AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY

Chaos Game Representation (CGR) Based DNA Sequence Visualization

24AIM144 Introduction to Data Compression

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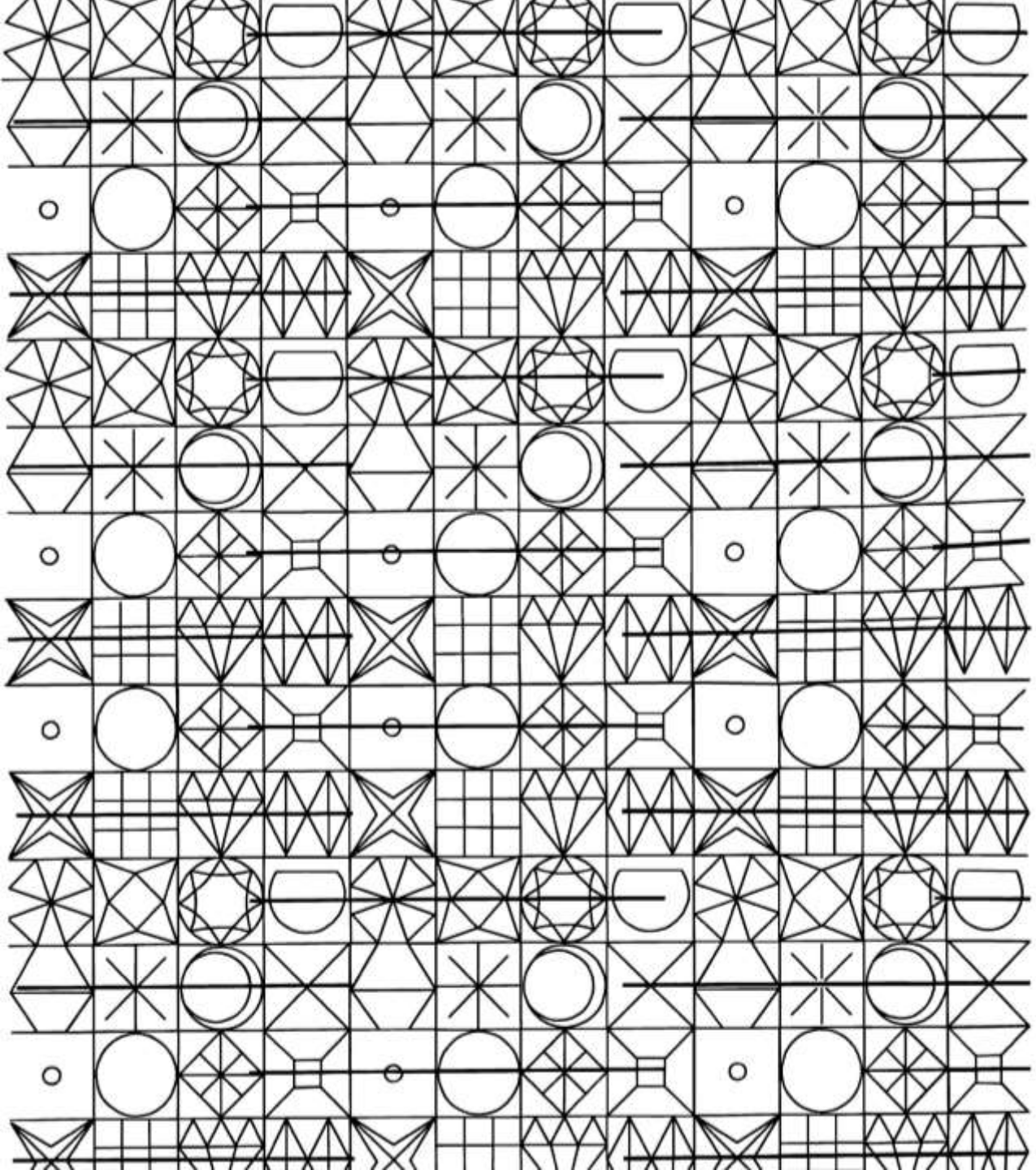
What is CGR?

CGR is a way to convert DNA into fractals.

It helps in visualizing long DNA sequences.

Each base (A, T, G, C) maps to a corner in a square ⟶ repeated midpoint plotting.



Why Use CGR?

Traditional methods can't visualize patterns.

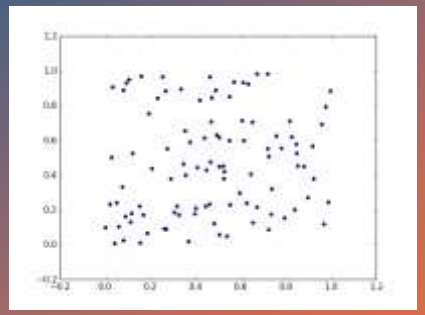
CGR reveals motifs, repetitions, and sequence complexity visually.

How It Works

Each base is assigned a corner.

Start at the center and keep plotting halfway points.

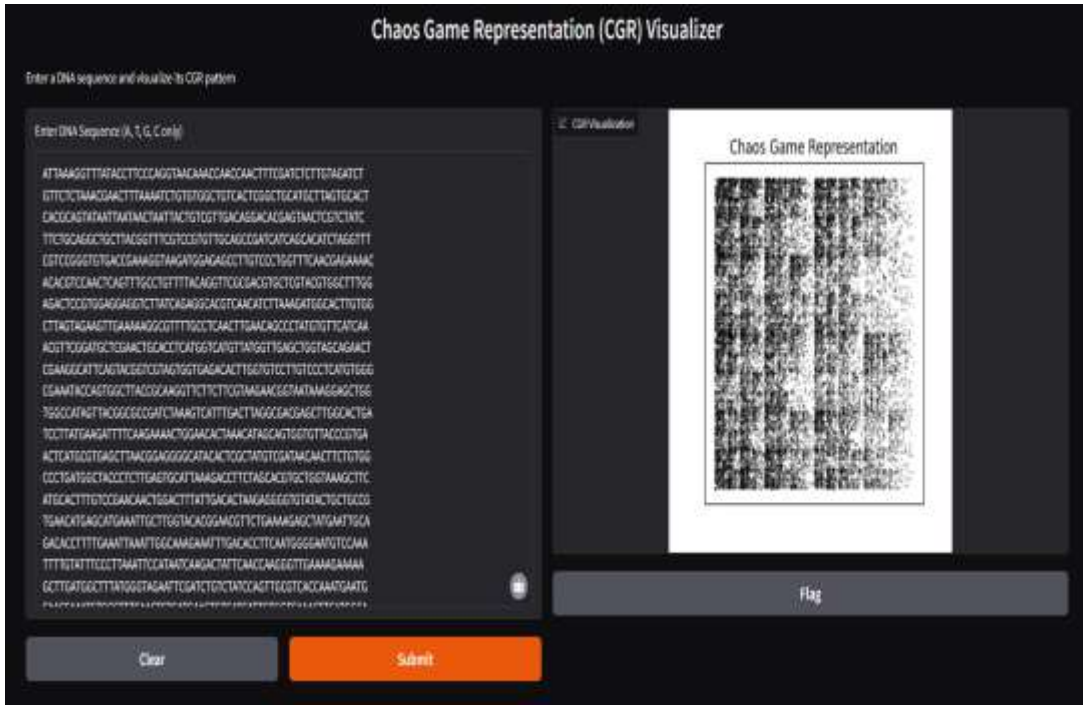
End result = a fractal image unique to the sequence.



Technology Used

- Python
- Matplotlib / NumPy for plotting
- Gradio for web interface

Our Interface



Input: DNA sequence

Output: CGR fractal image

Applications

DNA pattern analysis

Biological fingerprinting

Can be extended to virus vs human DNA classification

Educational tool for bioinformatics

Our Work on some dna sequences

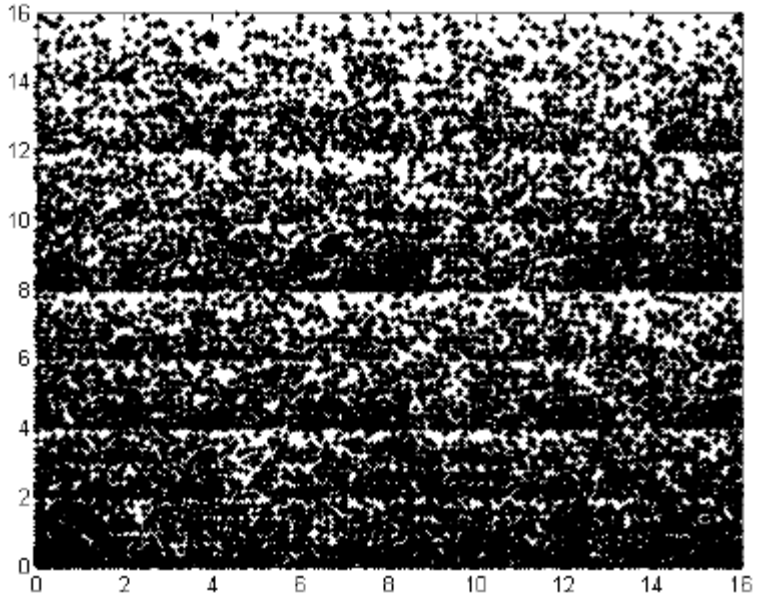


Fig-1:Schizosaccharomyces Pombe (Eukaryote)

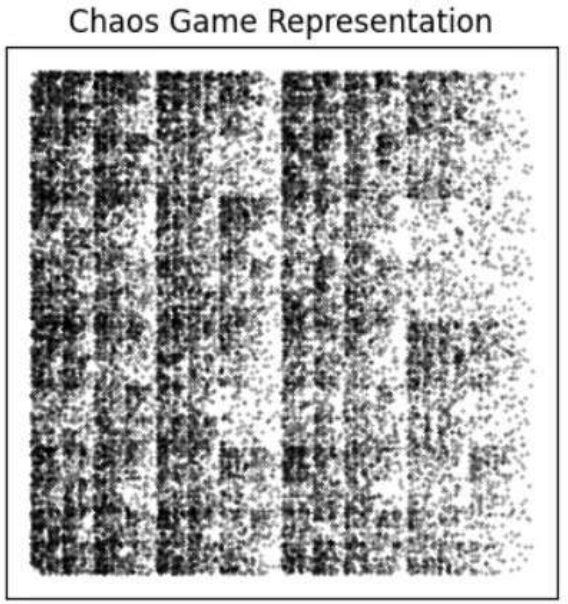


Fig-2:Covid OM798486.1 DNA representation

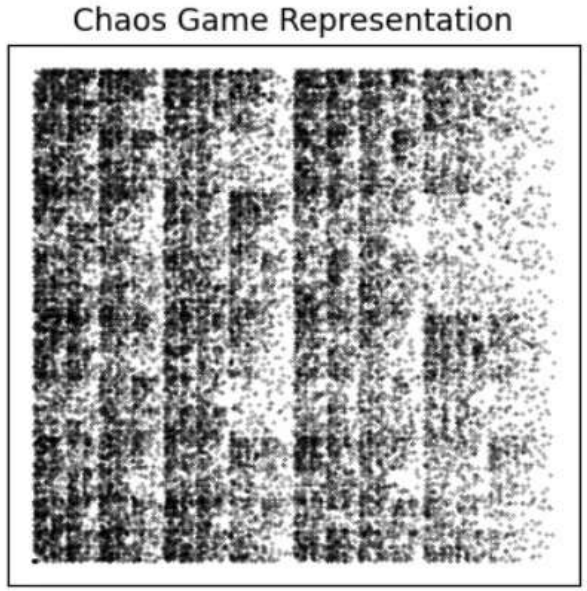


Fig-3:PA564804.1 DNA representation

Conclusion

Simple yet powerful visualization method

Interactive tool using CGR and Gradio

Great potential for education and research

Thank you sir