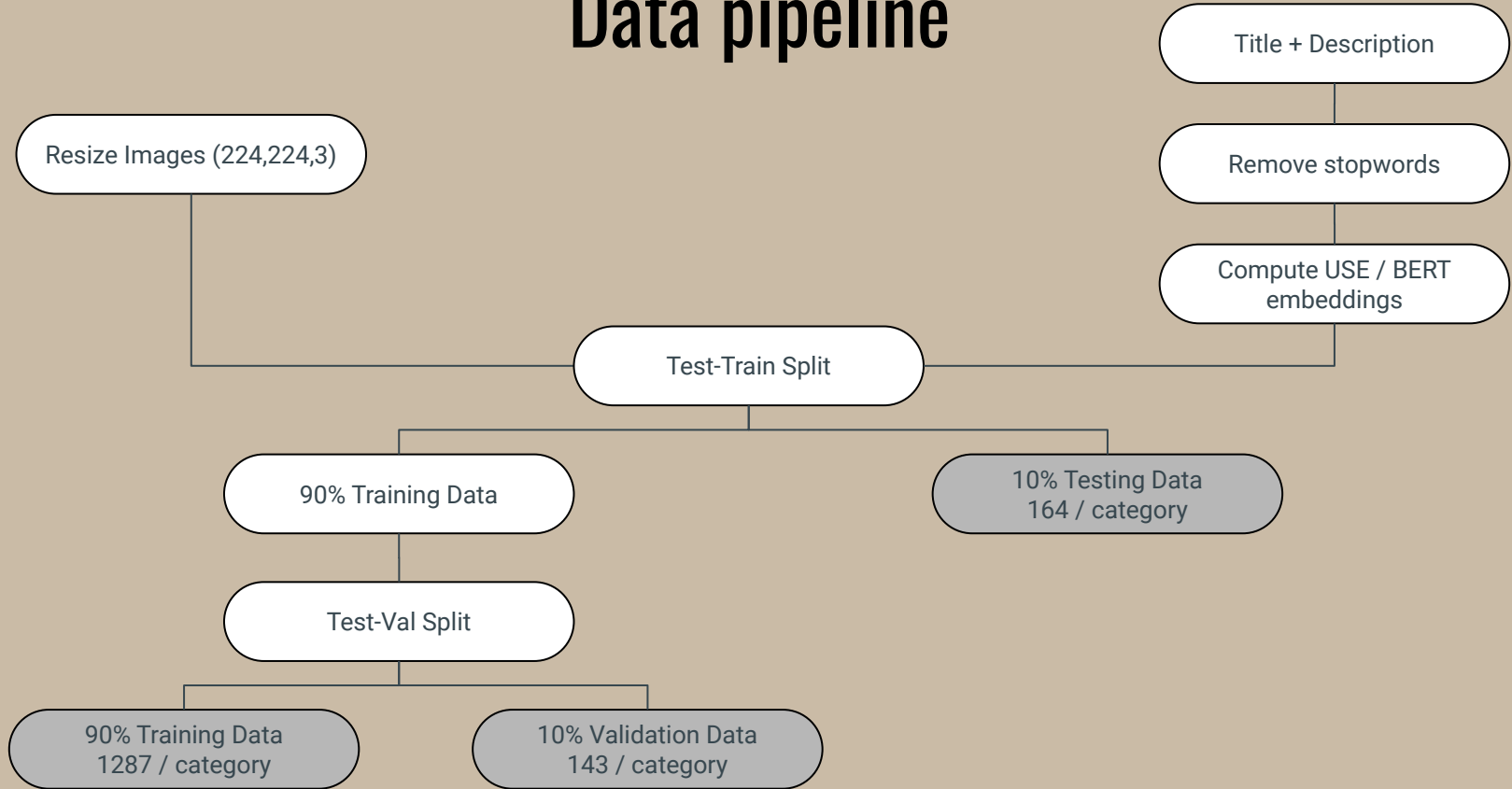
Training a Multimodal Model
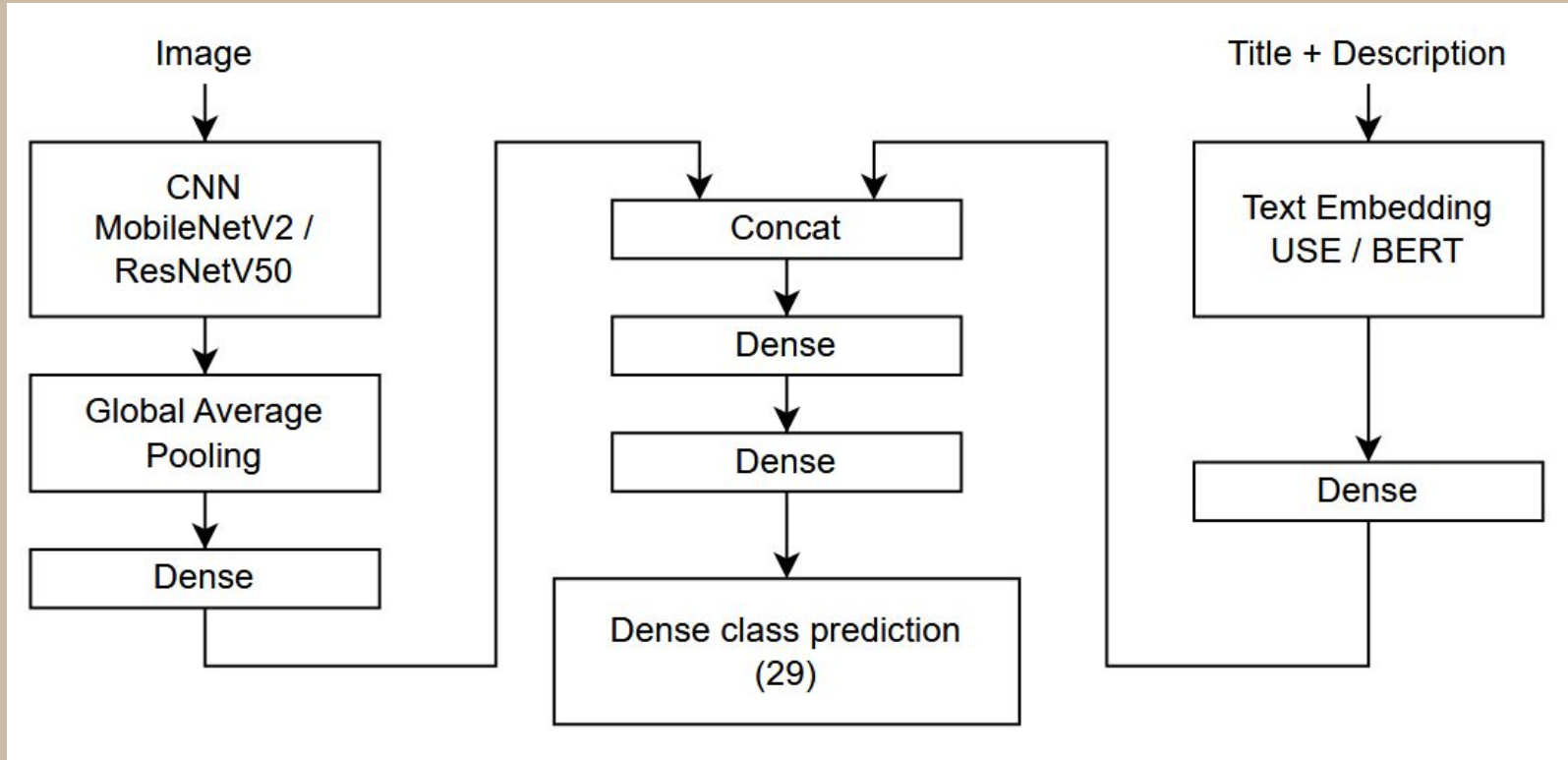
Evaluation

Model	Accuracy	Top-5 Accuracy	Precision	Recall	F1-Score
MobileNet+USE	**60.1%**	90%	60%	60.1%	59.6%
MobileNet+BERT	56.3%	89%	57.7%	56.3%	56.2%
ResNet+USE	59.4%	90%	59.8%	59.4%	59.1%
USE	59.2%	90%	59.5%	59.2%	59.1%
BERT	56.5%	89%	56.9%	56.5%	55.9%
MobileNet	23.3%	53%	22%	23.3%	21.2%

Example Output

True: Humor & Entertainment
Pred: Humor & Entertainment (0.78), Computers &
Technology (0.15), Crafts, Hobbies & Home (0.02),
Engineering & Transportation (0.01), Reference
(0.01)
Desc: guinness world records gamer edition bestselling
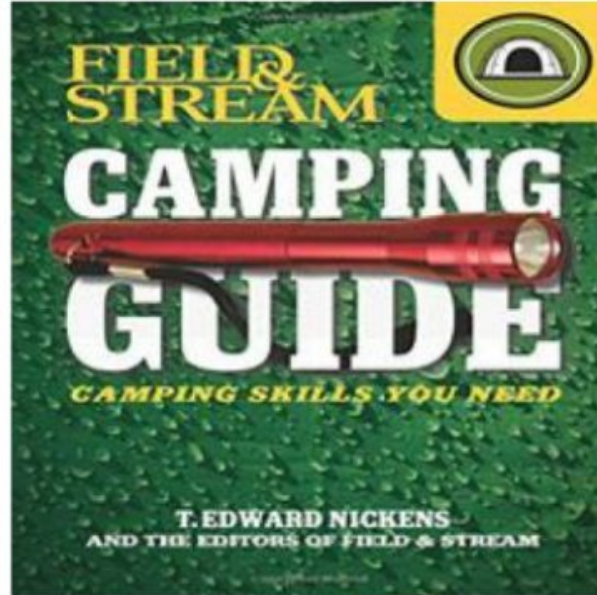video games annual back burstin...

True: Sports & Outdoors
Pred: Sports & Outdoors (0.98), Travel (0.00),
Humor & Entertainment (0.00), Reference (0.00),
Crafts, Hobbies & Home (0.00)
Desc: field stream skills guide camping field streams
total outdoorsman challenge prac...

Example Output

True: Christian Books & Bibles
Pred: Christian Books & Bibles (0.70), Parenting &
Relationships (0.17), Religion & Spirituality
(0.03), Reference (0.02), Self-Help (0.02)
Desc: life god children fifth sixth grade volume life
god children spiritual formation...

True: Self-Help
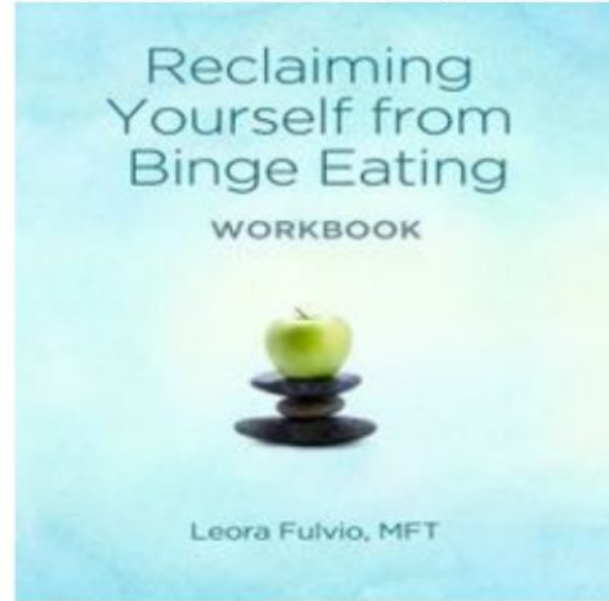Pred: Self-Help (0.56), Health, Fitness & Dieting
(0.29), Medical Books (0.03), Parenting &
Relationships (0.02), Religion & Spirituality
(0.02)
Desc: reclaiming binge eating workbook companion
successful book reclaiming binge eati...

Thank you for your attention!
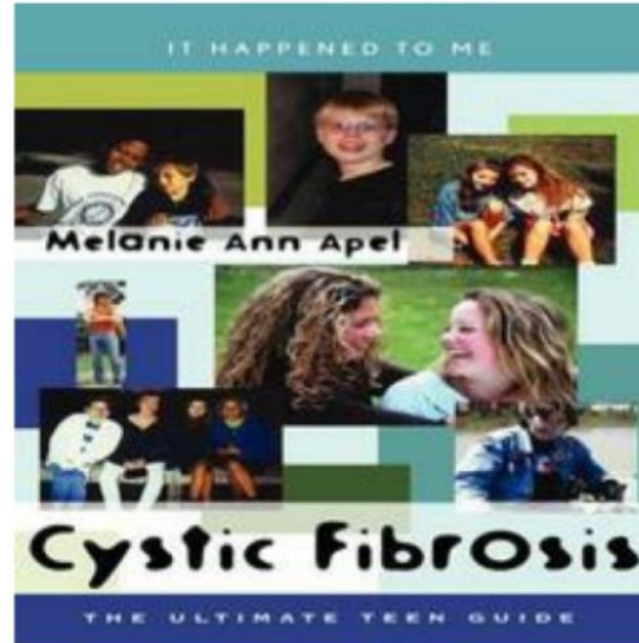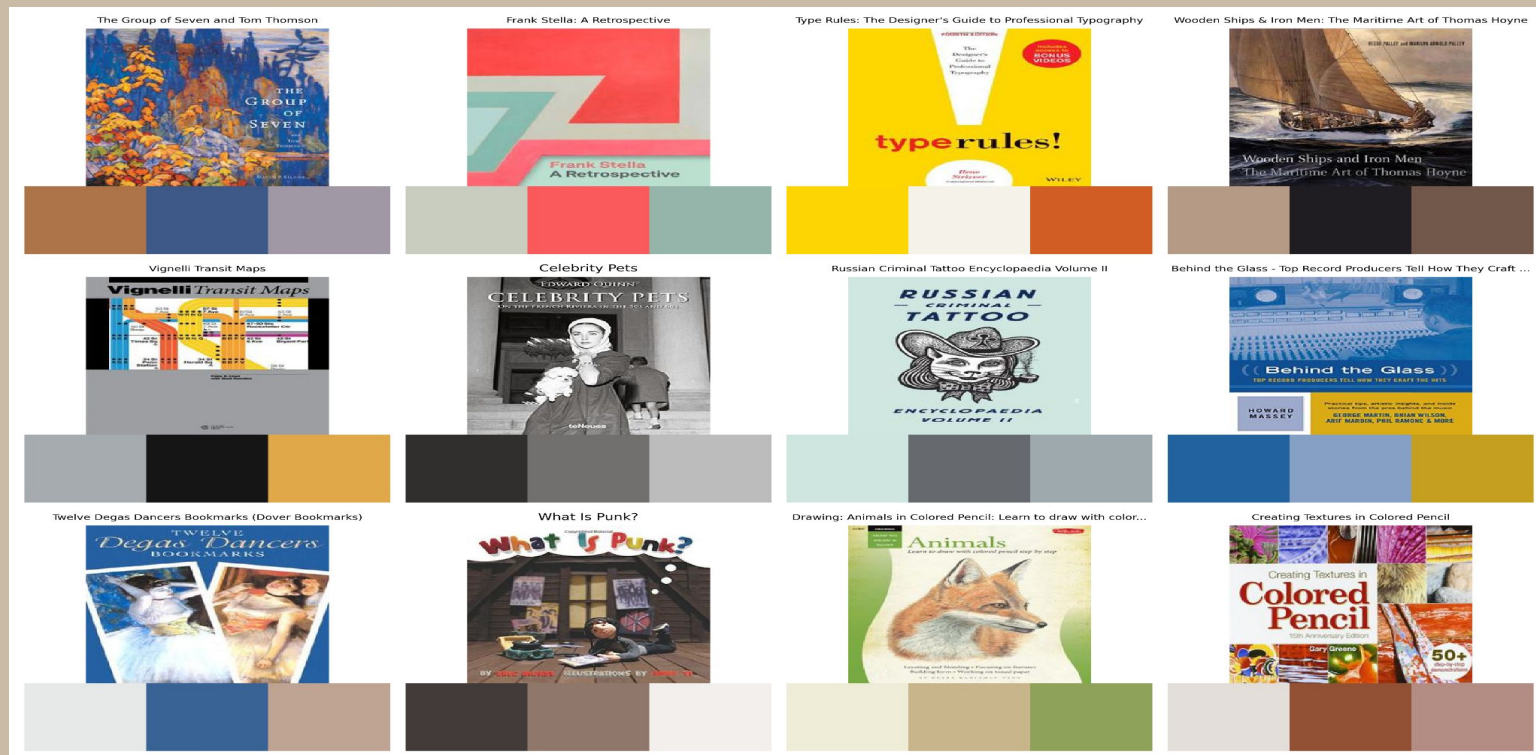
Appendix - MobileNet only

True: Comics & Graphic Novels
Pred: Comics & Graphic Novels (0.87), Children's Books (0.03), Arts & Photography (0.01), Humor & Entertainment (0.01), Teen & Young Adult (0.01)

True: Health, Fitness & Dieting
Pred: Arts & Photography (0.10), Parenting & Relationships (0.10), Teen & Young Adult (0.08), Crafts, Hobbies & Home (0.07), Politics & Social Sciences (0.07)

Appendix - Can the Dominant Color of a Book Cover Influence How It Is Categorized?

The Group of Seven and Tom Thomson

Frank Stella: A Retrospective

Type Rules: The Designer's Guide to Professional Typography

Wooden Ships & Iron Men: The Maritime Art of Thomas Hoyne

Vignelli Transit Maps

Celebrity Pets

Russian Criminal Tattoo Encyclopaedia Volume II

Behind the Glass - Top Record Producers Tell How They Craft ...

Twelve Degas Dancers Bookmarks (Dover Bookmarks)

What Is Punk?

Drawing: Animals in Colored Pencil: Learn to draw with color...

Creating Textures in Colored Pencil

Appendix - Top 7 Dominant Colors for a Book in Each Category

Appendix - Average Dominant Color for Books in Each Category