IDUG

2025

Atlanta, GA | June 8-12

NA Db2 TECH CONFERENCE

Db2 AI Vectors: Powering Modern AI Use Cases

Shaikh Quader and Mike Springgay, *IBM*

Session Code: ####

Platform:

LUW

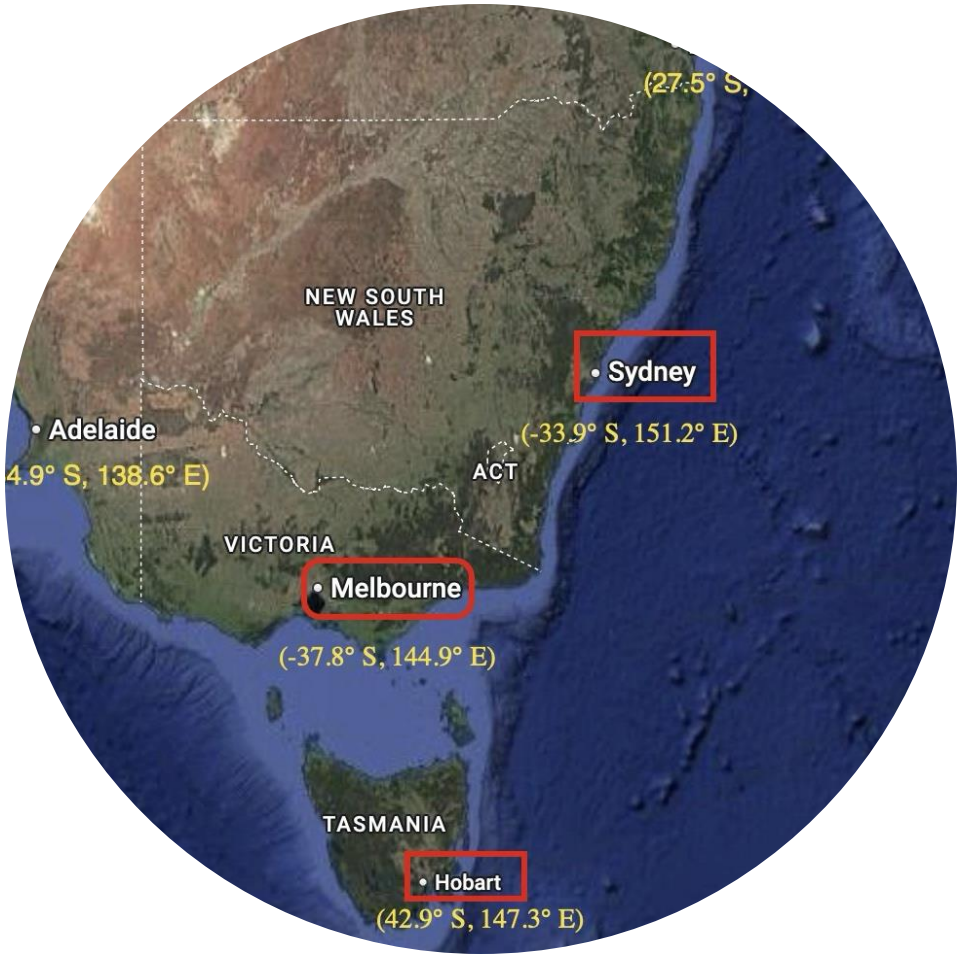
AGENDA

- Understanding AI Vectors
- Real-world Use Cases for Vectors
- Phase 1: Vector Support in Db2
- Db2 Vectors: The Road Ahead
- Demo

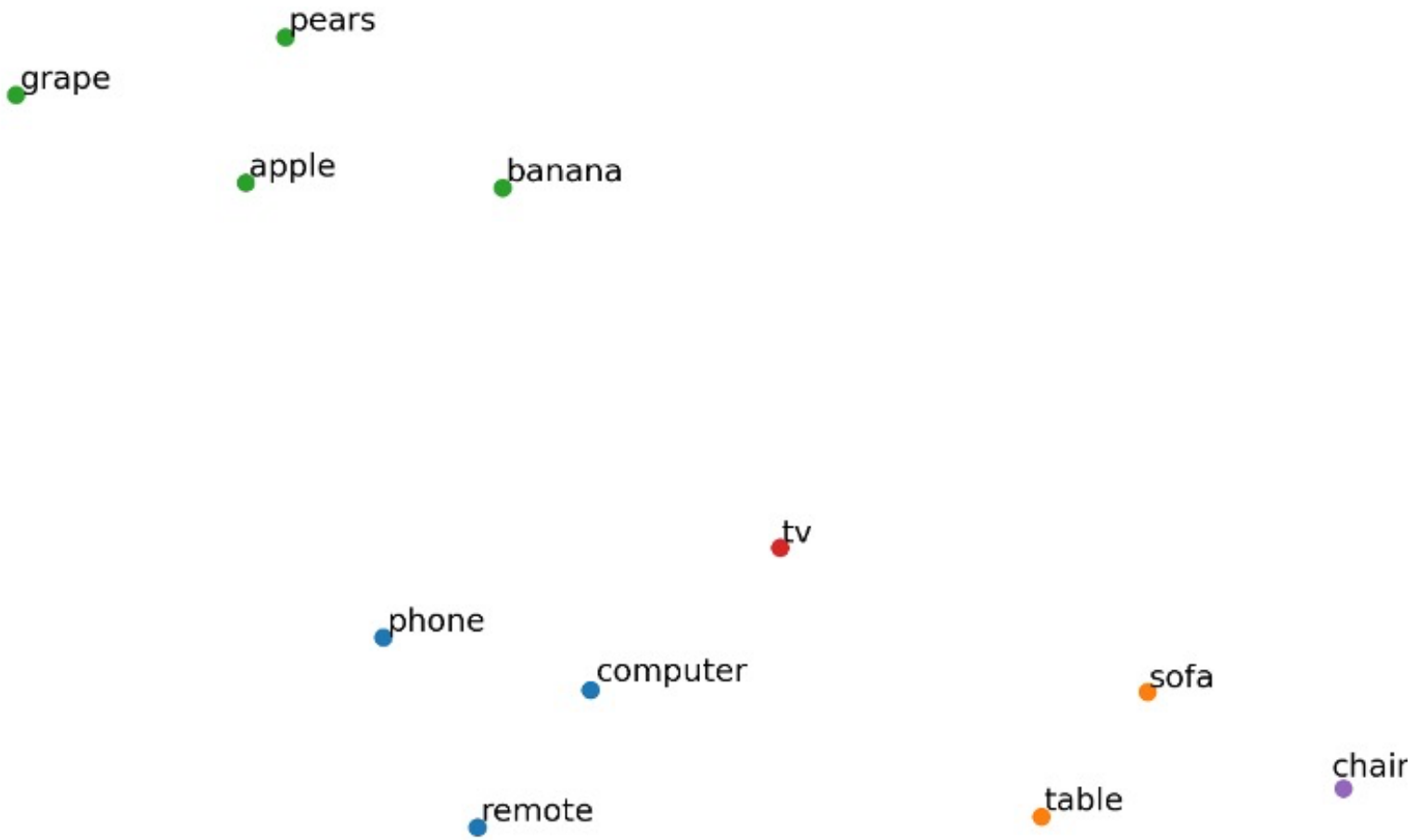
Which Two Are More Similar?

What is a vector?

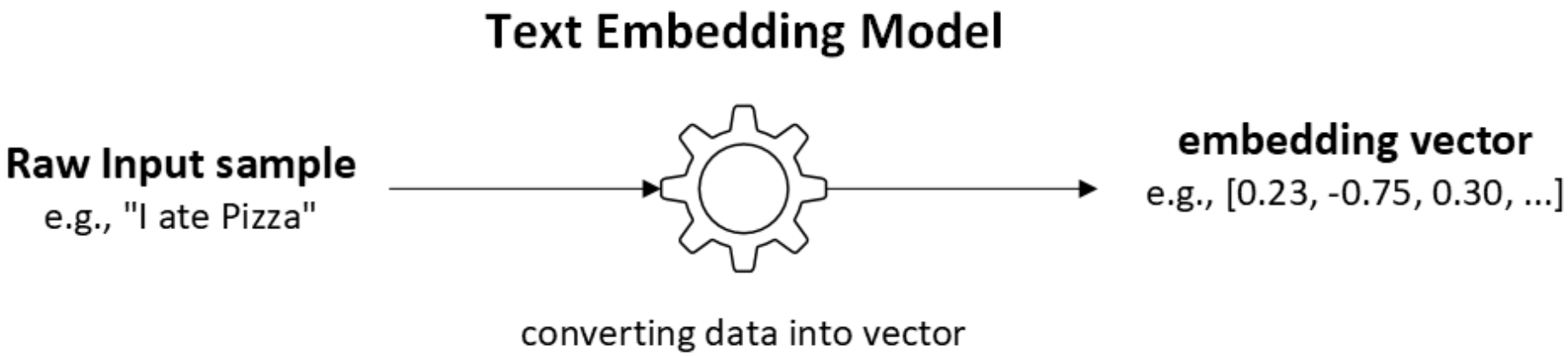
- A list of numbers, like (1, 2)
- Represents a point in space
- Like map coordinates (e.g., Sydney: -33.9° S, 151.2° E)
- You can measure distance between two vectors



Real-world Entities on Vector Space

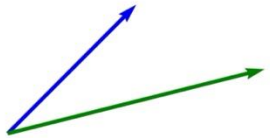


Vector Embedding: Turning Data Into Vectors



Common Vector Distance Metrics

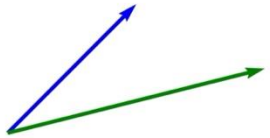
Cosine: angular directions, no magnitude



Euclidean: straight line distance

Euclidean²: relative distance

Negative Dot: direction + magnitude



Manhattan: city block distance

Hamming: bit differences

u = [1, 0, 1, 1]
v = [1, 1, 0, 1]

Hamming = 2

So, what? What can Vectors do for you?

Advisor
Recommendation
$

Fraud
Detection

ANOMALY DETECTION
IN CLAIMS
CLAIM

Q&A
Policy
Q&A

Automated
Underwriting

Phase 1 Vector Support at Db2

VECTOR type:

- FLOAT32 vectors
- INT8 vectors
- Max dimension:
  - 8168 (FLOAT 32)
  - 32672 (INT8)

LLM Apps Dev Support: LangChain Connector

VECTOR Functions:

- VECTOR_DISTANCE – between a pair of vectors
- VECTOR constructor – string to vector type
- VECTOR_SERIALIZE – vector type to string
- *VECTOR_NORM* – computing vector magnitude
- VECTOR_DIMENSION_COUNT – counting vector elements

Vector Data Type

Syntax:

VECTOR (<dimension> ,<coordinate-type>)

Example:

CREATE TABLE VTABLE (RV VECTOR(100, REAL), IV VECTOR(300, INT8))

Describe on Vector Column

```
$ db2 describe table VTABLE

                                Data type                                Column
Column name                     schema    Data type name                 Length     Scale Nulls
------------------------------- --------- ------------------------------ ---------- ----- ------
RV                              SYSIBM    VECTOR(FLOAT32)                       100     0 Yes
IV                              SYSIBM    VECTOR(INT8)                          300     0 Yes

  1 record(s) selected.
```

Vector Distance Function

Syntax:

```
VECTOR_DISTANCE -- ( -- vector1 --,-- vector2 --+--,-- COSINE ------------+-- )
                                                +--,-- DOT ---------------+
                                                +--,-- EUCLIDEAN ----------+
                                                +--,-- EUCLIDEAN_SQUARED --+
                                                +--,-- HAMMING ------------+
                                                +--,-- MANHATTAN ----------+
```

VECTOR constructor and serialize

VECTOR Constructor

```
UPDATE VECTOR_TB SET RVECTOR = VECTOR('[0.123, -0.456, 0.789]', 3, REAL) WHERE ID = 1;

Returns a VECTOR(3, REAL)
```

VECTOR_SERIALIZE

```
SELECT VECTOR_SERIALIZE(RVECTOR) as VECTOR FROM VECTOR_TB FETCH FIRST 1 ROWS ONLY
```

Result:

```
VECTOR
------------------------------------------------
[-0.0762727037,0.0559631996,-0.0107453996]

  1 record(s) selected.
```

More VECTOR functions

VECTOR NORM – computes the magnitude of a vector

```
SELECT VECTOR_NORM(VECTOR('[-0.0762727, 0.0559632]', 2, REAL), EUCLIDEAN)
FROM FROM SYSIBM.SYSDUMMY1
```

```
------------------------
  +9.46012923776943E-002
```

VECTOR_DIMENSION_COUNT – returns the dimension of a vector

```
SELECT VECTOR_DIMENSION_COUNT(RVECTOR) as VEC_DIM FROM VECTOR_TB FETCH FIRST 1 ROWS ONLY
```

```
VEC_DIM
-----------
          3
```

Roadmap

Vector Index

approximate nearest neighbor (ANN) support

Scaling search to larger vector space

Cloud AI platforms integration

Generating embeddings and text using Cloud AI APIs

Demo: Finding Similar Products Using Vector Search in Db2

IDUG

2025

Atlanta, GA | June 8-12

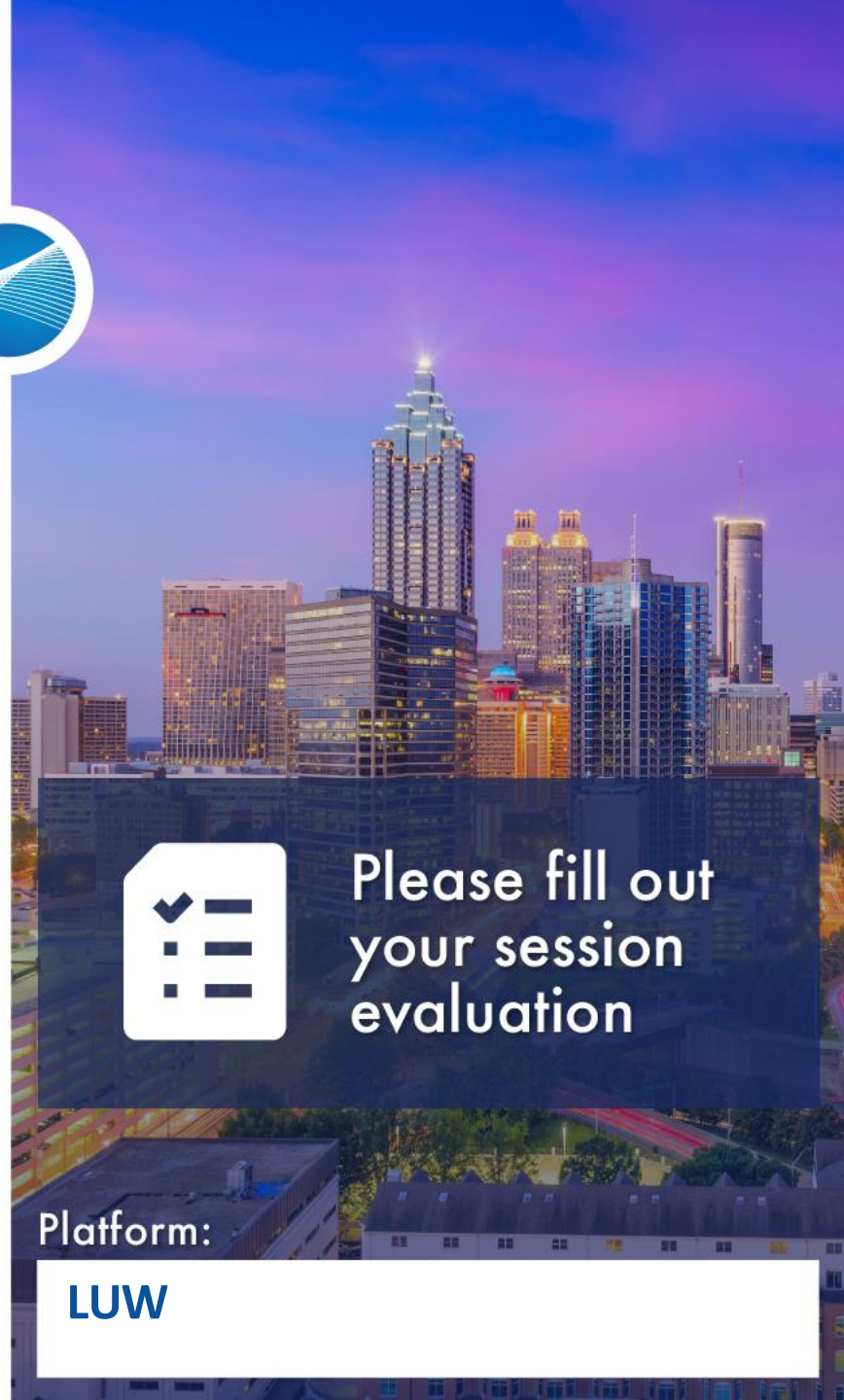
NA Db2 TECH CONFERENCE

Db2 AI Vectors: Powering Modern AI Use Cases

Shaikh Quader and Mike Springgay, *IBM*

Contact: shaikhq@ca.ibm.com, springga@ca.ibm.com

Session Code: ####



IDUG
2025 NA Db2 Tech Conference