Haversine distance:

α and β are the latitudinal values in radians, and A and B are the longitudinal values in radians.

Let’s expand the first component in the square root function:

We know that, ………….. (1)

Therefore, ………….. (2)

Replace the in eqn. 2 with . We get,

* ………….. (3)

Therefore, using eqn. 3,

* ………….. (4)

Similarly

* ………….. (5)

Using eqn. 4 and eqn. 5, we can simplify the haversine distance to