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Uniform Machine Learning Framework for Intent Based Semantic Image Retrieval

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Semantic Image Retrieval



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There are multiple approaches for image retrieval and some of these deep learning techniques are Tag based retrieval, User query on captions derived from an image, User query on Scene graphs derived from an image etc.



The analytics derived from the image is stored in database. Different methods use different type of databases. For example, a tag-based search uses a Key Value DB, Scene graph-based retrieval uses a graph DB.

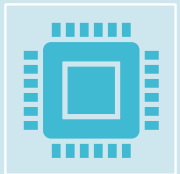
Problems in Semantic Image Retrieval



No Standard format to store analytics from deep learning algorithms.



Every algorithm requires a different kind of database to store the data.



Maintaining a database on low compute device adds to the complexity of design.



Constraints

Low Memory Footprint

- Deep Learning models consume a lot of memory.

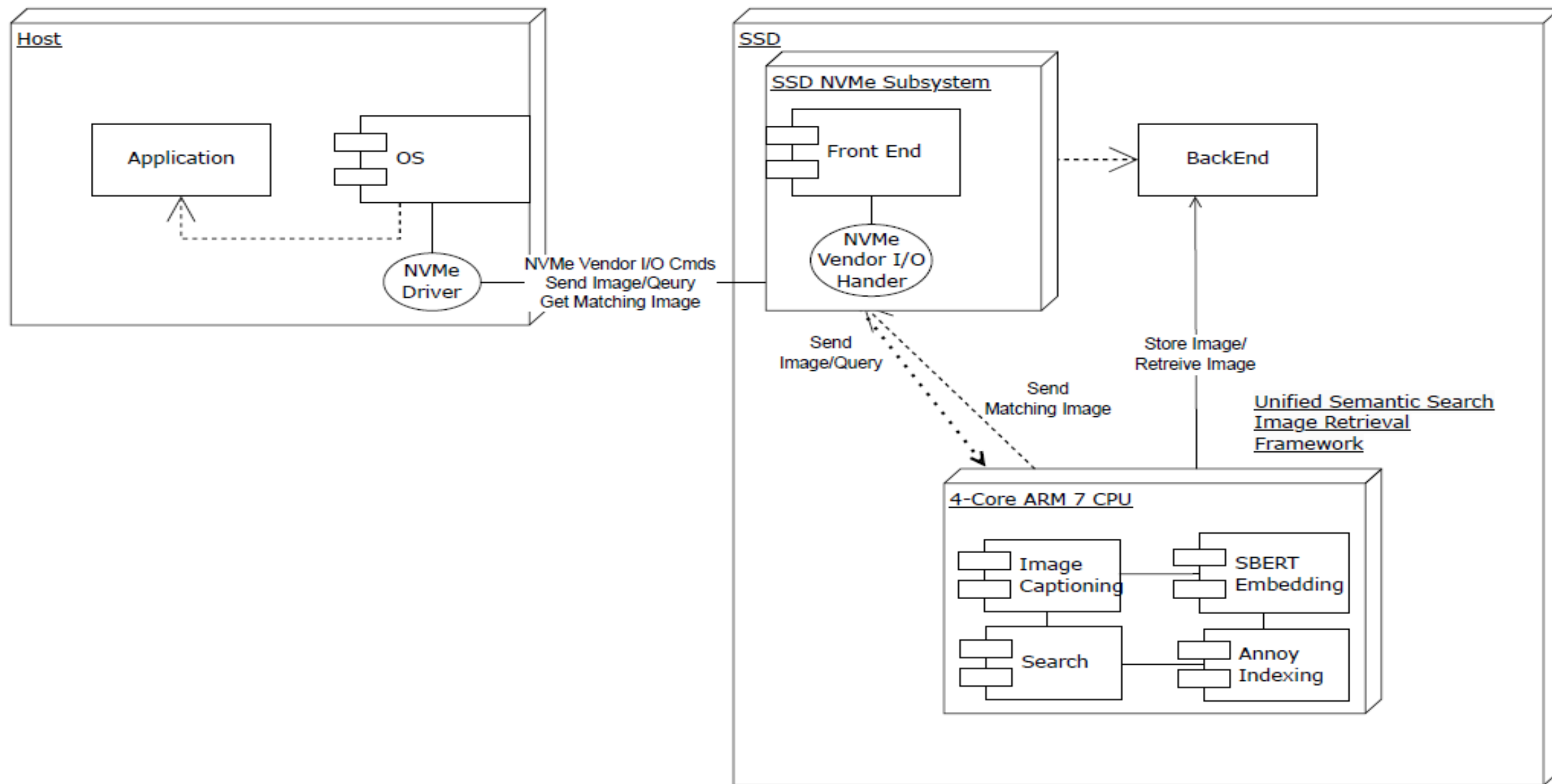
High Level of Accuracy

- Higher accuracy requires usage of heavier models.

Low Latency for Search

- RAM requirement grows exponentially as number of images in database increase, Search time takes a hit.

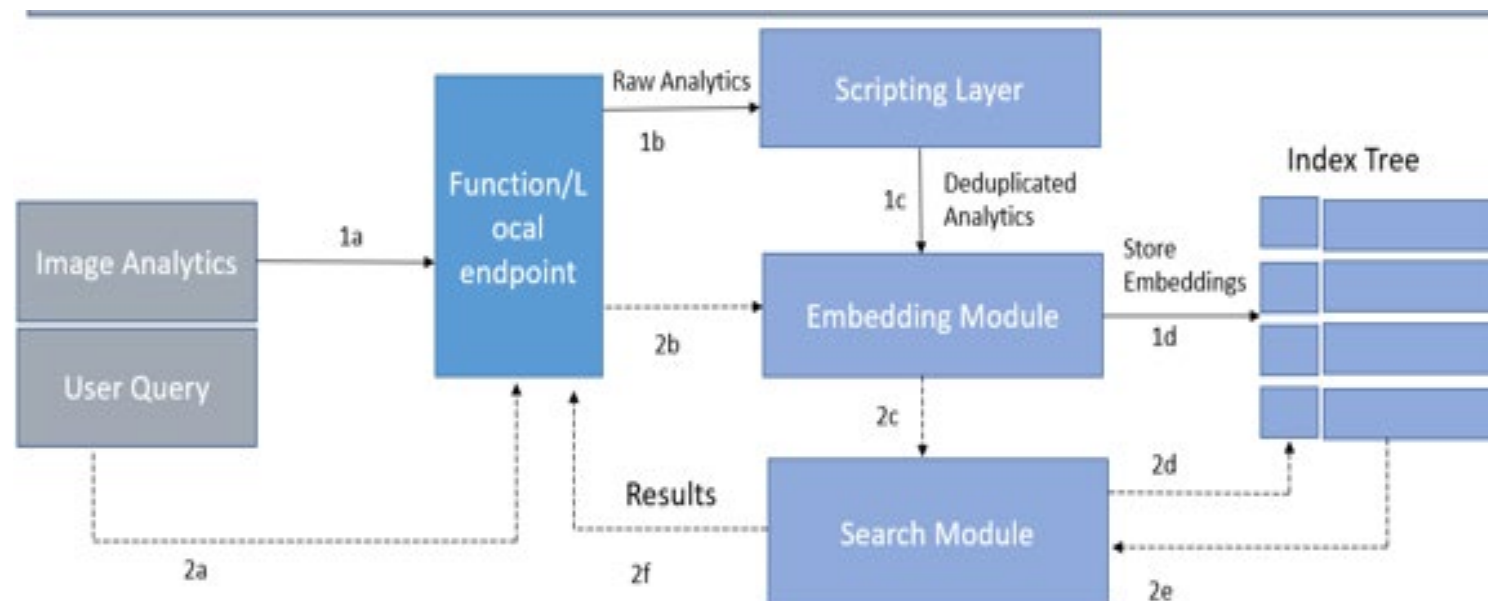
SSD with Unified Semantic Search Image Retrieval Framework





Solution – Siamese BERT

- Image Captioning + Deduplicated Triplets.
- 768-dimension encoding – SBERT Embedding Model.
- Index Tree using Annoy indexing.



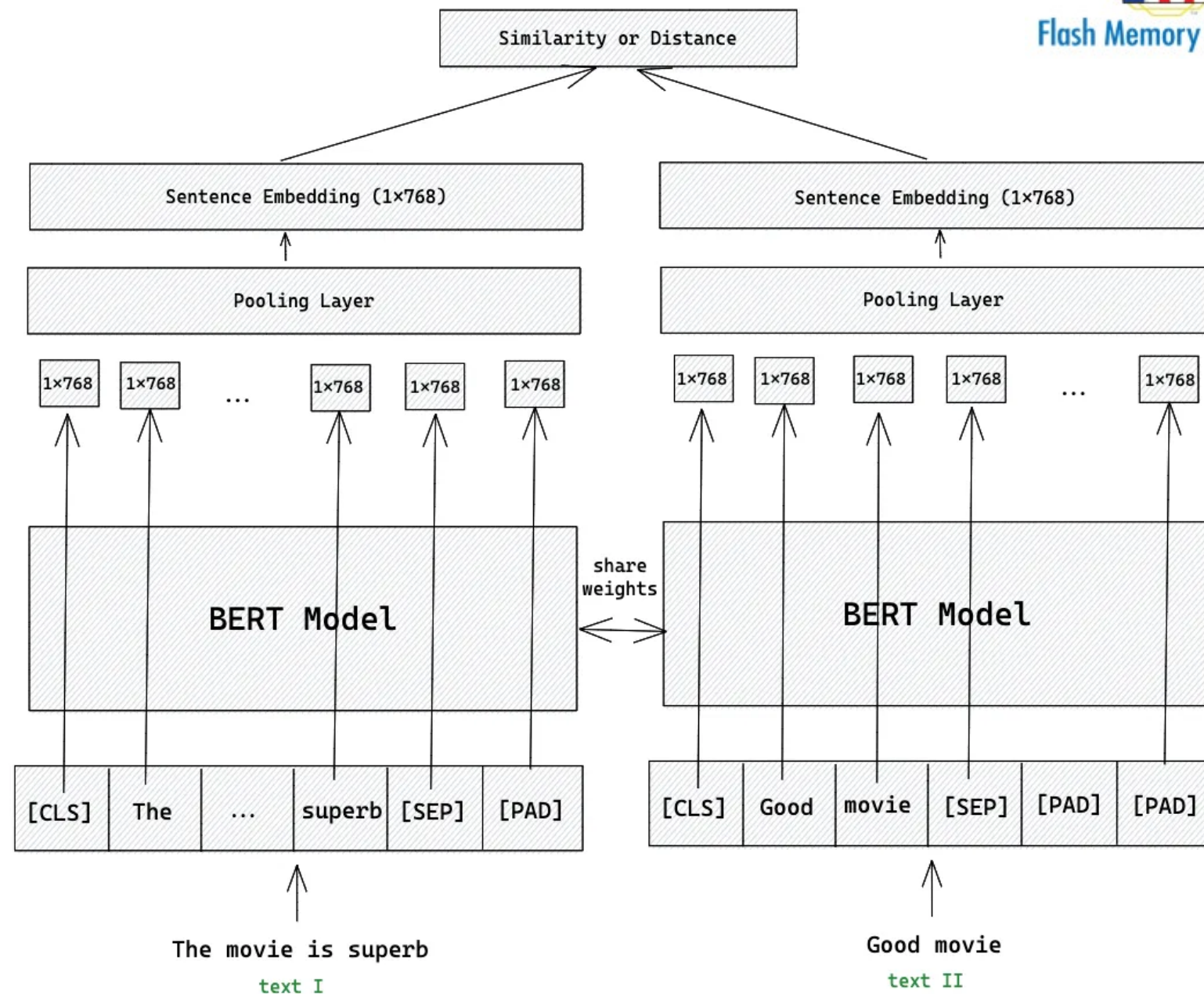
Siamese BERT – Sentence Transformer Model



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SBERT implements an additional pooling layer on top of BERT. There are three different pooling strategies implemented by SBERT.

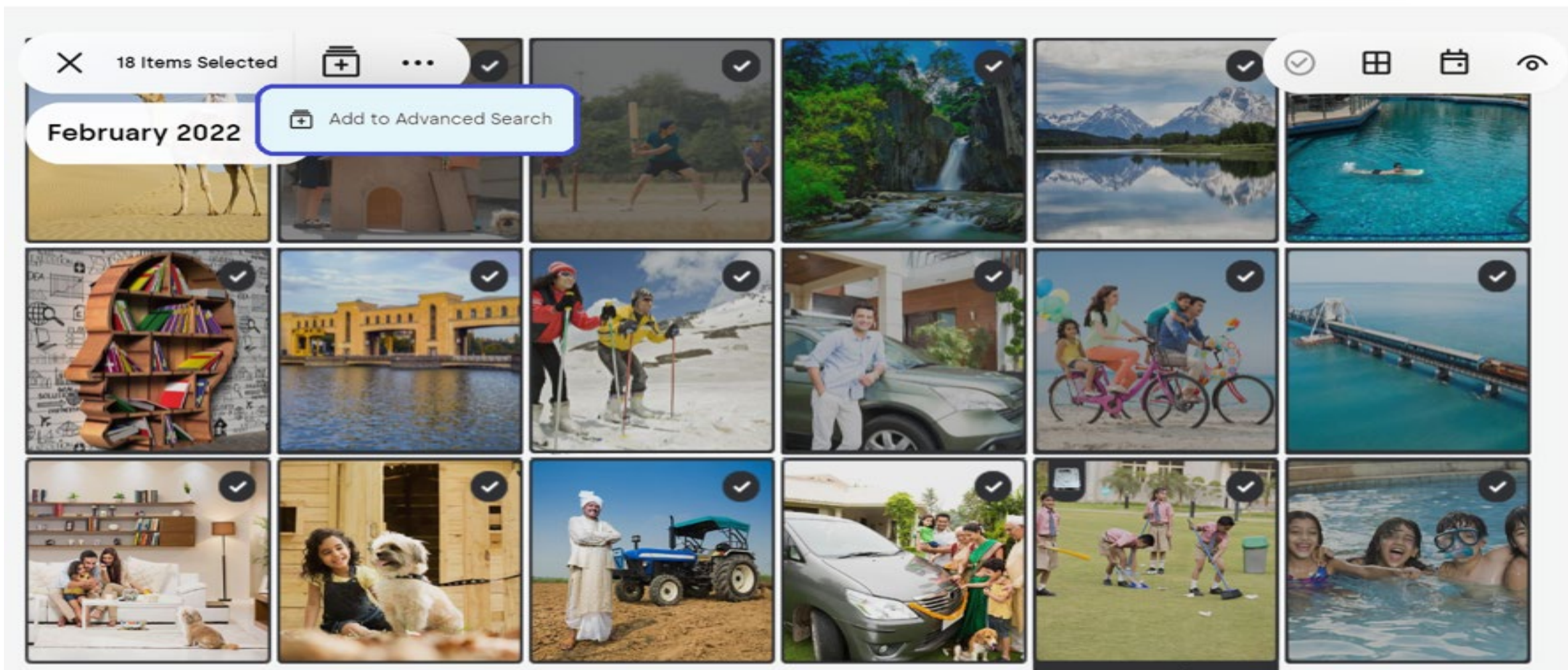
What we get after the pooling layer is the embedding vector of a text that has 768 dimensions. This embedding then can be compared to each other with pairwise distance or cosine similarity



Application View – Add to Advanced Search

< > Browse | Photos

Search...



Application View – Semantic Image Retrieval

< > Search Results for "snow on mountains"

Q snow on mountains

X






More Filters



Search Results for "snow on mountains"

Photos & Videos



	822308	JPEG Image	Feb 1, 2022	Windows (C:)	104.19 KB
	868537	JPEG Image	Feb 2, 2022	Windows (C:)	200.89 KB
	868454	JPEG Image	Feb 2, 2022	Windows (C:)	194.83 KB

1

Uniform framework for
semantic image retrieval

2

Separate Quad core
ARM CPU to do Image
Captioning, embedding,
and Searching

3

Annoy Indexing for fast
search on Quad core
ARM CPU

Summary



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Thank You!