Next Generation Number theory ! - Shivam Patel

About the speaker

I am Shivam Patel, I am involved in research, contributing and promoting python since the last 5 years. I work on computational number theory which involves the proving of conjectures, prediction, and understanding of complex patterns in sequences and visually representing them as well as exploiting the structure to find newer patterns aided by the computational power of the computer along with the conventional pen paper mathematics. I align these interest of mine with my interest in machine learning and learning representation. I have collaborated with Professor Gilbert Strang from Massachusetts Institute of Technology on statistical machine learning. I have 14 publications in national and international journals and also have been invited as a speaker twice in Gujarat State Mathematical Conference. I am also a TEDx speaker. I have taken numerous workshops at both beginner and advanced levels in Python programming language.

Abstract

The motive of the talk would be about how I managed to compute 3.3 trillion decimal digits of pi using python , about the work I have done in finding out new primes, finding patterns in a lot of known sequences and really working on proving or gathering evidence for or against conjectures and open problems in number theory throwing light on the libraries which I have used, along with the amazing approaches and python based shortcuts that have made numerical conjecture verification extremely fast and efficient .

I would cover how I used libraries like Numpy , Scipy ,SymPy ,FuncDesigner ,PyIMSL ,PyACTS,OpenOpt to compute values of constants like pi , zeta(5) etc to more than millions of decimal digits and how using these tools and understand the lesser known patterns in their digits and further explore on evidences towards unsolved questions like whether it is a normal number or not? In the same spirit talk about how python based libraries could be used to find newer prime numbers with different representations, explore I used these libraries to address problems of finding solutions of Diophantine equations of solutions which are very high in magnitude and some similar problems which are intensive in computation inspired from combinatorics.

Also lastly I would add how I used libraries like Tensorlfow which are implemented to run amazingly efficiently with GPUs to understand sequences which formerly were extremely difficult to access and analyse.