Secure Binary Embeddings (SBE)

- \( q(x) = Q\left(\frac{x \cdot a + w}{\Delta}\right) \); \( a \): gaussian, \( w \): uniform \([0, \Delta]\)
- Euclidean distance vs. normalized Hamming distance
- adjustable to any Euclidean distance range (\(\Delta\))
- unknown security guarantees
- linear behaviour
Locality-Sensitive Hashing (LSH) – random projections

- $h(v) = sgn(v \cdot r); r$: random
- cosine distance vs. normalized block Hamming distance
- theoretical security (one-way hashing function, e.g. SHA)
- compromise between hash strength and dynamic range (notice the small value of hashes per coefficient)
- non-linear behaviour, but it should still provide good results within the dynamic range
Locality-Sensitive Hashing (LSH) – stable distributions

- $h(v) = \left\lfloor \frac{a \cdot v + b}{r} \right\rfloor$; $a$: gaussian, $b$: uniform $[0, r]$

- Euclidean distance vs. normalized block Hamming distance
- theoretical security (one-way hashing function, e.g. SHA)
- adjustable to any Euclidean distance range (number of hashes vs. $r$)
- non-linear behaviour, but it should still provide good results within the dynamic range