The output of the program, when the timestamp is in every 1000-turn, it print the estimated, real count and separation of the buckets:

Number of ones in last 1000-bit stream:(441, 504)/1000

128 128 , 64 64 , 32 32 , 16 16 , 8 8 , 4 , 2 2 , 1

Number of ones in last 1000-bit stream:(588, 468)/2000

256 , 128 128 , 64 64 , 32 , 16 , 8 8 , 4 4 , 2 , 1 1

Number of ones in last 1000-bit stream:(561, 485)/3000

256 , 128 128 , 64 , 32 32 , 16 16 , 8 , 4 , 2 2 , 1

Number of ones in last 1000-bit stream:(531, 482)/4000

256 , 128 128 , 64 , 32 , 16 16 , 8 , 4 4 , 2 , 1

Number of ones in last 1000-bit stream:(512, 493)/5000

256 , 128 128 , 64 , 32 , 16 , 8 , 4 , 2 , 1 1

Number of ones in last 1000-bit stream:(495, 495)/6000

256 , 128 , 64 64 , 32 32 , 16 16 , 8 , 4 , 2 , 1

Number of ones in last 1000-bit stream:(472, 489)/7000

256 , 128 , 64 64 , 32 , 16 16 , 8 8 , 4 , 2 , 1 1

Number of ones in last 1000-bit stream:(445, 485)/8000

256 , 128 , 64 , 32 32 , 16 16 , 8 8 , 4 4 , 2 2 , 1

Number of ones in last 1000-bit stream:(448, 515)/9000

256 , 128 , 64 64 , 32 , 16 , 8 , 4 , 2 , 1 1

Number of ones in last 1000-bit stream:(457, 520)/10000

256 , 128 , 64 64 , 32 , 16 , 8 8 , 4 , 2 2 , 1

Let use “Number of ones in last 1000-bit stream:(457, 520)/10000” as the example, the 457 is the estimation of DGIM and the 520 is the real count in the last 1000-bit stream.

As the property of the DGIM algorithm, the estimation between the real result would not larger than 128, which is the half of the largest bucket size.

In the programming, I use Bucket, BucketPair and BucketChain to achieve the DGIM:

1. Bucket is the basic item, which contains timestamp and size of the 1-bit.
2. BucketPair is the pair of the Bucket
3. BucketChain the list of BucketPair

Let use “Number of ones in last 1000-bit stream:(457, 520)/10000” to demonstrate the separation of the buckets:

The separation is printed as:

256 , 128 , 64 64 , 32 , 16 , 8 8 , 4 , 2 2 , 1

So the Result is:

457 = 256/2+128+64+64+32+16+8+8+4+2+2+1