PI Calculation - Graph

This document describes the Monte Carlo Method of Pi number approximation that we have used to demonstrate the parallel processing with MatDeck. The idea is to create randomly generated points inside the square using uniform distribution, to check which of them are inside the circle which is inscribed in the square and then to use the ratio of the total number of points and the number of points in the circle to approximate the Pi number. An explanation of this approximation equation is presented in the canvas below.

```
calcPi(npoints)
{
1   b := matrix allocate(npoints , 2)
    for(i := 0 , i < npoints , i += 1)
    {
        1   xcord := randnum(-1 , 1)
2       2   ycord := randnum(-1 , 1)
        3   ii := i + npoints
        4   b[i] := xcord
        5   b[ii] := ycord
    }
3   return(b)
}
```
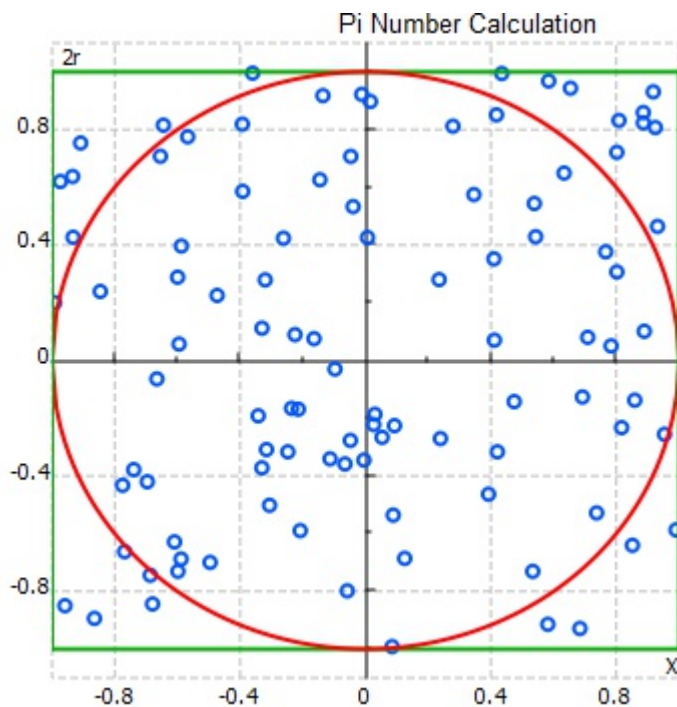
$$b1 := \begin{bmatrix} -1 & 1 \\ 1 & 1 \end{bmatrix} \quad b2 := \begin{bmatrix} -1 & 1 \\ -1 & -1 \end{bmatrix} \quad b3 := \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix} \quad b4 := \begin{bmatrix} -1 & -1 \\ -1 & 1 \end{bmatrix}$$

$$a1 := curve2d\left(sqrt\left(1 - z^2\right) , -1 , 1 , 300 \right)$$

$$a2 := curve2d\left(-sqrt\left(1 - z^2\right) , -1 , 1 , 300 \right)$$

a := 100

x := static value("x" , calcPi(a))

set static value("x" , x)

Area of square

$$A_{square} := (2\,r)^2$$

Area of circle

$$A_{circle} := \pi \cdot r^2$$

Ratio between area of circle and are of square

$$A_{circle} / A_{square} = \pi / 4$$

Pi Number Calculation

Pi number approximation formula

$$\pi = 4 * A_{circle} / A_{square}$$

Increasing the number of points generated, improves the approximation.