python code

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[6]:
```python
import numpy as np
import time

def matvec(matrix, vector):
    rows = matrix.shape[0]
    cols = matrix.shape[1]
    result = np.zeros(rows)

    for i in range(rows):
        for j in range(cols):
            result[i] += matrix[i, j] * vector[j]

    return result

# Test the function with different matrix sizes and time each operation
sizes = [1000, 2000, 3000, 4000]
timings = []

for n in sizes:
    matrix = np.random.rand(n, n)
    vector = np.random.rand(n)

    start_time = time.time()
    result = matvec(matrix, vector)
    end_time = time.time()

    timings.append(end_time - start_time)

print("Timings:", timings)
```

```
Timings: [0.454028844833374, 1.8933076858520508, 4.098950386047363,
7.389406204223633]
```