

# R&D on the Synthesis of High-Speed Pattern Matching Circuits and Their Applications

<Program for Fostering Regional Innovation (Global Type) >

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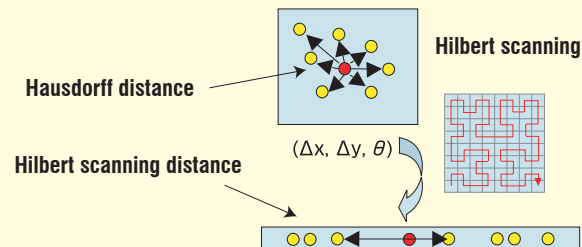
## Purpose of the Research

- Pattern matching has been performed by software, but the software implementations are too slow.
- In this research, we will realize high-speed pattern matching circuits that utilize FPGAs and memory.
- We combine the pattern matching circuit with rewritable circuits such as memory and FPGAs.
- We develop software for logic synthesis.
- We develop algorithms with smaller amount of computation while maintaining the accuracy.

## Summary of the Research

- In this research, we implement high-speed pattern matching by using logic circuits that utilize FPGAs and memory.
- We develop software for logic synthesis to implement required circuits.
- Hausdorff distance -> Reduce the amount of computation by using Hilbert scanning distance to realize a high-speed processing.
- We develop various applications.
- Detection of Internet virus, biometrical authentication, bioinformatics for DNA, amino acid, base, and the like which use multiple sequence alignment, and others.

Internet virus checking device



## Results of the Research

- Realized the CAM function using RAM

We realized a pattern matching circuit that is functionality equivalent to one using associative memory (CAM) and RAM. This circuit is as fast as CAM and consumes a magnitude lower power. (DSD 2007, 10th EUROMICRO Conference on Digital System Design, Architectures, Methods and Tools. Aug. 27-31, 2007.)

- Established a biometrical fingerprint authentication algorithm
- We realized an improved accuracy which is about 50% higher than the conventionally most accurate method (Error rate: 1.96%, IEEE Trans PAMI, 2006). (IEEE/ACM Int. Conf. SITIS 2007 (Dec. 2007))

- Created a prototype of biometrical recognition unit



## Prospective Fields of Applications

Virus check device for network, network device, peripheral circuits for microprocessor, individual authentication system, DNA sequence alignment system, coin discrimination system, remote monitoring system, robot vision, entrance and exit control system, public certificate, IC card authentication



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