Estimation of volume of ellipsoid using Monte Carlo

Introduction

The basic idea of estimating the volume is to construct a cuboid of dimensions $\{2a, 2b, 2c\}$, so as to enclose the ellipsoid within it. We then generate random points within our constructed cuboidal volume and note down the number of points that happen to fall within the ellisoid volume.

The following ratio is then calculated.

$$\text{fraction of points within the ellisoid} = \frac{\text{No. of points within the ellipsoid}}{\text{Total no. of points}}$$

This ratio multiplied with the volume of the constructed cuboid, should yield an approximate value for the volume of the ellipsoid in question.

Increasing accuracy

The more random points are generated, the greater will be our estimate for the volume of the ellipsoid.