

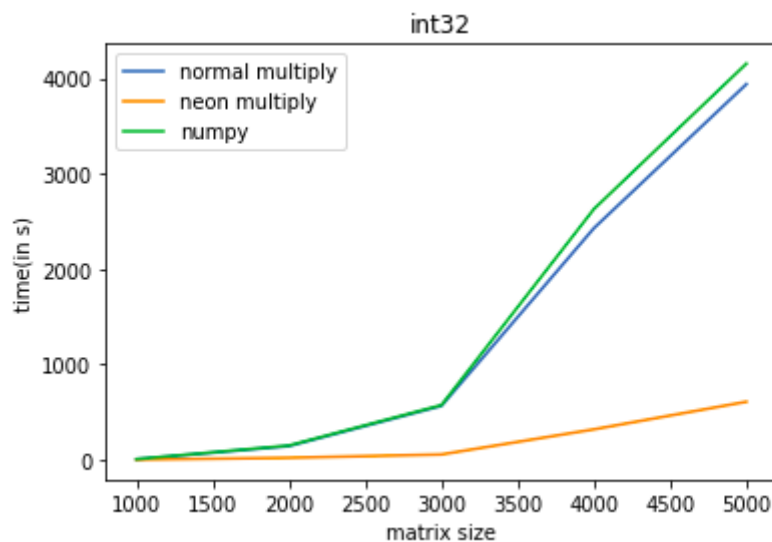
SIMD BASED MATRIX MULTIPLICATION USING AVX, AVX2 AND ARM-NEON

Processor used for Testing

- AVX, AVX2 - INTEL i5
- ARM-NEON - Raspberry pi 4

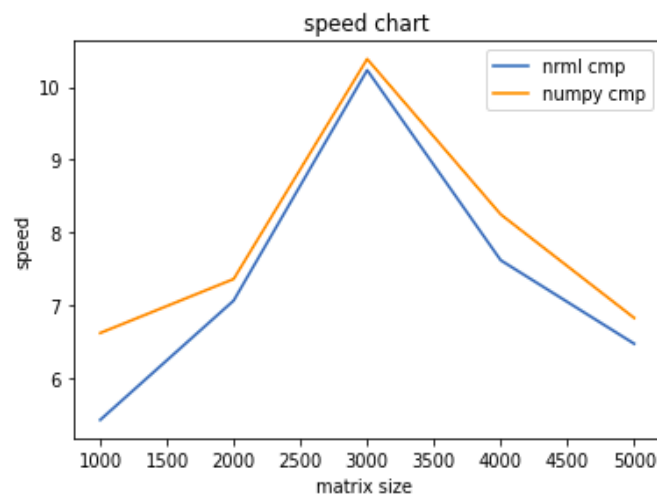
Results

The **int32** data type is tested on the avx,avx2 and arm-neon. The graph given below is for int32 under arm-neon and the speed is compared with python numpy library.



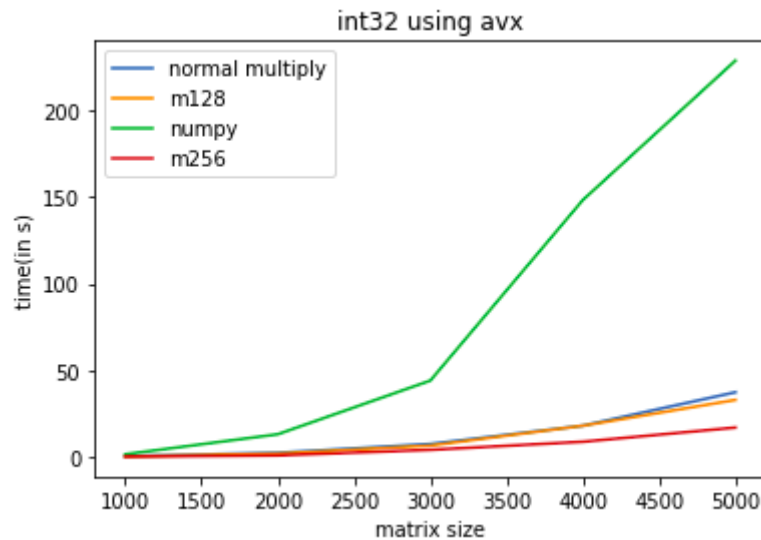
The graph given below is speed chart

Speed = Time taken by normal mul or numpy / Time taken by arm-neon



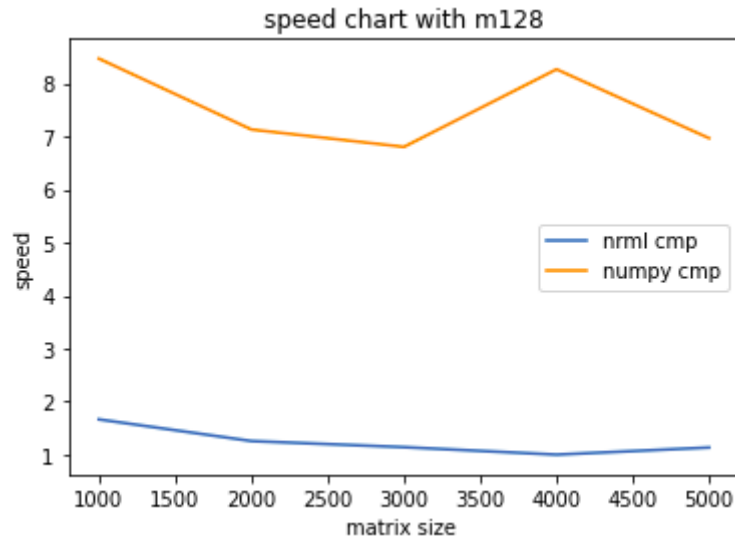
The graph shows the neon mul is 8X faster than normal mul and 8.2X faster than numpy mul.

The graph given below is AVX graph for int32



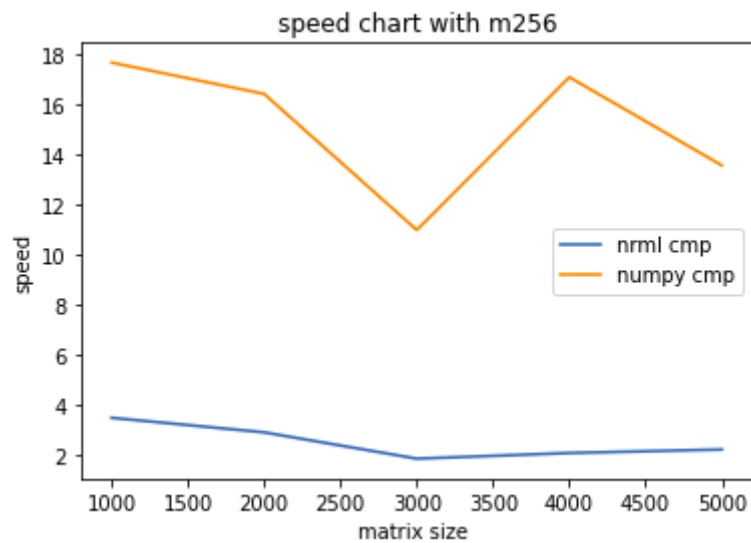
The speed chart of m128i compared with numpy and normal mul is given below

Speed = Time taken by normal mul or numpy mul/ Time taken by m128i mul



The graph results show that the m128i mul is 1X faster than normal mul and 8X faster than numpy mul.

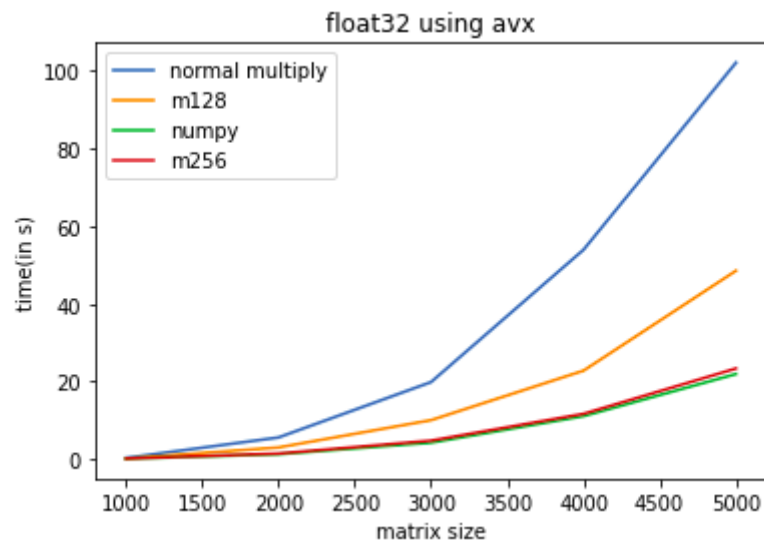
The speed chart for m256i is given below.



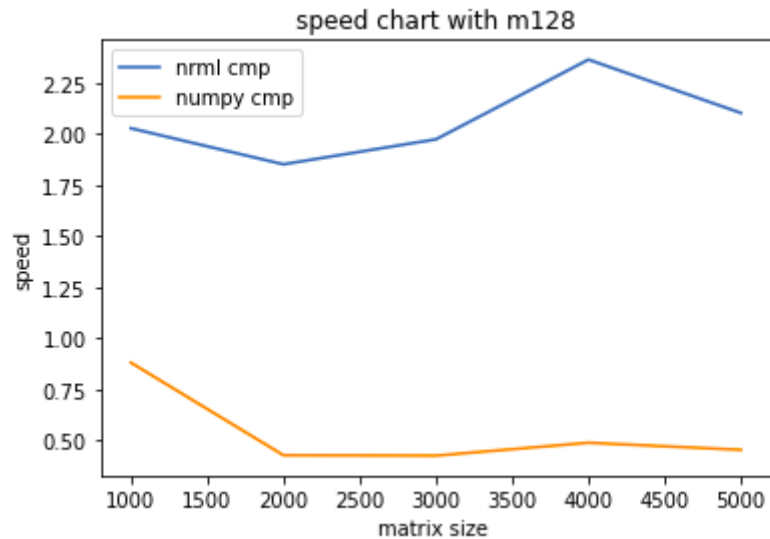
The speed of m256i is 2X faster than normal mul and 14X faster .

The **float32** is tested under avx,avx2 and arm-neon. The graph given below is for int32 under arm-neon and the speed is compared with python numpy library.

The graph below is for float32 tested in avx.

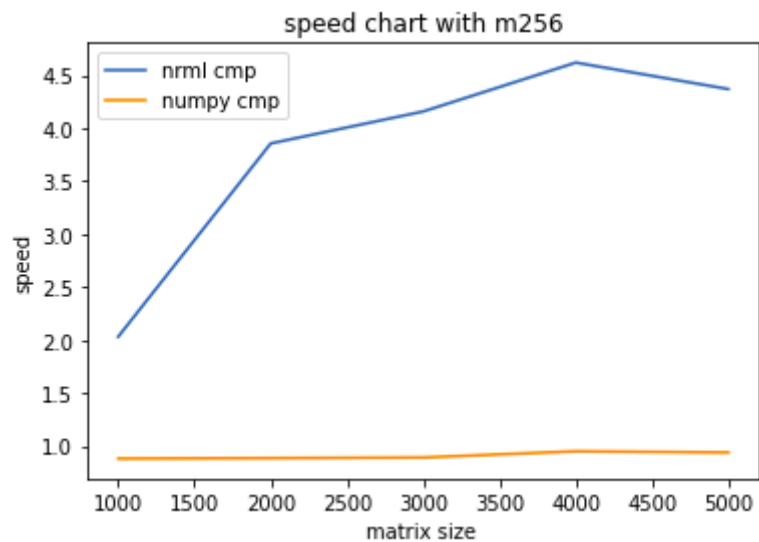


The graph below is a speed chart for m128 compared with normal mul and numpy mul.



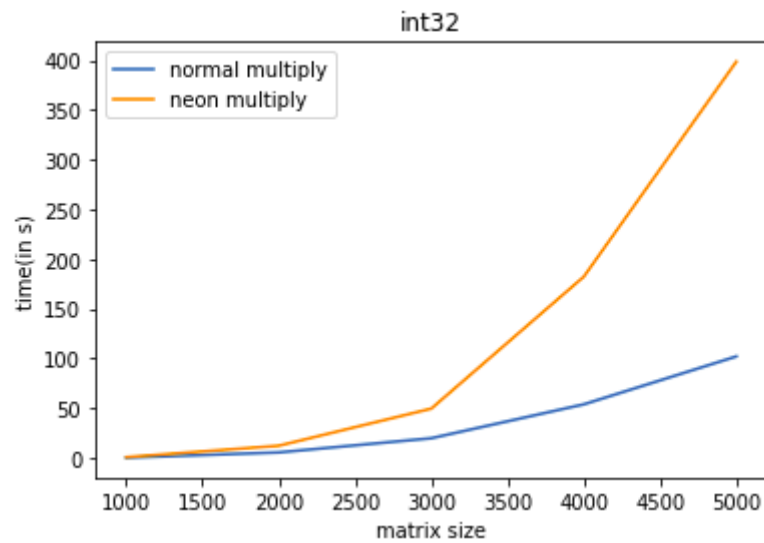
The speed of m128 mul is 2X faster than normal mul and 0.5X slower than neon mul.

The speed chart for m256 when compared with numpy and normal mul is given below.



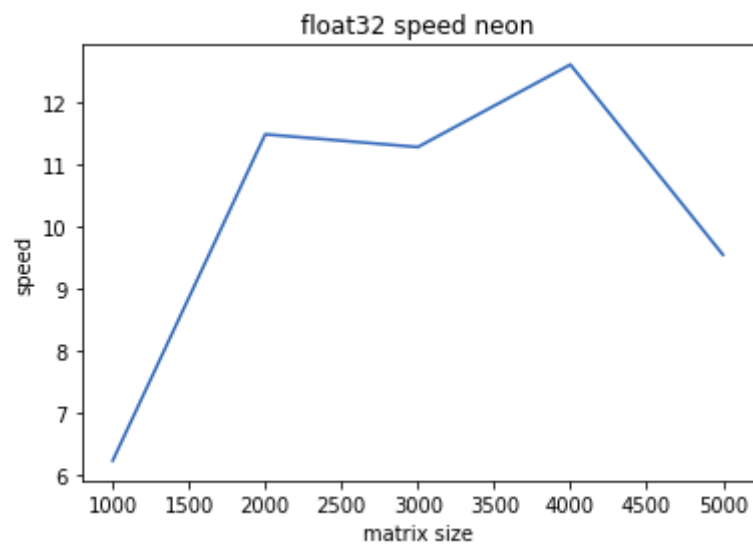
The speed of m256 mul is 4X faster than normal mul and for numpy it is quite similar.

The float32 on the Arm-Neon graph is given below.



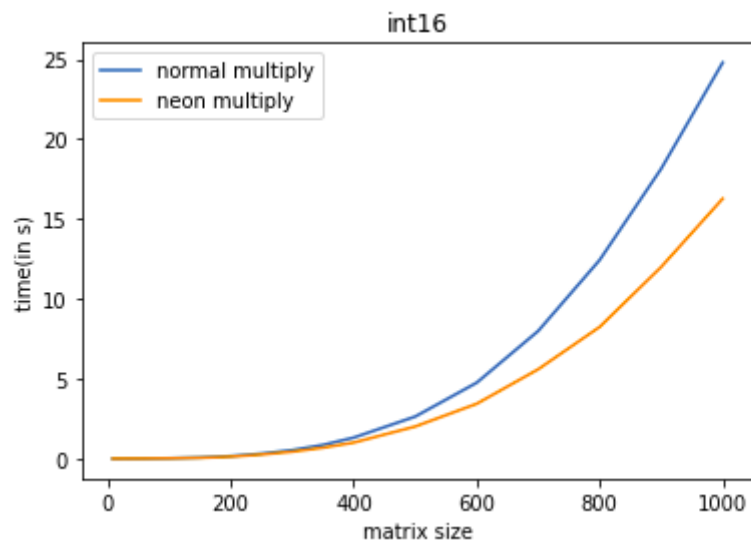
The graph comparing Arm-Neon with Normal mul is given below.

Speed = Time taken by normal mul / Time taken by neon mul

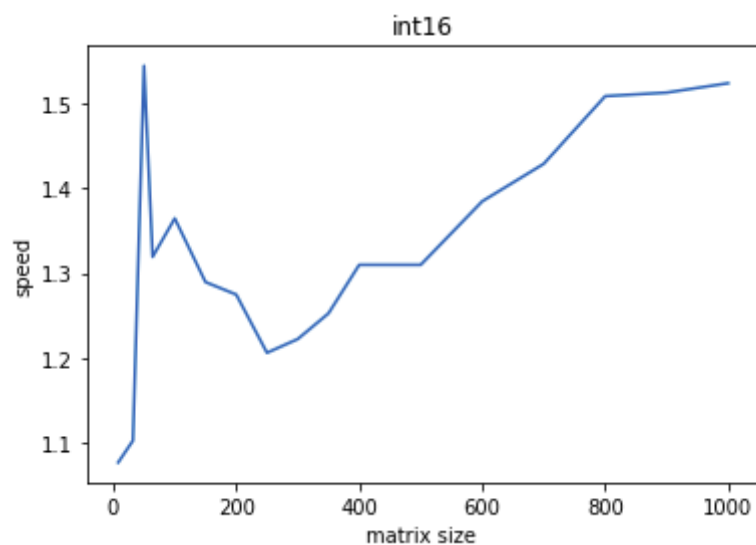


When compared to normal mul the arm-neon is 10X faster.

The graph for **int16** on arm-neon is shown below.

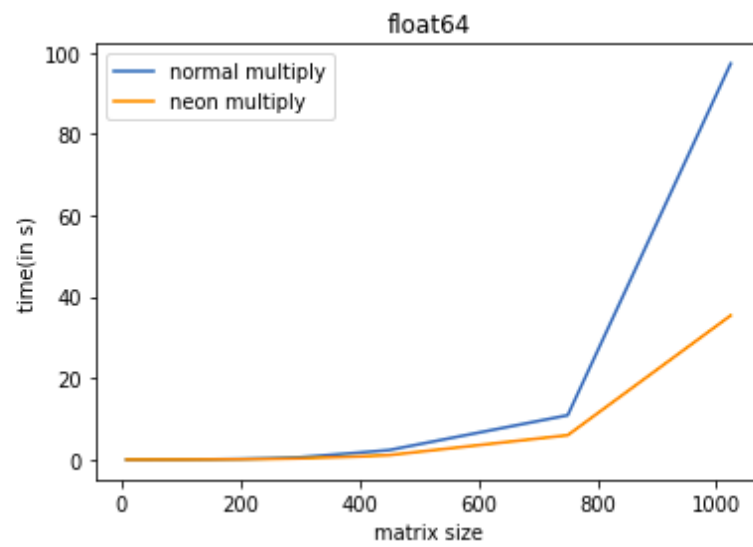


The speed graph for int16 compared with neon mul and normal mul is given below

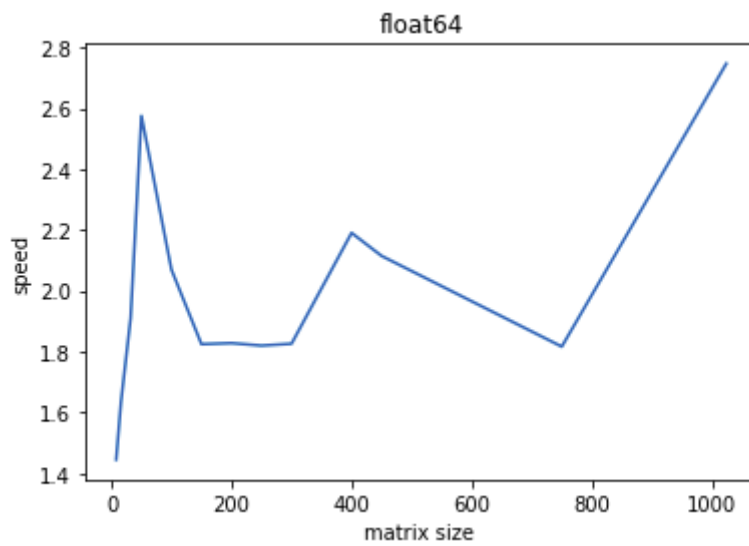


When compared with normal mul neon mul is 1.35X faster.

The graph for float64 using arm neon is given below



The speed graph for float64 with normal multiply is shown below.



**** Total iteration used is 10 for all data types****