Day95_ChromaDB_CRUD_and_Metadata

October 2, 2025

1 Vector Databases CRUD with ChromaDB

In this notebook, we will learn how to perform **CRUD operations** in **ChromaDB**:

- **C → Create (Add documents)**
- **R → Read (Query documents)**
- **U → Update (Modify documents/metadata)**
- **D → Delete (Remove documents)**

We will do this **with** and **without metadata**.
Metadata helps us add extra info (author, year, category) so we can filter results easily.

2 Setup & Imports

We first import `chromadb` and create a client to connect to ChromaDB.
We also set up an **embedding function** (SentenceTransformer model) that converts text → vectors.

[1]:
```
import chromadb
from chromadb.utils import embedding_functions

# Create client
client = chromadb.Client()

# Define embedding function (SentenceTransformer)
ef = embedding_functions.SentenceTransformerEmbeddingFunction(
    model_name="all-MiniLM-L6-v2"
)
```

3 Create a Collection

We create a new collection named `"news_crud"`.
Think of a collection like a table in SQL – it stores documents, embeddings, and metadata.

[2]:
```
# Delete old collection if it exists
try:
    client.delete_collection("news_crud")
except:
    pass

# Create new collection
collection = client.create_collection(
    name="news_crud",
    embedding_function=ef
)

print(" Collection created")
```

```
Collection created
```

4 Add Documents (Create)

We insert documents into the collection.
Each document must have a **unique ID**.

[3]:
```
collection.add(
    documents=[
        "Elon Musk founded SpaceX in 2002.",
        "Apple just released iPhone 16 Pro.",
        "Virat Kohli scored a century yesterday."
    ],
    ids=["doc1", "doc2", "doc3"]
)

print(" Added 3 documents")
```

```
Added 3 documents
```

5 Query Documents (Read)

We query the database.
The query is converted into an embedding → compared with stored vectors → top matches returned.

[4]:
```
results = collection.query(
    query_texts=["Who founded SpaceX?"],
    n_results=2
)

print(" Query results:")
print(results)
```

```
 Query results:
{'ids': [['doc1', 'doc2']], 'embeddings': None, 'documents': [['Elon Musk
founded SpaceX in 2002.', 'Apple just released iPhone 16 Pro.']], 'uris': None,
'included': ['metadatas', 'documents', 'distances'], 'data': None, 'metadatas':
[[None, None]], 'distances': [[0.23058748245239258, 0.9184808731079102]]}
```

6 Update Documents

Updating = re-adding with the **same ID**.
This overwrites the old document.

[5]:
```
collection.add(
    documents=["Apple unveiled iPhone 17 Ultra with AI features."],
    ids=["doc2"]   # same ID → overwrites
)

print(" Updated doc2")
```

```
 Updated doc2
```

7 Delete Documents

We can delete documents using their IDs.

[6]:
```
collection.delete(ids=["doc3"])
print(" Deleted doc3 (Virat Kohli news)")
```

```
 Deleted doc3 (Virat Kohli news)
```

8 Peek Collection

We check the current state of the collection.

[7]:
```
collection.peek()
```

[7]:
```
{'ids': ['doc1', 'doc2'],
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```

```
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 'documents': ['Elon Musk founded SpaceX in 2002.',
  'Apple just released iPhone 16 Pro.'],
 'uris': None,
 'included': ['metadatas', 'documents', 'embeddings'],
 'data': None,
 'metadatas': [None, None]}
```

9 Metadata Example

9.1 Create a Collection with Metadata

Now let's use metadata (category, author, year).
Metadata helps filter documents beyond semantic meaning.

[8]:
```
# Delete old collection if exists
try:
    client.delete_collection("news_metadata")
except:
    pass

collection_meta = client.create_collection(
    name="news_metadata",
    embedding_function=ef
)

print(" Metadata collection created")
```

```
Metadata collection created
```

9.2 Add Documents with Metadata

We attach metadata along with each document.

[9]:
```
collection_meta.add(
    documents=[
        "Elon Musk founded SpaceX in 2002.",
        "Apple just released iPhone 16 Pro.",
        "Virat Kohli scored a century yesterday."
    ],
```

```
    ids=["doc1", "doc2", "doc3"],
    metadatas=[
        {"category": "space", "author": "John", "year": 2002},
        {"category": "tech", "author": "Alice", "year": 2024},
        {"category": "sports", "author": "Raj", "year": 2025}
    ]
)

print(" Added documents with metadata")
```

```
 Added documents with metadata
```

9.3 Query with Metadata Filter

We filter search results by metadata.
Example → find `"Apple iPhone"` only inside **tech** category.

[10]:
```
results = collection_meta.query(
    query_texts=["Apple iPhone"],
    n_results=2,
    where={"category": "tech"}   # filter
)

print(" Query results (filtered by category=tech):")
print(results)
```

```
 Query results (filtered by category=tech):
{'ids': [['doc2']], 'embeddings': None, 'documents': [['Apple just released
iPhone 16 Pro.']], 'uris': None, 'included': ['metadatas', 'documents',
'distances'], 'data': None, 'metadatas': [[{'year': 2024, 'category': 'tech',
'author': 'Alice'}]], 'distances': [[0.39052993059158325]]}
```

9.4 Update Metadata

Re-adding with the same ID allows us to update metadata too.

[11]:
```
collection_meta.add(
    documents=["Apple unveiled iPhone 17 Ultra with AI features."],
    ids=["doc2"],
    metadatas=[{"category": "tech", "author": "Alice", "year": 2025}]
)

print(" Updated doc2 with new metadata")
```

```
 Updated doc2 with new metadata
```

9.5 Delete by Metadata

We can delete all docs from a certain category.
Example → delete all `"sports"` news.

[12]:
```
collection_meta.delete(where={"category": "sports"})
print(" Deleted all sports news")
```

```
Deleted all sports news
```

10 Summary

- **Add (Create)** → `collection.add()`
- **Read (Query)** → `collection.query()`
- **Update** → re-add with same `id`
- **Delete** → `collection.delete(ids=[...])` or `collection.delete(where={...})`
- **Metadata** → enables category/year filtering

This extends **Day94 notebook** by adding CRUD operations and metadata support.