

# Practicing PgVector & PgAgent

Musab Khan - Code:  
<https://github.com/musabaku/pgVectorPractice/blob/main/pgVector3.py>

# Problems with installing pg vector

- LNK1112 error: "module machine type 'x86' conflicts with target machine type 'x64"

```
C:\Users\musab\AppData\Local\Temp\pgvector>nmake /F Makefile.win WIN64=1
```

```
Microsoft (R) Program Maintenance Utility Version 14.40.33812.0  
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```

```
cl /nologo /I"C:\Program Files\PostgreSQL\16\include\server\port\win32_msvc" /I"C:\Program Files\PostgreSQL\16\include\server\port\win32" /I"C:\Program Files\PostgreSQL\16\include\server" /I"C:\Program Files\PostgreSQL\16\include" /O2 /fp:fast src\bitutils.obj src\bitvec.obj src\halfutils.obj src\halfvec.obj src\hnsb.obj src\hnsbbuild.obj src\hnsbinsert.obj src\hnsbscan.obj src\hnsbutils.obj src\hnsbwacuum.obj src\ivfbuild.obj src\ivfflat.obj src\ivfinsert.obj src\ivfkmeans.obj src\ivfscan.obj src\ivfutils.obj src\ivfvacuum.obj src\sparsvec.obj src\vector.obj "C:\Program Files\PostgreSQL\16\lib\postgres.lib" /link /DLL /OUT:vector.dll  
src\hnsb.obj : fatal error LNK1112: module machine type 'x64' conflicts with target machine type 'x86'  
NMAKE : fatal error U1077: 'cl /nologo /I"C:\Program Files\PostgreSQL\16\include\server\port\win32_msvc" /I"C:\Program Files\PostgreSQL\16\include\server\port\win32" /I"C:\Program Files\PostgreSQL\16\include\server" /I"C:\Program Files\PostgreSQL\16\include" /O2 /fp:fast src\bitutils.obj src\bitvec.obj src\halfutils.obj src\halfvec.obj src\hnsb.obj src\hnsbbuild.obj src\hnsbinsert.obj src\hnsbscan.obj src\hnsbutils.obj src\hnsbwacuum.obj src\ivfbuild.obj src\ivfflat.obj src\ivfinsert.obj src\ivfkmeans.obj src\ivfscan.obj src\ivfutils.obj src\ivfvacuum.obj src\sparsvec.obj src\vector.obj "C:\Program Files\PostgreSQL\16\lib\postgres.lib" /link /DLL /OUT:vector.dll' : return code '0x2'  
Stop.
```

```
C:\Users\musab\AppData\Local\Temp\pgvector>nmake /F Makefile.win WIN64=1
```

```
Microsoft (R) Program Maintenance Utility Version 14.40.33812.0  
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```

```
cl /nologo /I"C:\Program Files\PostgreSQL\16\include\server\port\win32_msvc" /I"C:\Program Files\PostgreSQL\16\include\server\port\win32" /I"C:\Program Files\PostgreSQL\16\include\server" /I"C:\Program Files\PostgreSQL\16\include" /O2 /fp:fast src\bitutils.obj src\bitvec.obj src\halfutils.obj src\halfvec.obj src\hnsb.obj src\hnsbbuild.obj src\hnsbinsert.obj src\hnsbscan.obj src\hnsbutils.obj src\hnsbwacuum.obj src\ivfbuild.obj src\ivfflat.obj src\ivfinsert.obj src\ivfkmeans.obj src\ivfscan.obj src\ivfutils.obj src\ivfvacuum.obj src\sparsvec.obj src\vector.obj "C:\Program Files\PostgreSQL\16\lib\postgres.lib" /link /DLL /OUT:vector.dll /MACHINE:X64  
src\bitutils.obj : fatal error LNK1112: module machine type 'x86' conflicts with target machine type 'x64'  
NMAKE : fatal error U1077: 'cl /nologo /I"C:\Program Files\PostgreSQL\16\include\server\port\win32_msvc" /I"C:\Program Files\PostgreSQL\16\include\server\port\win32" /I"C:\Program Files\PostgreSQL\16\include\server" /I"C:\Program Files\PostgreSQL\16\include" /O2 /fp:fast src\bitutils.obj src\bitvec.obj src\halfutils.obj src\halfvec.obj src\hnsb.obj src\hnsbbuild.obj src\hnsbinsert.obj src\hnsbscan.obj src\hnsbutils.obj src\hnsbwacuum.obj src\ivfbuild.obj src\ivfflat.obj src\ivfinsert.obj src\ivfkmeans.obj src\ivfscan.obj src\ivfutils.obj src\ivfvacuum.obj src\sparsvec.obj src\vector.obj "C:\Program Files\PostgreSQL\16\lib\postgres.lib" /link /DLL /OUT:vector.dll /MACHINE:X64' : return code '0x2'  
Stop.
```

## Fixed by adding /Machine=64

```
C:\Users\musab\AppData\Local\Temp\pgvector>nmake /F Makefile.win clean
```

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```
del /f vector.dll vector.lib vector.exp
Could Not Find C:\Users\musab\AppData\Local\Temp\pgvector\vector.dll
del /f sql\vector--0.8.0.sql
```

```
Could Not Find C:\Users\musab\AppData\Local\Temp\pgvector\sql\vector--0.8.0.sql
del /f src/bitutils.obj src/bitvec.obj src\halfutils.obj src\halfvec.obj src\hnsr.obj src\hnsrbuild.obj src\hnsrinsert.obj src\hnsrscan.obj src\hnsrutils.obj src\hnsrswvacuum.obj src\ivfbuild.obj src\ivfflat.obj src\ivfinsert.obj src\ivfmeans.obj src\ivfscan.obj src\ivfutils.obj src\ivfvacuum.obj src\sparsevec.obj src\vector.obj
del /f /s /q results regression.diffs regression.out tmp_check tmp_check_iso log output_iso
Could Not Find C:\Users\musab\AppData\Local\Temp\pgvector\results
```

```
C:\Users\musab\AppData\Local\Temp\pgvector>nmake /F Makefile.win WIN64=1
```

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```
cl /nologo /I"C:\Program Files\PostgreSQL\16\include\server\port\win32_msvc" /I"C:\Program Files\PostgreSQL\16\include\server\port\win32" /I"C:\Program Files\PostgreSQL\16\include\server" /I"C:\Program Files\PostgreSQL\16\include" /O2 /fp:fast /c src\bitutils.c /Fosrc\bitutils.obj
bitutils.c
```

```
cl /nologo /I"C:\Program Files\PostgreSQL\16\include\server\port\win32_msvc" /I"C:\Program Files\PostgreSQL\16\include\server\port\win32" /I"C:\Program Files\PostgreSQL\16\include\server" /I"C:\Program Files\PostgreSQL\16\include" /O2 /fp:fast /c src/bitvec.c /Fosrc/bitvec.obj
bitvec.c
```

```
cl /nologo /I"C:\Program Files\PostgreSQL\16\include\server\port\win32_msvc" /I"C:\Program Files\PostgreSQL\16\include\server\port\win32" /I"C:\Program Files\PostgreSQL\16\include\server" /I"C:\Program Files\PostgreSQL\16\include" /O2 /fp:fast /c src\halfutils.c /Fosrc\halfutils.obj
halfutils.c
```

```
cl /nologo /I"C:\Program Files\PostgreSQL\16\include\server\port\win32_msvc" /I"C:\Program Files\PostgreSQL\16\include\server\port\win32" /I"C:\Program Files\PostgreSQL\16\include\server" /I"C:\Program Files\PostgreSQL\16\include" /O2 /fp:fast /c src\hnsinsert.c /Fosrc\hnsinsert.obj
hnsinsert.c
```

Makefile - Notepad

File Edit Format View Help

```
SHAREDIR = $(PGROOT)\share
```

```
CFLAGS = /nologo /I"$$(INCLUDEDIR_SERVER)\port\win32_msvc" /I"$$(INCLUDEDIR_SERVER)
```

```
CFLAGS = $(CFLAGS) $(PG_CFLAGS)
```

```
SHLIB = $(EXTENSION).dll
```

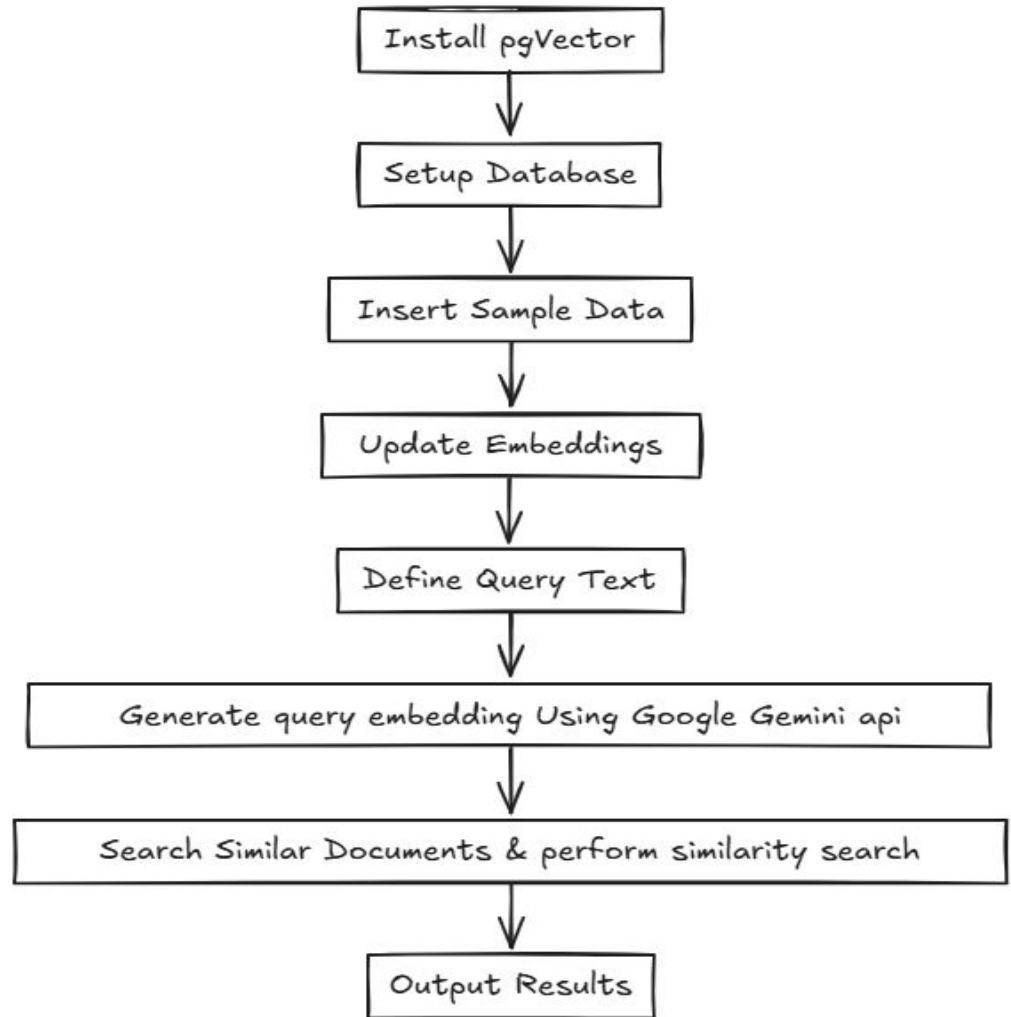
```
LIBS = "$(LIBDIR)\postgres.lib"
```

```
all: $(SHLIB) $(DATA_built)
```

```
.c.obj: $(CC) $(CFLAGS) /c $< /Fo$@
```

```
$(SHLIB): $(OBSJ)
$(CC) $(CFLAG) $(OBSJ) $(LIB) /link /DLL /OUT:$(SHLIB) /MACHINE:X64
```

# Flow-chart





# Step 1 - Installing pgVector

Follow steps on below github repo

<https://github.com/pgvector/pgvector>

C:\> Command Prompt

```
Creating library vector.lib and object vector.exp
copy sql\vector.sql sql\vector--0.8.0.sql
1 file(s) copied.

C:\Users\musab\AppData\Local\Temp\pgvector>nmake /F Makefile.win install

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        copy vector.dll "C:\Program Files\PostgreSQL\16\lib"
        1 file(s) copied.
        copy vector.control "C:\Program Files\PostgreSQL\16\share\extension"
        1 file(s) copied.
        copy sql\vector--*.sql "C:\Program Files\PostgreSQL\16\share\extension"
sql\vector--0.1.0--0.1.1.sql
sql\vector--0.1.1--0.1.3.sql
sql\vector--0.1.3--0.1.4.sql
sql\vector--0.1.4--0.1.5.sql
sql\vector--0.1.5--0.1.6.sql
sql\vector--0.1.6--0.1.7.sql
sql\vector--0.1.7--0.1.8.sql
sql\vector--0.1.8--0.2.0.sql
sql\vector--0.2.0--0.2.1.sql
sql\vector--0.2.1--0.2.2.sql
sql\vector--0.2.2--0.2.3.sql
sql\vector--0.2.3--0.2.4.sql
sql\vector--0.2.4--0.2.5.sql
sql\vector--0.2.5--0.2.6.sql
sql\vector--0.2.6--0.2.7.sql
sql\vector--0.2.7--0.3.0.sql
sql\vector--0.3.0--0.3.1.sql
sql\vector--0.3.1--0.3.2.sql
sql\vector--0.3.2--0.4.0.sql
sql\vector--0.4.0--0.4.1.sql
sql\vector--0.4.1--0.4.2.sql
sql\vector--0.4.2--0.4.3.sql
sql\vector--0.4.3--0.4.4.sql
sql\vector--0.4.4--0.5.0.sql
sql\vector--0.5.0--0.5.1.sql
sql\vector--0.5.1--0.6.0.sql
sql\vector--0.6.0--0.6.1.sql
sql\vector--0.6.1--0.6.2.sql
sql\vector--0.6.2--0.7.0.sql
sql\vector--0.7.0--0.7.1.sql
sql\vector--0.7.1--0.7.2.sql
sql\vector--0.7.2--0.7.3.sql
sql\vector--0.7.3--0.7.4.sql
sql\vector--0.7.4--0.8.0.sql
sql\vector--0.8.0.sql
35 file(s) copied.
        mkdir "C:\Program Files\PostgreSQL\16\include\server\extension\vector"
        for %f in (src\halfvec.h src\sparsevec.h src\vector.h) do copy %f "C:\Program Files\PostgreSQL\16\include\server\extension\vector"

C:\Users\musab\AppData\Local\Temp\pgvector>copy src\halfvec.h "C:\Program Files\PostgreSQL\16\include\server\extension\vector"
1 file(s) copied.

C:\Users\musab\AppData\Local\Temp\pgvector>copy src\sparsevec.h "C:\Program Files\PostgreSQL\16\include\server\extension\vector"
1 file(s) copied.

C:\Users\musab\AppData\Local\Temp\pgvector>copy src\vector.h "C:\Program Files\PostgreSQL\16\include\server\extension\vector"
1 file(s) copied.
```

# Step 2 - Setup DB & Insert Data

CREATE EXTENSION vector;

- Above command for using vector in this database

File Object Tools Edit View Window Help

Welcome vectorPractice/po... X public.documents/vectorPractice/postgres@PostgreSQL 16 X

public.documents/vectorPractice/postgres@PostgreSQL 16

100 rows

Query Query History

```
1 SELECT * FROM public.documents
2 ORDER BY id ASC LIMIT 100
3
```

Data Output Messages Notifications

	id [PK] integer	title text	description text
1	1	Algorithm Basics	An introduction to algorithms, complexity, and computational theory.
2	2	Machine Learning	Overview of supervised and unsupervised learning techniques in computer science.
3	3	Neural Networks	Exploring deep learning and artificial neural networks, including backpropagation.
4	4	Data Structures	Fundamental concepts of data organization, including arrays, linked lists, and trees.
5	5	Operating Systems	Understanding processes, threads, memory management, and scheduling in OS.

# Using google gemini api

<https://aistudio.google.com/app/apikey>

Google AI Studio

Get API key

Get API key

Create Prompt

Stream Realtime

Starter Apps

Tune a Model

Library

Enable chat history

Prompt Gallery

API documentation

Developer forum

Changelog NEW

Settings

## API keys

Quickly test the Gemini API

[API quickstart guide](#)

```
curl "https://generativelanguage.googleapis.com/v1beta/models/gemini-2.0-flash:generateContent?key=GEMINI_API_KEY" \
-H 'Content-Type: application/json' \
-X POST \
-d '{
  "contents": [{
    "parts": [{"text": "Explain how AI works"}]
  }]
}'
```

Use code [with caution](#).

Create API key

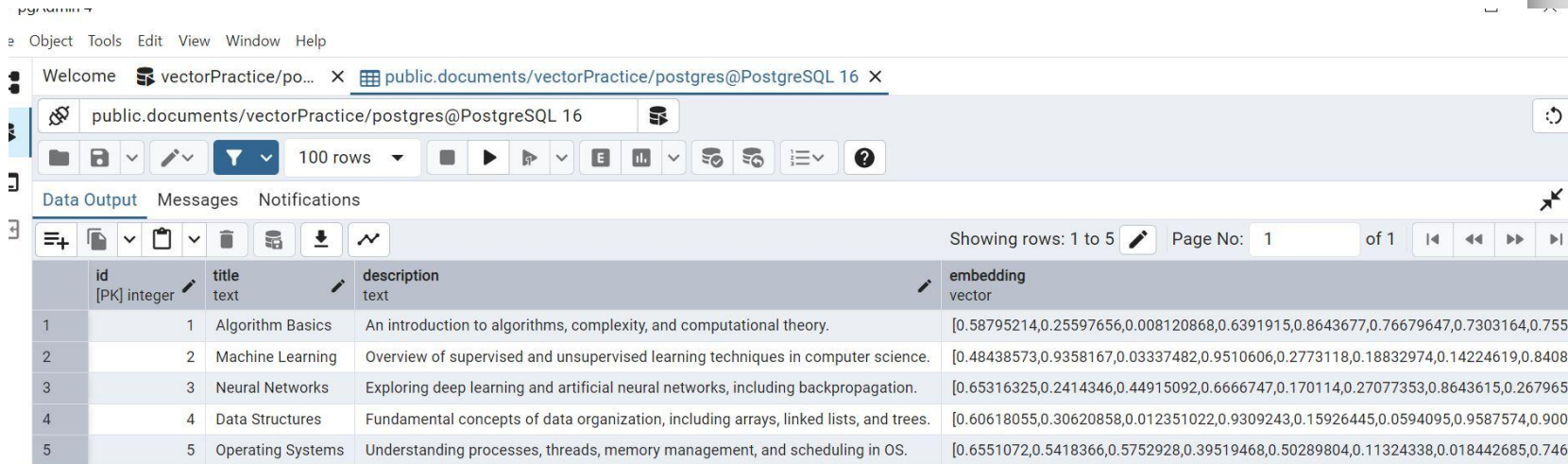
Your API keys are listed below. You can also view and manage your project and API keys in Google Cloud.

Project number	Project name	API key	Created	Plan
...9989	Generative Language Client	...dxkU ...7Mu4	Mar 4, 2025 Jan 2, 2024	Free of charge <a href="#">Set up Billing</a> <a href="#">View usage data</a>
...6858	Generative Language Client	...GvQQ	Dec 30, 2023	Free of charge <a href="#">Set up Billing</a> <a href="#">View usage data</a>

# Step 4 - Insert Embedding Using google gemini api

CREATE EXTENSION vector;

- Sending description to google - gemini and LLM outputs embedding values which are stored in database



The screenshot shows a PostgreSQL database interface with a table containing 5 rows of data. The table has columns: id, title, description, and embedding. The data includes topics like Algorithm Basics, Machine Learning, Neural Networks, Data Structures, and Operating Systems.

	id [PK] integer	title text	description text	embedding vector
1	1	Algorithm Basics	An introduction to algorithms, complexity, and computational theory.	[0.58795214,0.25597656,0.008120868,0.6391915,0.8643677,0.76679647,0.7303164,0.755
2	2	Machine Learning	Overview of supervised and unsupervised learning techniques in computer science.	[0.48438573,0.9358167,0.03337482,0.9510606,0.2773118,0.18832974,0.14224619,0.8408
3	3	Neural Networks	Exploring deep learning and artificial neural networks, including backpropagation.	[0.65316325,0.2414346,0.44915092,0.6666747,0.170114,0.27077353,0.8643615,0.267965
4	4	Data Structures	Fundamental concepts of data organization, including arrays, linked lists, and trees.	[0.60618055,0.30620858,0.012351022,0.9309243,0.15926445,0.0594095,0.9587574,0.900
5	5	Operating Systems	Understanding processes, threads, memory management, and scheduling in OS.	[0.6551072,0.5418366,0.5752928,0.39519468,0.50289804,0.11324338,0.018442685,0.746



# Perform Similarity Search - Results

```
PS C:\Users\musab\Desktop\ji> python -u "c:\Users\musab\Desktop\ji\pgVector3.py"
```

```
Database and table setup completed.
```

```
Data already exists. Skipping sample data insertion.
```

```
Similarity search results:
```

```
ID: 1, Title: Algorithm Basics, Distance: 10.9707
```

```
ID: 3, Title: Neural Networks, Distance: 11.0669
```

```
PS C:\Users\musab\Desktop\ji> python -u "c:\Users\musab\Desktop\ji\pgVector.py"
```

```
Database and table setup completed.
```

```
Database and table setup completed.
```

```
Data already exists. Skipping sample data insertion.
```

```
Similarity search results:
```

```
ID: 5, Title: Operating Systems, Distance: 11.3737
```

```
ID: 4, Title: Data Structures, Distance: 11.3797
```

```
Similarity search results:
```

```
ID: 5, Title: Operating Systems, Distance: 11.3737
```

```
Similarity search results:
```

```
Similarity search results:
```

```
ID: 4, Title: Data Structures, Distance: 11.3797
```

```
ID: 2, Title: Machine Learning, Distance: 11.4691
```

# Pg Agent - Simple task, run every 5 minute to check for missing embeddings in database

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

Dashboard x Properties x SQL x Statistics x Dependents x Processes x



## General

Name Check Missing Embeddings

ID 1

Enabled? ☒

Job class Routine Maintenance

Host agent

Created 2025-03-05 07:19:43.355852+03

Changed 2025-03-05 07:19:43.355852+03

Next run 2025-03-05 07:22:00+03

Last run 2025-03-05 07:20:41.845341+03

- vectorDemo1
  - Casts
  - Catalogs
  - Event Triggers
  - Extensions
  - Foreign Data Wrappers
  - Languages
  - Publications
  - Schemas
  - Subscriptions
- vectorDemo2
- vectorPractice
- Login/Group Roles (15)
- Tablespaces (2)
- pgAgent Jobs (1)
  - Check Missing Embeddings
  - Schedules (1)
    - Every 5 Minutes
  - Steps (1)

# Pg Agent

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

- vectorDemo1
  - Casts
  - Catalogs
  - Event Triggers
  - Extensions
  - Foreign Data Wrappers
  - Languages
  - Publications
  - Schemas
  - Subscriptions
- vectorDemo2
- vectorPractice
- Login/Group Roles (15)
- Tablespaces (2)
- pgAgent Jobs (1)
  - Check Missing Embeddings
    - Schedules (1)
      - Every 5 Minutes
    - Steps (1)
      - Query Embedding Status

Dashboard x Properties x SQL x Statistics x Dependents x Processes x

ID	1
Name	Query Embedding Status
Enabled?	<input checked="" type="checkbox"/>
Kind	<input checked="" type="radio"/> SQL <input type="radio"/> Batch
Connection type	<input checked="" type="radio"/> Local <input type="radio"/> Remote
Database	vectorPractice
Connection string	
On error	Fail
Comment	

Code

```
1 SELECT 'Missing embeddings count: ' || COUNT(*) AS missing_count
2 FROM documents
3 WHERE embedding IS NULL;
4
```