Theory of Natural Computation Lab.

Prof. Da-Jung Cho

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Member: Da-Jung Cho

Academic bio.

- 2021.03 – current: Assistant professor, Ajou university
- 2019.09 – 2021.02: Post doctoral researcher, University of Kassel
- 2018.05 – 2019.08: Post doctoral researcher, University of Paris Saclay
- 2011.09 – 2018.02: Ph.D., Yonsei University

Major: Theory of computation, Formal language and automata theory

Member

학부 인턴생 2명 since 2021.05

다양한 흥미로운 연구 주제에 대해 OPEN되어 있습니다.

어떤 문제를 해결하는 과정을 즐기고, 효율적인 알고리즘을 찾고

분석하는 과정에 흥미를 갖는 학생들의 지원을 기다립니다 :)

Research

Research fields

- Theory of computation
- Formal language and automata theory
- Natural computing
- Circuit complexity

Research interests: *Theoretical* analysis of problems

- Interpretation and formalization of biological phenomena
- Design efficient algorithms to solve problems inspired from nature
- Modeling biological phenomena and analysis

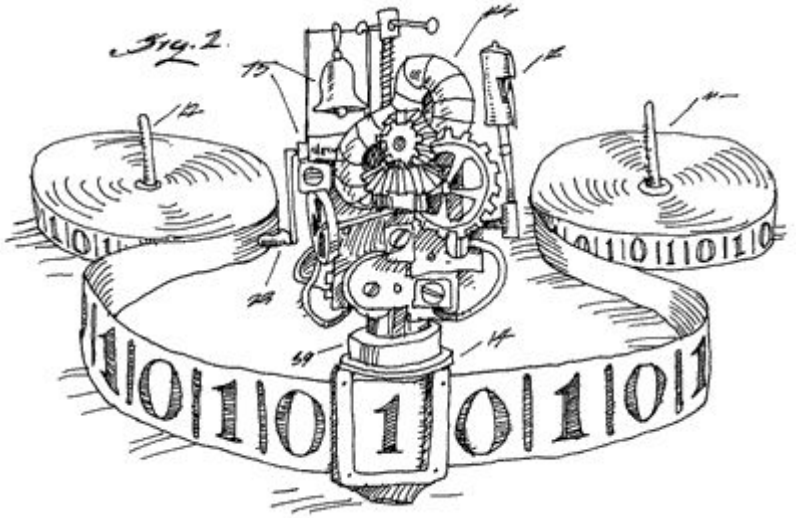
Research

"What are the fundamental capabilities and limitations of computer?"

Research

Theory of Computation seeks to determine

- what can or can not be computed,
- how quickly can be computed,
- with how much memory it can be computed,
- on which type of computational model it can be computed.



Theory is relevant to practice!

Research

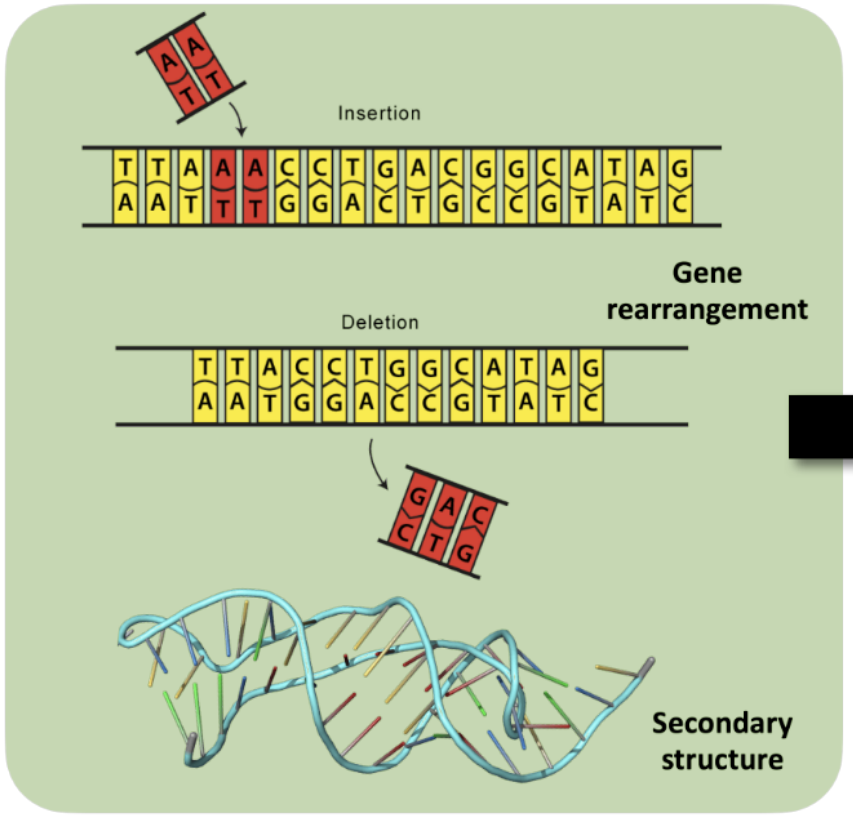
Theory of Natural Computation

- is based on the use of theory to understand and analyze natural phenomena
- takes inspiration from nature for the development of novel problem-solving techniques
- employs natural materials (e.g., molecules) to compute

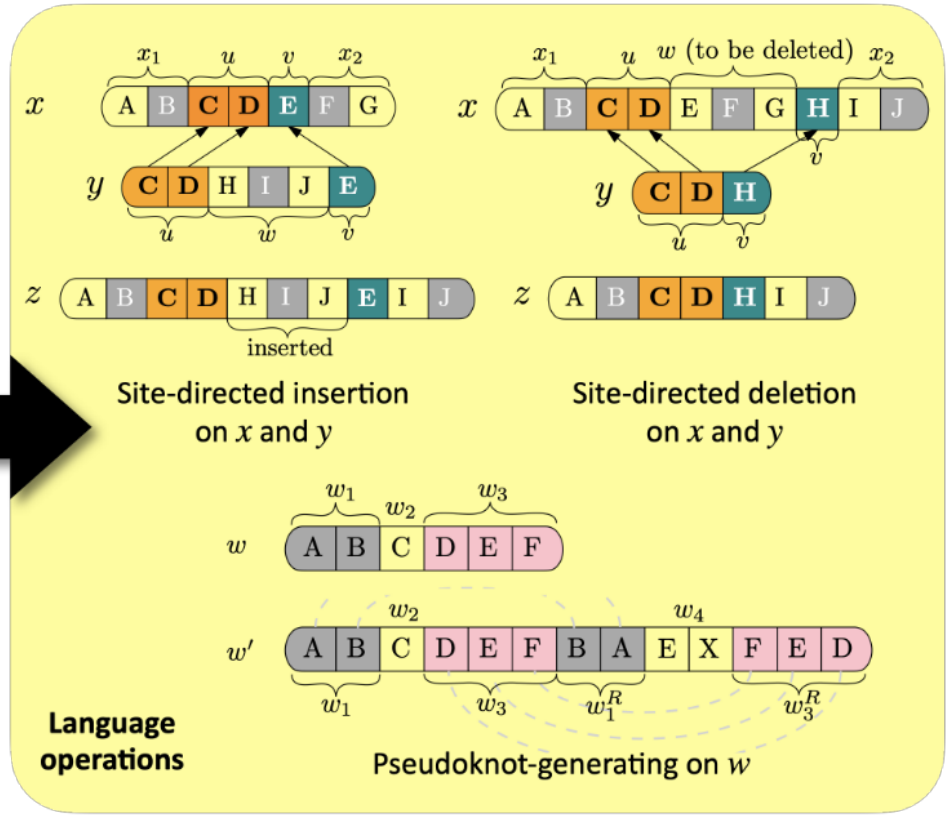
출처: www.3dmoleculardesigns.com

Research details

Interpretation and formalization of biological phenomena



Biological events

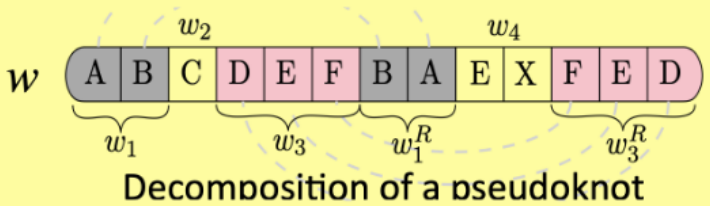


Bio-inspired operation on strings

Research details

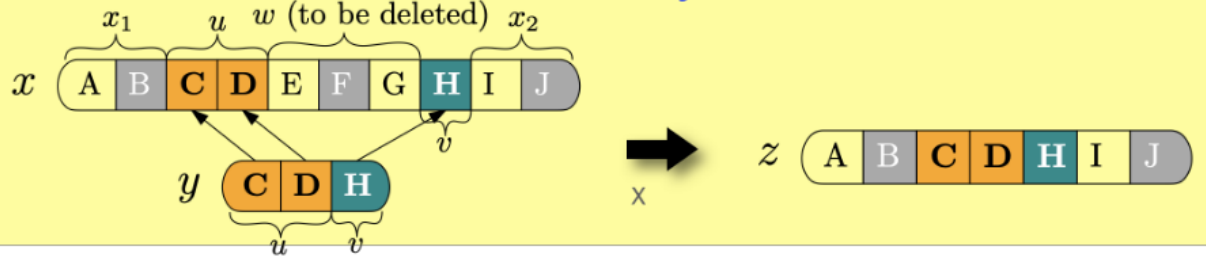
Design efficient algorithms to solve problems inspired from nature

- **Theorem**. Given a string w of length n, we can determine whether or not w is a *pseudoknot* in $O(n)$ time.



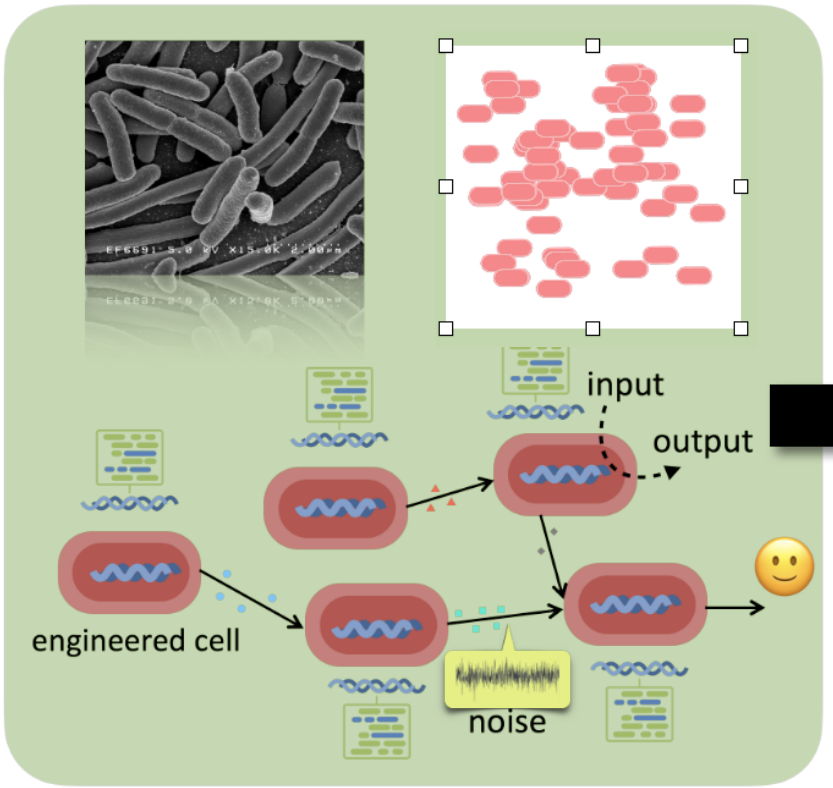
Decomposition of a pseudoknot

- **Theorem**. Given three strings x, y and z, we can determine whether or not z is generated by site-directed deletion of x and y, in other words $z \in x \overset{sdd}{\leftarrow} y$, in $O(n)$ time.

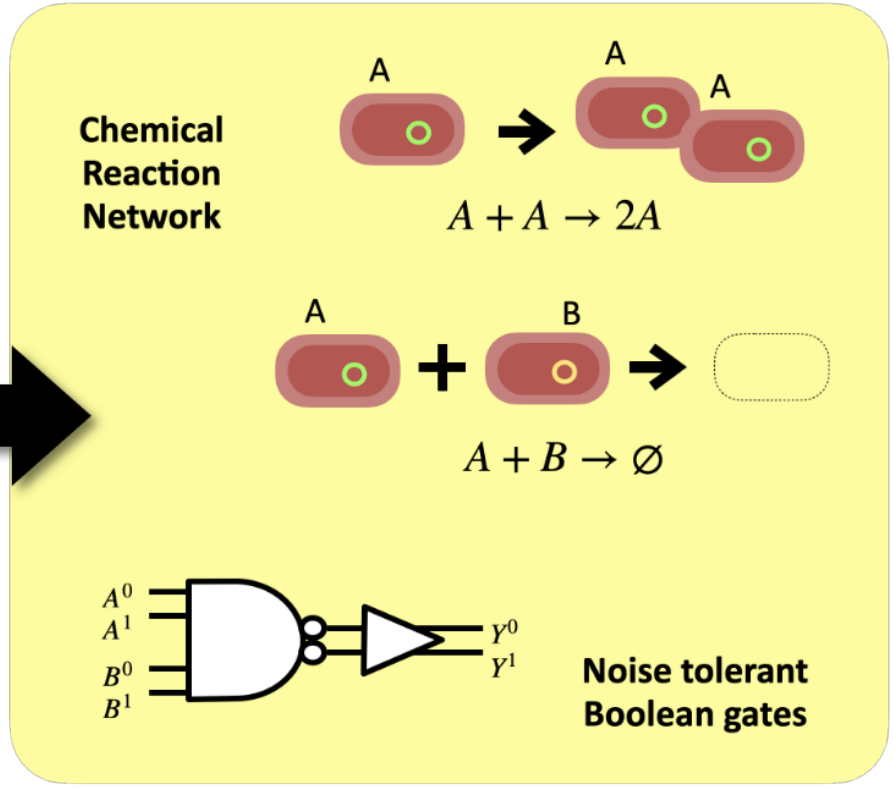


Research details

Modeling biological phenomena and analysis



Cellular communication



Modeling and theoretical analysis

Plan

As a member of our lab,

1. Study *Introduction to the theory of computation* by Michael Sipser
2. Study the latest research in our field
3. Define scientific problems
4. Solve problems by designing an efficient algorithm
5. Write academic papers
6. Attend international conferences :)

Thank you!

Please feel free to contact me :)

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