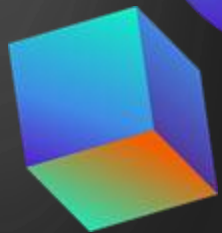





# Bookworm

Team Genies: Lillian Haspel, Joeun Yook, Adam Omarali, Joanne Wang



# The Problem

## Rising Returns

Faulty books returned by customers often re-enter inventory, go unsold, or are thrown out, creating **storage and logistics issues**

## Missed Resale Market Opportunity

The global second-hand book market is projected to reach **\$45.4 billion** by 2032, with an annual **growth rate of 6.6%** from 2025

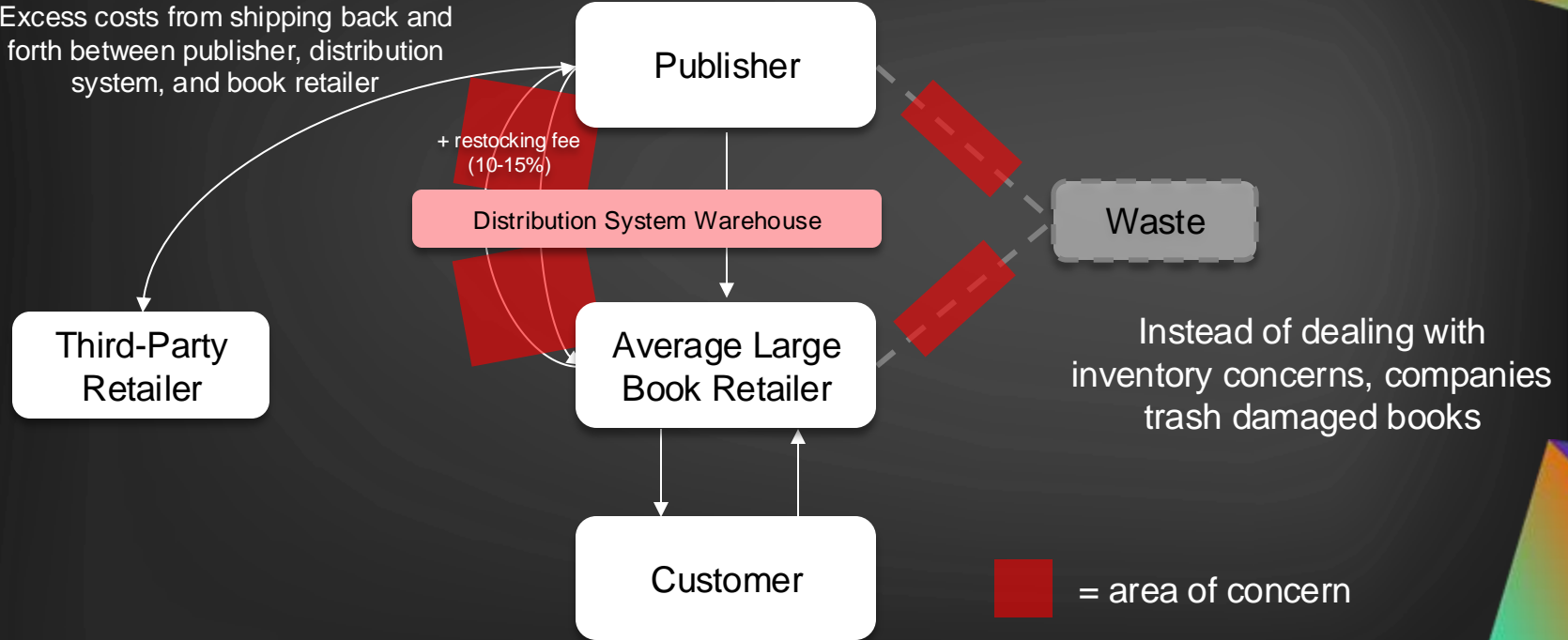
## Sustainability Concerns

**160,000+ truckloads** of books are **discarded** each year

These books are **contributing to waste** and environmental concerns

# Book Return Processes

Excess costs from shipping back and forth between publisher, distribution system, and book retailer



Problem

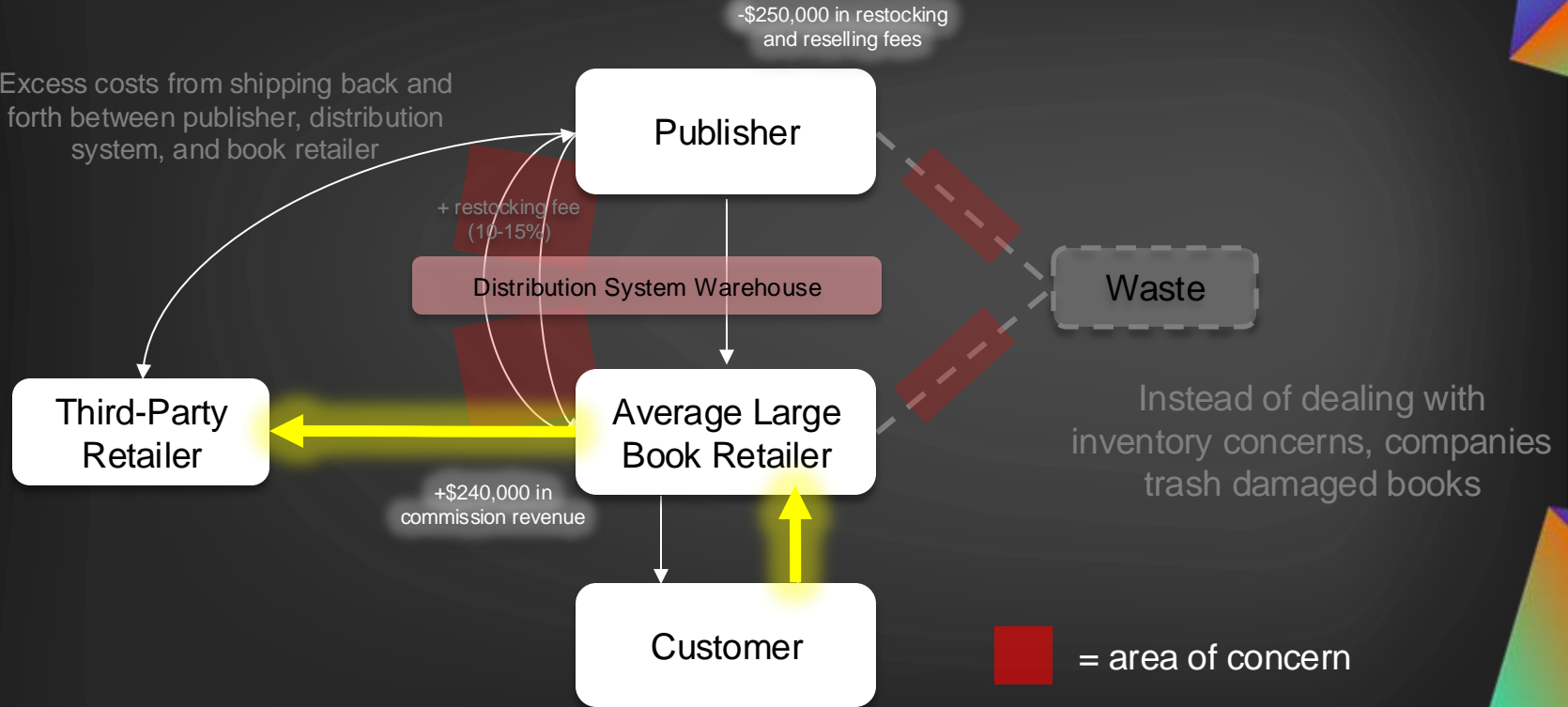
Solution

Demo

Impact

# Book Return Processes

Excess costs from shipping back and forth between publisher, distribution system, and book retailer



Problem

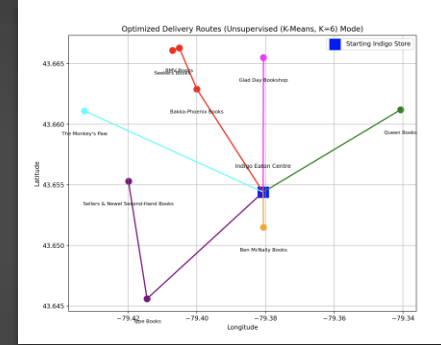
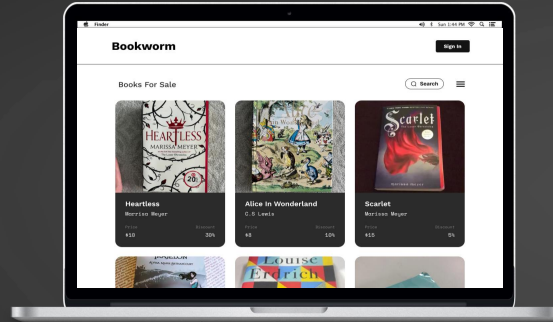
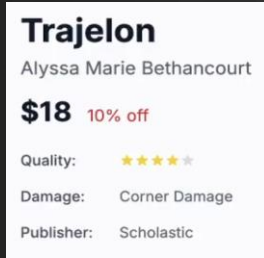
Solution

Demo

Impact

# The Solution

\*Everything happens within stores to **streamline processes**



## AI-Powered Defect Detection

Scan return images to **detect** and **label** damages

## Used Book Catalog

Books uploaded to an **accessible** and **flexible** selling platform

## Third-Party Partnerships

Leverage the growing second-hand book market and **optimize** delivery routes

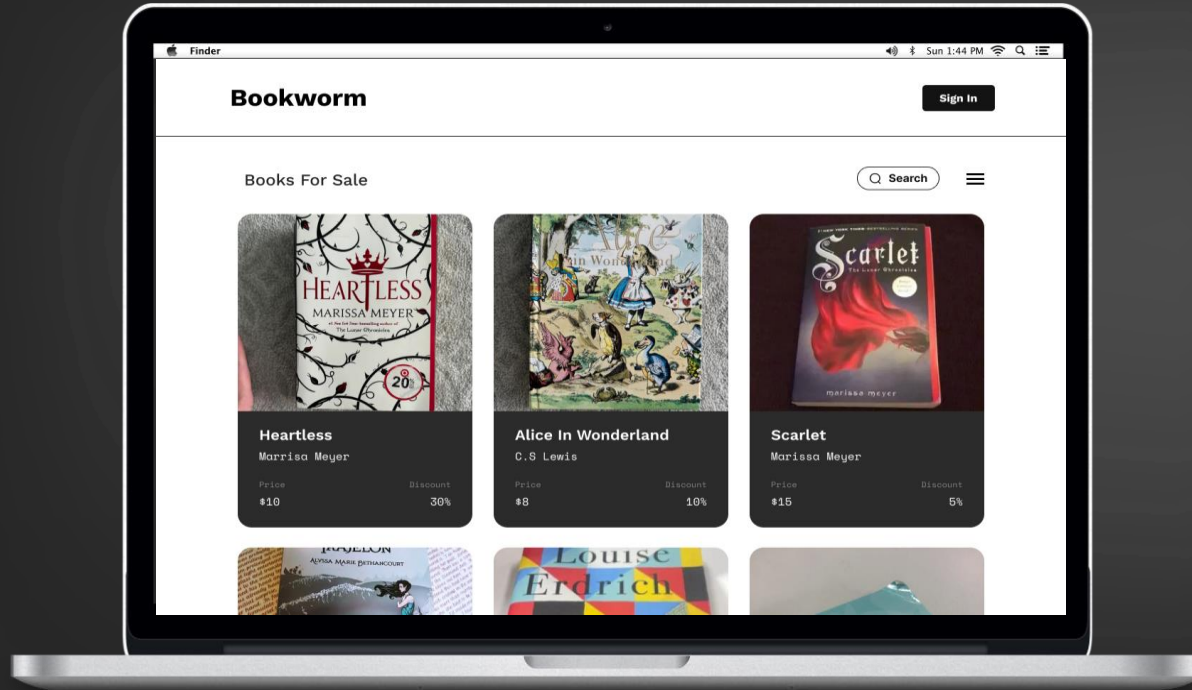
Problem

Solution

Demo

Impact

Live Demo : [Here](#)



Problem

Solution

Demo

Impact

# Bookworm Damage Detection Architecture

**Gemini API**

**Prompt Engineering**

8 Damage type labels  
&  
1-5 severity scale

```
damage_types = [  
    "corner_damage",  
    "cover_scratches",  
    "spine_damage",  
    "water_damage",  
    "tears_or_rips",  
    "misprints",  
    "missing_dust_jacket",  
    "trim_issues"  
]
```

**Response  
Processing**

**Add to  
Database**

**Display on  
website**

Output Example:  
Damage Type: corner\_damage  
Severity: 3

Problem

Solution

Demo

Impact

# Bookworm Logistics Route Optimizer Architecture

## Clustering Based Route Optimizer

Mode 1

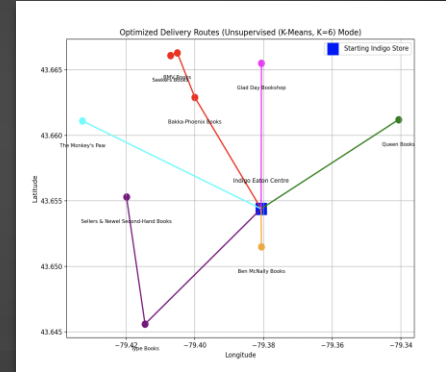
### K-Means Clustering

User specifies # of clusters  
( i.e. available delivery trucks)

Mode 2

### DBSCAN

AI determines optimal # of clusters  
+  
Dynamically adjust delivery fee



## Delivery Route

Problem

Solution

Demo

Impact



## Stakeholder Impact

### Publishers

- **Reduce costs** for shipping and restocking
- Receive **royalty deals** from otherwise unsold books
- Sustainability

- Receive a **steady supply** of inventory
- Boost sales
- **Larger market presence**

- **Reduced costs** for shipping and restocking
- **Streamlined** operations
- Sustainability
- Additional **commission \$** from resale market
- Reputation boost



20-40% of books in traditional retail are returned

\$1.50 to \$5 costs per book for shipping and restocking

**+\$250,000/year  
costs reduced**

Problem

Solution

Demo

Impact

## Stakeholder Impact

- **Reduce costs** for shipping and restocking
- Receive **royalty deals** from otherwise unsold books
- Sustainability

### Third-Party Resellers

- Receive a **steady supply** of inventory
- Boost sales
- **Larger market presence**

- **Reduced costs** for shipping and restocking
- **Streamlined** operations
- Sustainability
- Additional **commission \$** from resale market
- Reputation boost



~1% of total books resold

**+100,000 books/year  
per retailer**

Problem

Solution

Demo

Impact

## Stakeholder Impact

- **Reduce costs** for shipping and restocking
- Receive **royalty deals** from otherwise unsold books
- Sustainability

- Receive a **steady supply** of inventory
- Boost sales
- **Larger market presence**

### Retailers

- **Reduced costs** for shipping and restocking
- **Streamlined** operations
- Sustainability
- Additional **commission \$** from resale market
- Reputation boost



~1% of total books resold  
(approx. 100,000+)

30% commission on  
average \$8 resale price

**+\$240,000/year  
revenue**

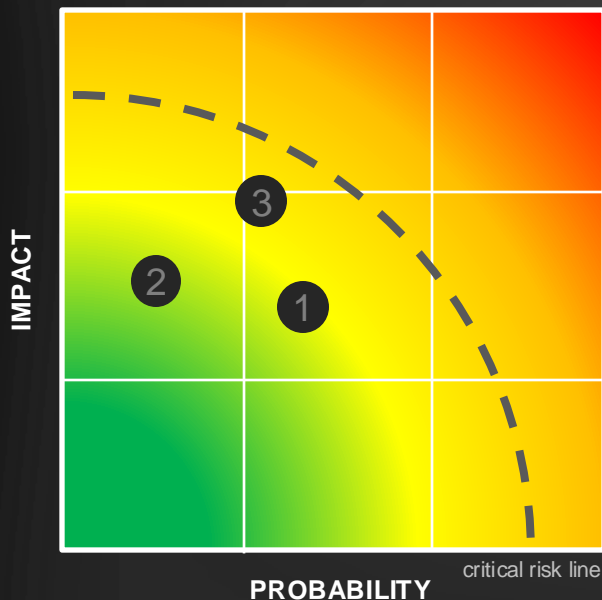
Problem

Solution

Demo

Impact

# Risks



## Risk

1

Competition

2

Accuracy

3

Popularity

## Mitigation Plan

Niche strategy, directly optimizing logistics for publishers and retailers

Custom defect detection model with tunable hyperparameter and enhanced control mechanisms

Develop targeted marketing campaigns

Problem

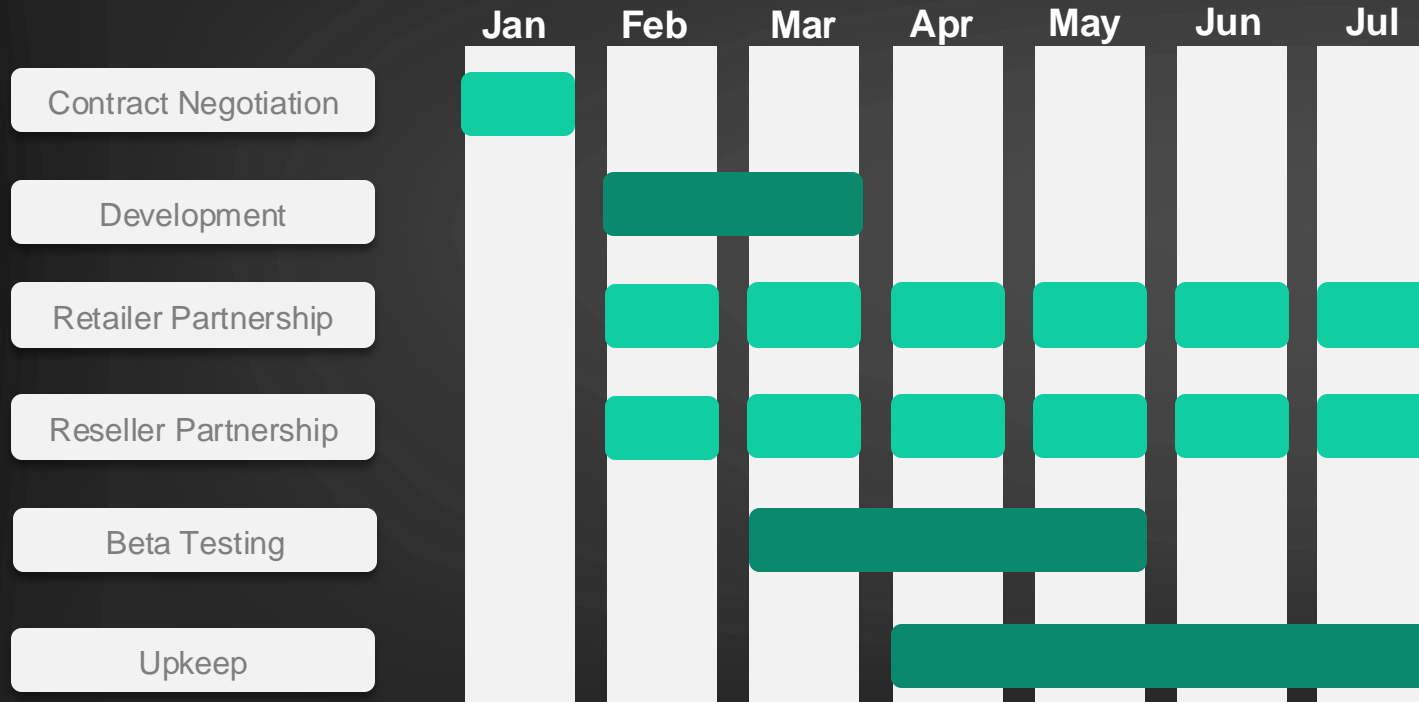
Solution

Demo

Impact

# Implementation Timeline

 = contractual     = development



...

Problem

Solution

Demo

Impact

# Financial Impact

Forecasted Income					
	2025		2026		2027
Revenue					
Reselling commission	\$	36,000.00	\$	144,000.00	\$ 288,000.00
Total revenue	\$	36,000.00	\$	144,000.00	\$ 288,000.00
Costs					
Development		40,000.00			
Maintenance			6,000.00		6,000.00
Gemini API		8.00	32.00		64.00
Wages		210,000.00	210,000.00		210,000.00
Total costs	\$	250,008.00	\$	216,032.00	\$ 216,064.00
Net Income	\$	(214,008.00)	\$	(72,032.00)	\$ 71,936.00

Problem

Solution

Demo

Impact

The background features several abstract, colorful geometric shapes. On the left, there are overlapping planes in shades of blue, green, and orange. On the right, there is a large, rounded triangular shape with a blue-to-orange gradient, a smaller sphere with a similar gradient, and a small cube with blue and orange faces. The entire scene is set against a dark gray background with a subtle grid pattern.

# Bookworm

Team Genies: Lillian Haspel, Joeun Yook, Adam Omarali, Joanne Wang

## Appendix 1: Sources

- Macy Berendsen. "Book Waste: The Dangers of Publishing and the Ethical Consumption of Books." Chicago Review of Books, 7 Dec. 2023, [chireviewofbooks.com/2023/12/07/book-waste-the-dangers-of-publishing-and-the-ethical-consumption-of-books/](https://chireviewofbooks.com/2023/12/07/book-waste-the-dangers-of-publishing-and-the-ethical-consumption-of-books/).
- Persistence Market Research. "Second Hand Books Market Size, Share, and Growth Forecast for 2025 - 2032 - Persistence Market Research." Persistence Market Research, 2025, [www.persistencemarketresearch.com/market-research/second-hand-books-market.asp](https://www.persistencemarketresearch.com/market-research/second-hand-books-market.asp). Accessed 9 Mar. 2025.
- Heritage, Canadian. "Economic Profile of the Canadian Book Publishing Industry: Technological, Legislative and Market Changes in Canada's English-Language Book Industry, 2008–2020." www.canada.ca, 26 Jan. 2022, [www.canada.ca/en/canadian-heritage/corporate/transparency/open-government/economic-profile-book-publishing-industry.html](https://www.canada.ca/en/canadian-heritage/corporate/transparency/open-government/economic-profile-book-publishing-industry.html).



## Appendix 2: Forecasted Income

Forecasted Income					
		2025		2026	2027
<u>Revenue</u>					
Reselling commission	\$	36,000.00	\$	144,000.00	\$ 288,000.00
<b>Total revenue</b>	\$	36,000.00	\$	144,000.00	\$ 288,000.00
<u>Costs</u>					
Development		40,000.00			
Maintenance				6,000.00	6,000.00
Gemini API		8.00		32.00	64.00
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<b>Total costs</b>	\$	250,008.00	\$	216,032.00	\$ 216,064.00
<b>Net Income</b>	\$	(214,008.00)	\$	(72,032.00)	\$ 71,936.00

## Appendix 3: Gemini API Costs

Gemini 2.0 Flash	
	Cost per 1M tokens (USD)
Input price	\$0.10 (text/image/video)
	\$0.70 (audio)
Output price	\$0.40
Context caching price	\$0.03 (text/image/video)
	\$0.18 (audio)
Context caching (storage)	\$1.00 / 1,000,000 tokens per hour
Grounding with Google Search	1,500 RPD (free), then \$35 / 1,000 requests

## Appendix 4: Detailed Prompt for Gemini

Strictly defined  
damage type

```
damage_options = ["corner_damage", "cover_scratches", "spine_damage", "water_damage", "tears_or_rips",  
                  "misprints", "missing_dust_jacket", "trim_issues"]
```

```
prompt = f"""Carefully analyze the image of the book.  
Identify the *single* most significant type of damage present.  
You *must* choose one of the following damage types (use *exactly* these labels): {', '.join(damage_options)}.
```

```
After identifying the damage type, assess its severity on a scale of 1 to 5, where:
```

- 1: Very Minor Damage
- 2: Minor Damage
- 3: Moderate Damage
- 4: Significant Damage
- 5: Severe Damage

Severity  
scale of 1-5

```
Return the result in *exactly* the following format. Do not include any other text:
```

```
Damage Type: [damage_type]  
Severity: [severity_level]
```

Mandated exact  
response format  
with example

```
Example:  
Damage Type: corner_damage  
Severity: 3
```

```
response = model.generate_content([prompt, image])
```