Molecular Evolutionary Learning of DNA Hypernetworks for Hand-written Digit Classification

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An intersection between biology and computation is explored by classifying handwritten digits using DNA computing. To do this, we propose employing the Molecular Evolutionary Hypernetwork [1] in vitro using specifically encoded DNA as pixels of images. This machine learning algorithm consists of various stages; matching of training or test data with the Hypernetwork (starting with a random single-stranded library of 3-order hyperedges), selection and amplification of similar sequences, isolation, classification, feedback and update of the Hypernetwork used in the next round of training. A key limiting factor of this design is the issue of scalability, as a very large dataset would need to be provided for demonstrating the learning process [2]. To address this, and for the verification of each experimental step, we design, create and test a random single-stranded DNA library using various techniques, which provides a base of larger scale experiments demonstrating molecular learning.

Figure 4. Overall experimental process of the evolutionary molecular Hypernetwork.

References

Acknowledgement
This work was supported by Samsung Foundation for Future Research Promotion (SRFC-1401-12)