

Demo Session: Price Discovery



Overview

- What has been completed
- Current Progress
- Next Steps

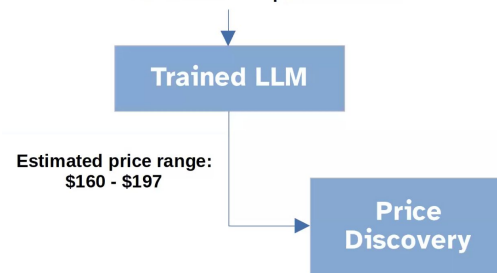


Objective

Develop LLM that sees product image and reads product description to establish price range.



Silver necklace with semiprecious stone



Recap

Week 1

- Collected Amazon 2023 product dataset ~ 1.4m entries
- Feature engineering on dataset
- Data scraper tested

Week 2

- CLIP w/ statistical Architecture designed and tested
- Text and image embeddings created
- Evaluation metrics selected and tested preliminarily

Week 3

- vit-large CLIP model used
- Evaluation metrics improved
- RAG implementation
- Price range outputting for products

Week 4

- Improvement of prompts
- Agent and prompt evaluations
- Fine tuning LLM

This Week

- Migrating the Vector Database from local machine to Cloud.
- Improving the data by exploring different embeddings from different multimodal llms or looking into Knowledge graph database.
- Experiment with plan and execute agents to try and reduce latency
- Experimenting with different LLMs (Mistral and Mixtral)

Database Migration



drant

amazon_new

POINTSINFOIMAGESPHOTOSSIMILAR

Collection Info

status

green

optimizer_status

ok

vectors_count

9999

indexed_vectors_count

0

points_count

9999

segments_count

2

config

{ "l2": 3, "l2s": 1 }

payload_schema

{ "p": 1, "l2s": 1 }

Collection Cluster Info

Shard ID

Location

Status

0

Local (8112183895486)

Active

drant

001a0f1e-4b07-4b11-856a-3802a8b095

Find Similar by ID

Point 561b41f8-c12e-4fdb-a8b9-9cd943e48d64

Payload:

Description

Men's Fishing Shorts, Hiking Shorts Quick Dry Comfortable UPF 50+, 7 Pockets, Shorts for Men, 10.5" Inseam

ID

80BK5Q299Q

Path

/testdata/images/51JAA3QzJpl_AC_UL320.jpg

Price

30.99

image_url

https://m.media-amazon.com/images/51JAA3QzJpl_AC_UL320.jpg

Vectors:

Default vector

Length: 512

FIND SIMILAR

Point 8be8fdd3-7ec1-45b0-8e81-f4cd07a2a049

Payload:

Description

Hyperflex Workout Shorts Men 9 Inch Inseam Zipper Pocket - Training, Athlete, Running, Lifting, Gym Shorts

ID

B0TYMH8P9Z

Path

/testdata/images/51ZX6DdWdL_AC_UL320.jpg

Price

34.99

image_url

https://m.media-amazon.com/images/51ZX6DdWdL_AC_UL320.jpg

Vectors:

Default vector

Length: 512

FIND SIMILAR

drant

Point 000f47c9-b574-481e-a0ec-c4161c3f35a7

Payload:

Description

Adult Cotton Quarter Socks, Multipairs

ID

B01NEF1EP8

Path

/testdata/images/91DyloA6DL_AC_UL320.jpg

Price

26.99

image_url

https://m.media-amazon.com/images/91DyloA6DL_AC_UL320.jpg

Vectors:

Default vector

Length: 512

FIND SIMILAR

Point 00105f36-5adf-4b79-b22a-66a884fdb93d

Payload:

Description

Men's Originals Cotton Pockets, Pull-on Jersey Gym Shorts, F

ID

B06VMW2HZX

Path

/testdata/images/51LnoW37teL_AC_UL320.jpg

Price

14

image_url

https://m.media-amazon.com/images/51LnoW37teL_AC_UL320.jpg

Vectors:

Default vector

Length: 512

FIND SIMILAR

Collection Info

status	green
optimizer_status	ok
vectors_count	50001
indexed_vectors_count	40192
points_count	50001



Qdrant Cluster

yunmo-apparel
Show code example

Free tier

4GB DISK
1GB RAM
0.5 vCPU

Usage

TYPE	USED	TOTAL
RAM	496.13 MB	1.00 GB
CPU	0.04261 vCores	0.5 vCores
Disk	145.25 MB	4.00 GB



Point 00091816-68ac-443f-bd21-e48d8c835c05

Payload:

metadata

{{'price': '12.99'}}

page_content

('10Pairs Tiny Cartilage Stud Earrings for Women Men Stainless Steel Cubic Zirconia Flatback Earrings Small Hoop Earrings Hoop Huggie Earring Sets for Multiple Piercings')

Vectors:

Default vector

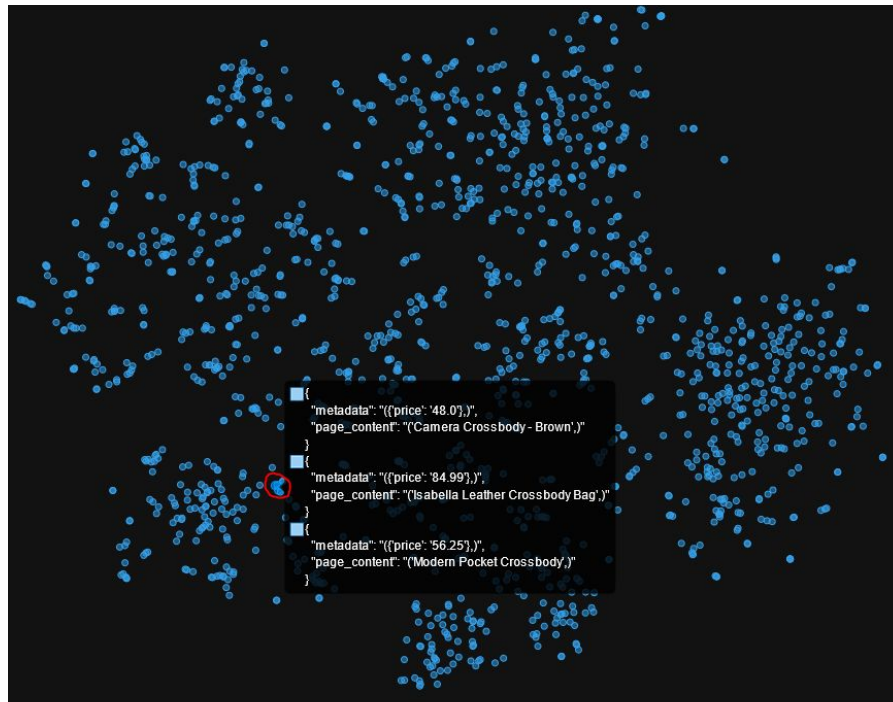
Length: 512

FIND SIMILAR

Shape of (1, 512)

```
[0.047900774,-0.009265206,-0.13058364,-0.0026475426,-0.002061118,0.013852904,0.0020981927,0.02033095,-0.011701272,0.00005975482,-0.039802223,0.051809993,-0.05611937,0.003378329,0.017301522,-0.0016699184,0.23983741,-0.02016371,-0.005192212,-0.039384604,0.0110690305,-0.0019488449,0.03582207,-0.0821287,-0.043699585,-0.042899657,-0.04027278,-0.013816387,-0.09648379,0.02477685,0.017857086,-0.095028974,0.04367884,-0.00899596,-0.014419842,0.0029658782,0.0153270485,...
```

```
0.049465884,0.048417922,-0.026480336,0.02832114,0.036019046,-0.018422429,-0.028004302,0.0331919,-0.058521096,0.012694165,-0.0055935783,0.08864113,0.014418576,-0.010777727,-0.054559715,-0.10479304,0.054489937,0.005090482,-0.007696778,0.053214245,0.05658143,-0.035472903,-0.008916863,-0.08331825,-0.0028002816,-0.023520332,0.024861895,-0.018434254,-0.08210615,0.055148173,-0.0897834,0.002654043]
```

Knowledge Graph Database




Why Knowledge graphs?

- 1. Enhanced Understanding of Product Relationships**
- 2. Improved Context for Textual Data**
- 3. Reasoning and Knowledge Integration**
- 4. Fast and efficient retrieval**

Representing data on graph structure

B3					Luggage Sets Expandable PC+ABS Durable Suitcase Double Wheels TSA Lock Blue							
	A	B	C	D	E	F	G	H	I	J	K	L
1	asin	title	imgUrl	productUR	stars	reviews	price	listPrice	category_id	isBestSelle	boughtIn	LastMonth
2	B014TMV5YE	Sion Softside Expandable Roller Luggage, Black, Checked-Large 29-Inch	https://m.r	https://www	4.5	0	139.99	0	104	FALSE	2000	
3	B07GDLQCXV	Luggage Sets Expandable PC+ABS Durable Suitcase Double Wheels TSA Lock	https://m.r	https://www	4.5	0	169.99	209.99	104	FALSE	1000	
4	B07XSCCZYG	Platinum Elite Softside Expandable Checked Luggage, 8 Wheel Spinner Suitcas	https://m.r	https://www	4.6	0	365.49	429.99	104	FALSE	300	
5	B08MVFKGJM	Freeform Hardside Expandable with Double Spinner Wheels, Navy, 2-Piece Se	https://m.r	https://www	4.6	0	291.59	354.37	104	FALSE	400	
6	B01DJLKZBA	Winfield 2 Hardside Expandable Luggage with Spinner Wheels, Checked-Large	https://m.r	https://www	4.5	0	174.99	309.99	104	FALSE	400	
7	B07XSCD2R4	Maxlite 5 Softside Expandable Luggage with 4 Spinner Wheels, Lightweight Suit	https://m.r	https://www	4.5	0	144.49	0	104	FALSE	500	
8	B07MXF4G8K	Hard Shell Carry on Luggage Airline Approved, Carry on Suitcases with Wheels	https://m.r	https://www	4.5	0	169.99	0	104	FALSE	400	
9	B07H515VCZ	Maxporter II 30" Hardside Spinner Trunk Luggage, Expandable, Navy	https://m.r	https://www	4.5	0	299.99	0	104	FALSE	100	
10	B08BXCBCNMQ	Omni 2 Hardside Expandable Luggage with Spinner Wheels, Checked-Large 28	https://m.r	https://www	4.5	0	112.63	137.04	104	FALSE	500	
11	B089K44XTS	Luggage Sets Expandable Lightweight Suitcases with Wheels PC+ABS Durable	https://m.r	https://www	4.4	0	209.99	0	104	FALSE	200	
12	B07QZLHTTY	Crew Versapack Softside Expandable 8 Spinner Wheel Luggage, USB Port, Me	https://m.r	https://www	4.7	0	271.99	319.99	104	FALSE	100	
13	B01HIATG6I	Chatelet Hard+ Hardside Luggage with Spinner Wheels, Champagne White, Cl	https://m.r	https://www	4.6	0	259.6	413.33	104	FALSE	100	
14	B07QXD3J9G	Crew Versapack Softside Expandable 8 Spinner Wheel Luggage, USB Port, Me	https://m.r	https://www	4.5	0	323.99	0	104	FALSE	100	
15	B081JDHNX1	Centric 2 Hardside Expandable Luggage with Spinners, True Navy, 3-Piece Set	https://m.r	https://www	4.5	0	399.92	699.97	104	FALSE	100	
16	B07DMBG7CX	Xpedition 30 Inch Multi-Pocket Upright Rolling Duffel Bag	https://m.r	https://www	4.3	0	42	0	104	FALSE	300	
17	B082X1BDFH	Stratum 2.0 Expandable Hardside Luggage with Spinner Wheels, 28" SPINNER	https://m.r	https://www	4.5	0	89.95	139.99	104	FALSE	300	
18	B00GI3572E	Women's Spinner Mobile Office, Black, One Size	https://m.r	https://www	4.6	0	164.99	174.99	104	FALSE	200	
19	B084P184MG	Ascella X Softside Expandable Luggage with Spinners, Black, Checked-Large 2	https://m.r	https://www	4.5	0	198.41	209.99	104	FALSE	100	
20	B094LVRCZD	Boren Polycarbonate Hardside Rugged Travel Suitcase Luggage with 8 Spinner	https://m.r	https://www	3.9	0	99.99	0	104	FALSE	300	
21	B077Z27K96L	Clear PVC Suitcase Cover Protectors 28 Inch Luggage Cover for Wheeled Suitc	https://m.r	https://www	4.2	0	17.99	19.99	104	FALSE	1000	
22	B09WXYLG6C	Aspire DLX Softside Expandable Luggage with Spinner Wheels, Checked-Medi	https://m.r	https://www	4.6	0	130.29	159.99	104	FALSE	200	
23	B07FDK2FVQ	Winfield 3 DLX Hardside Luggage with Spinners, 3-Piece Set (20/25/28), Blue/I	https://m.r	https://www	4.3	0	366.53	779.97	104	FALSE	50	
24	B07FNSKMST	Oxford Expandable Spinner Luggage Suitcase with TSA Lock - 30.1 Inch, Black	https://m.r	https://www	4.5	0	119.47	0	104	FALSE	100	
25	B09R35YK22	Chatelet Hardside 2.0 Luggage with Spinner Wheels, Chocolate Brown, Check	https://m.r	https://www	4.5	0	276	369.99	104	FALSE	50	
26	B084LP1JLY	Anzio Softside Expandable Spinner Luggage, Teal, Checked-Large 30-Inch	https://m.r	https://www	4.1	0	98.62	149.99	104	FALSE	300	

Product information

Product Dimensions	12.75 x 20 x 31 inches
Item Weight	14.3 pounds
Department	unisex-adult
Manufacturer	Samsonite Corporation
ASIN	B01DJLKZBA
Country of Origin	Myanmar
Item model number	56846-1277
Customer Reviews	4.5  21,580 ratings 4.5 out of 5 stars
Best Sellers Rank	#4,903 in Clothing, Shoes & Jewelry (See Top 100 in Clothing, Shoes & Jewelry) #4 in Suitcases
Is Discontinued By Manufacturer	No
Capacity	11.5 Pounds
Item Weight	14.3 Pounds

Agents



Steps Taken

- Experimented with one-shot prompting.
 - To see whether the performance will be good(good price range)
- Experimented with plan and execute agents
 - To see whether they will help reduce latency(faster results)
- Experimented with different LLMs on ReAct Agent
 - Gemini
 - Mixtral
- Experimented with visual LLM to supplement description which was then fed to agent.
 - To use both image and description for price range prediction

Experiment with one-shot Prompt

```
✓ test_prompt_two = ""
```

```
As an experienced product analyst proficient in determining accurate product price ranges, utilize all available tools {tools}, including internet searches and databases, to precisely answer the given question. Begin by checking the database, then proceed to search the internet. Then pick the most similar products and use them to come up with an accurate price range. Similar products are those with closely matching specifications based on product information and brand. Based on this comparison, generate a highly accurate, reasonable, and compact estimate of the price range for the product. If a tool encounters an error, use another tool. Return ONLY the ESTIMATE of the PRICE RANGE for the product. An example being $100-110 with the price of the product being $106
```

```
Use the following format:
```

```
Question: the input question you must answer.
```

```
Thought: you should always think about what to do.
```

```
Action: the action to take, should be ONE of[{tool_names}].
```

```
Action Input: the input to the action. It SHOULD be a string.
```

```
Action: choose another tool if a tool fails or handle its error.
```

```
Observation: the result of the action, including insights gained or findings.
```

```
... (this Thought/Action/Action Input/Observation can repeat N times). If no result is found, use your own knowledge.
```

```
Thought: I now know the final answer that is based on the analysis of your findings and observations.
```

```
Final Answer: the final answer to the original input question, which must be as accurate as possible. NEVER say you can't answer.
```

```
An example to follow is:
```

```
Question: what is the estimated, accurate and compact price range of a Sony WH-CH520 Wireless Headphones Bluetooth On-Ear Headset with Microphone, Black New?
```

```
Thought 1: I need to search for the Sony WH-CH520 Wireless Headphones to identify their price range.
```

```
Action 1: search text db
```

```
Action Input 1: : Sony WH-CH520 Wireless Headphones.
```

```
Observation 1: The search results providing various listings for products similar to the Sony WH-CH520 Wireless Headphones with different prices.
```

```
Action 2: search internet
```

```
Action Input 2: Sony WH-CH520 Wireless Headphones Bluetooth On-Ear Headset with Microphone.
```

```
Observation 2: The search results provide various listings for the Sony WH-CH520 Wireless Headphones with different prices.
```

```
Thought 3: I need to check the obtained products for similarity.
```

```
Action 3: The products with great similarity to the Sony WH-CH520 Wireless Headphones are chosen.
```

```
Thought 4: I need to gather information on the range of prices offered for these headphones.
```

```
Action 4: Compare and analyze the search results to determine the price range.
```

```
Observation 4: Prices for the Sony WH-CH520 Wireless Headphones range from $80 to $100 across different retailers and platforms, based on comparing to very similar products with similar specifications and brand.
```

```
Thought 5: The price range of the Sony WH-CH520 Wireless Headphones is between $80 and $100.
```

```
Final Answer: $80 - $100
```


Best performing Prompts

```
test_prompt_four = """
```

```
Given the product description and the product image, utilize all available tools {tools}, including internet searches and databases, to precisely answer the given question.  
Begin by checking the database, then proceed to search the internet. Then pick the most similar products and use them to come up with an accurate price range. Similar products are those with closely matching specifications based on product information and brand.  
Based on this comparison, generate a highly accurate, reasonable, and compact estimate of the price range for the product  
If a tool encounters an error, use another tool.  
Return ONLY the ESTIMATE of the PRICE RANGE for the product. An example being $100-110 with the price of the product being $106
```

```
Use the following format:
```

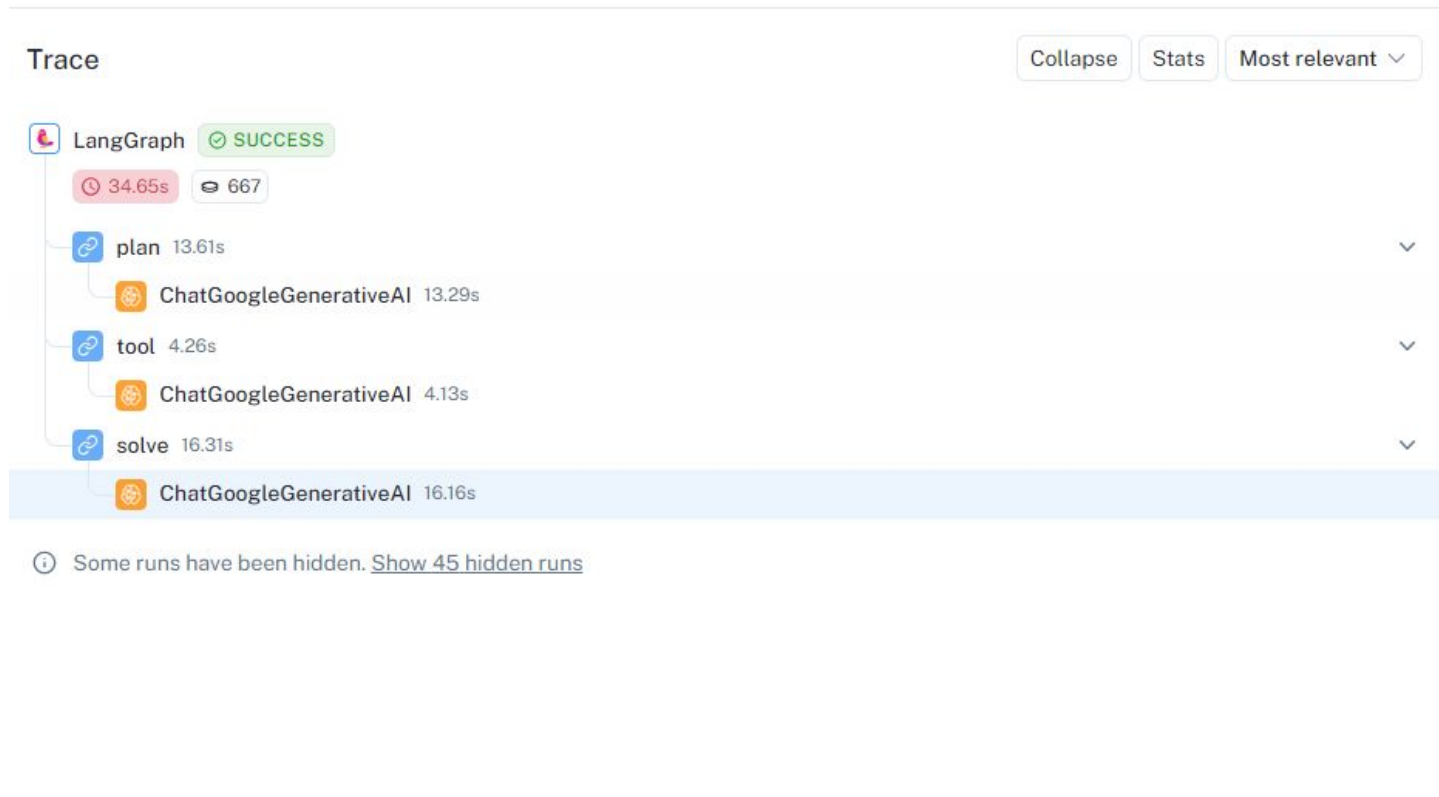
```
Question: the input question you must answer.  
Thought: you should always think about what to do.  
Action: the action to take, should be ONE of or ALL of [{tool_names}].  
Action Input: the input to the action. It SHOULD be a string.  
Action: choose another tool if a tool fails or handle its error.  
Observation: the result of the action, including insights gained or findings.  
... (this Thought/Action/Action Input/Observation can repeat N times). If no result is found, use your own knowledge.  
Thought: I should recheck my answer and make sure it meets the specifications. If not, try again before coming up with the final answer.  
Thought: I now know the final answer that is based on the indepth analysis of your findings and observations.  
Final Answer: the final answer to the original input question, which must be as accurate and compact as possible. NEVER say you can't answer.
```

```
Begin!
```


```
Question: {input}  
Image: {image}  
Thought: {agent_scratchpad}
```

```
"""
```







Experimentation with plan and execute agents



Result from Gemini and Mixtral

 AgentExecutor 🟢 SUCCESS

🕒 32.81s 🗨️ 2,713

-  ChatGoogleGenerativeAI 2.79s
-  search text db 0.54s
 -  Retriever 0.50s
-  ChatGoogleGenerativeAI 9.53s
-  search internet 4.31s
-  ChatGoogleGenerativeAI 15.06s







📄 Some runs have been hidden. [Show 18 hidden runs](#)

AI

Final Answer: \$349.99-429.00

 AgentExecutor 🟢 SUCCESS

🕒 20.42s 🗨️ 2,813

-  HuggingFaceEndpoint 5.97s
-  search text db 3.54s
 -  Retriever 3.51s
-  HuggingFaceEndpoint 3.47s
-  search internet 3.19s
-  HuggingFaceEndpoint 2.37s


📄 Some runs have been hidden. [Show 18 hidden runs](#)

Final Answer: {'price_range': {'min': 349.99, 'max': 429.0}}</s>

Execution Flow

Price Range Generator

Upload a product image

 Drag and drop file here
Limit 200MB per file • JPG, JPEG, PNG

Browse files

 51RE0DBn5VL._AC_SL1500_.jpg 42.4KB

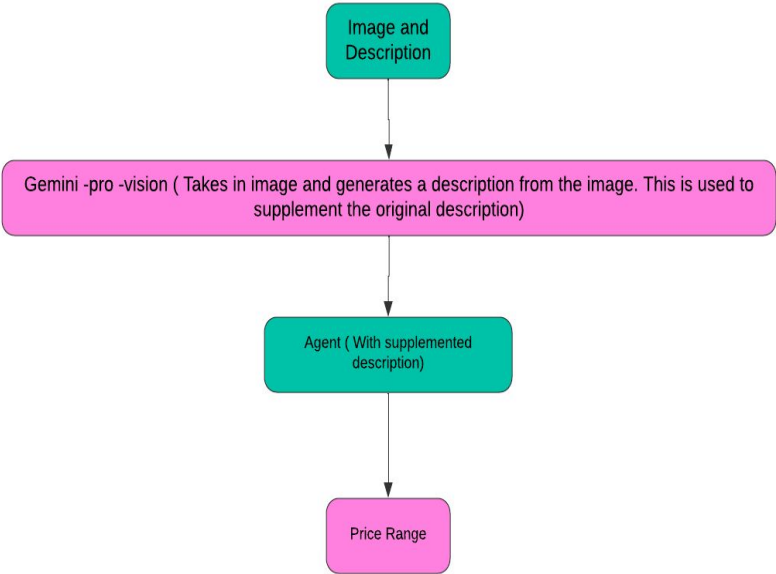
×

Enter product description

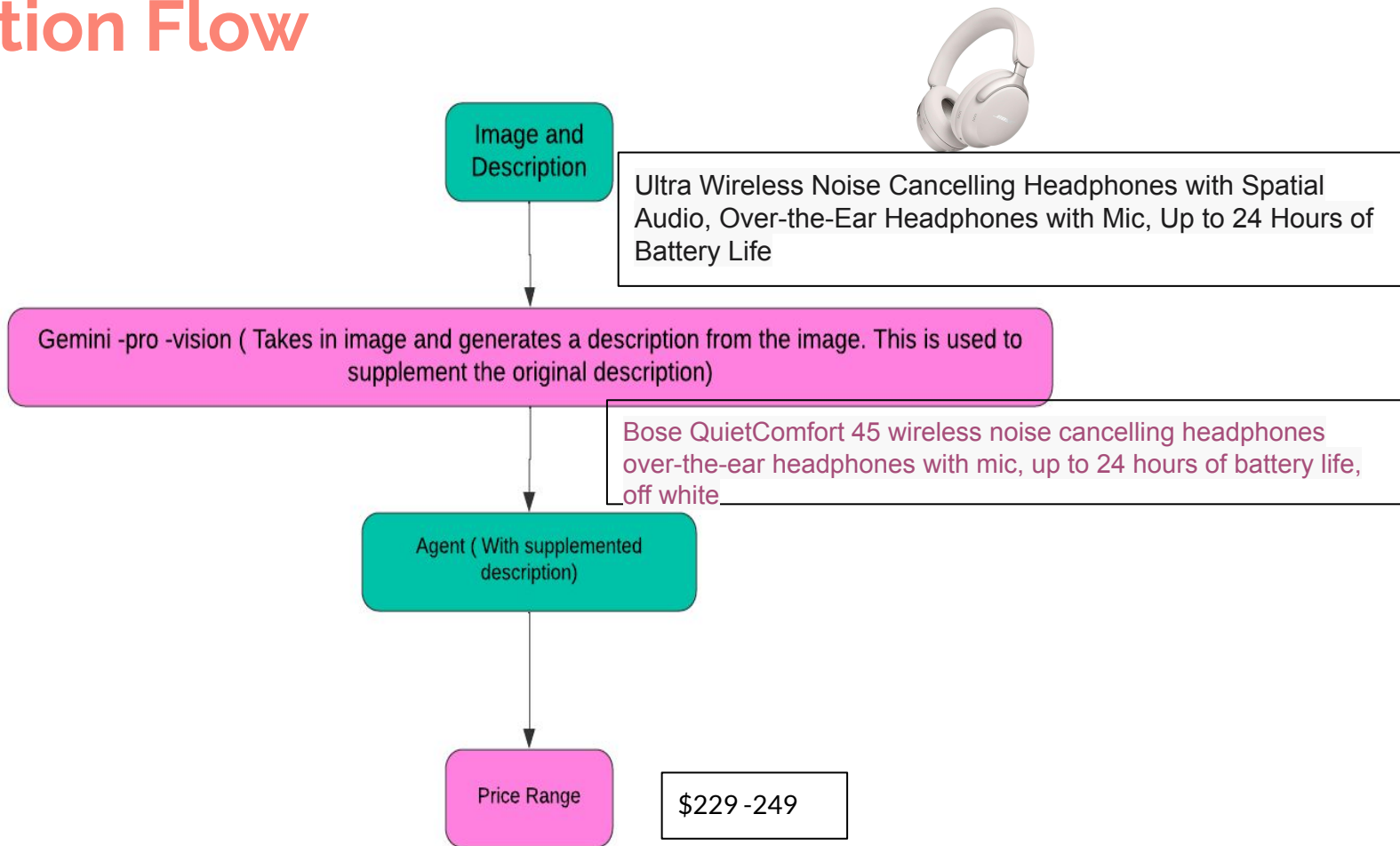
Ultra Wireless Noise Cancelling Headphones with Spatial Audio, Over-the-Ear Headphones with Mic, Up

Generate Price Range

\$229-249



Execution Flow



Next Steps

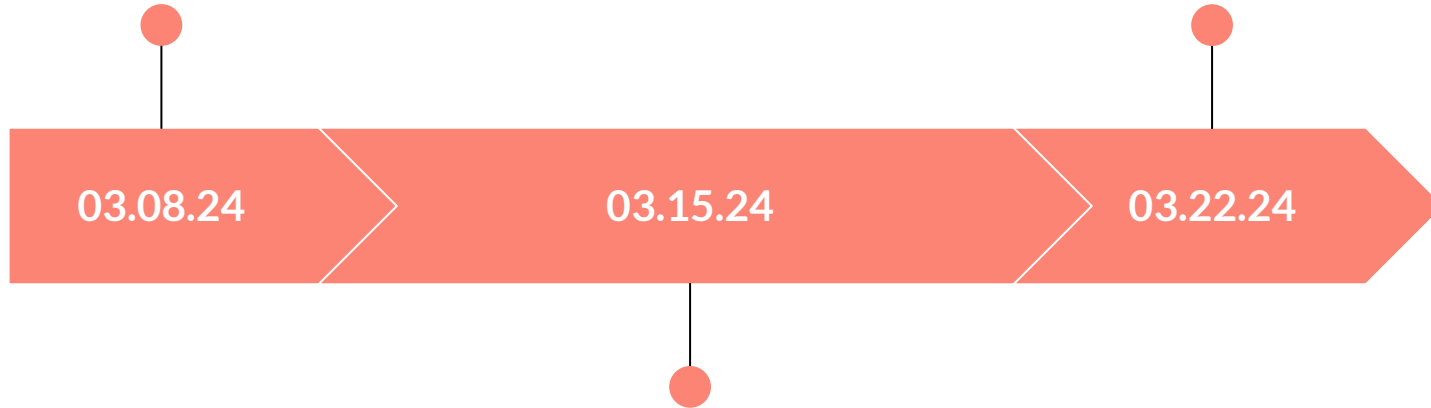


Plan for improvement

- Improving on the decided evaluation metric that makes sure the range given is suitable and that the price is in the range.
- Product demonstration preparation
- Deployment to cloud
 - Text and image

Product Fine Tuning

Product finalization &
Documentation



Product Demonstration &
Monitoring



Feedback?

