DNA Encodings for *in Vitro* Molecular Learning of Multimodal Data

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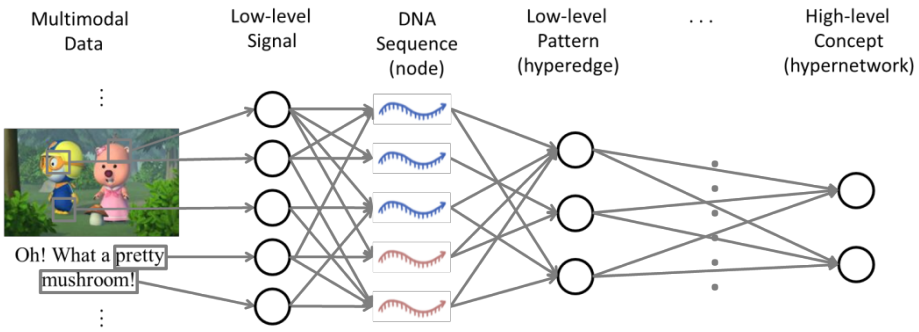
Abstract

The two characteristics of DNA computing, the ability of performing massively parallel computing and self-assembly between complement sequences, are closely related to the characteristics of the human brain. Inspired by theses similarities, the hypernetwork model was developed as an evolving associative memory model that can learn multimodal data in a massively parallel manner [1-4]. *In silico* implementation of the hypernetwork model showed that visual-linguistic concepts could be emerged from watching cartoon videos[5-6]. However, *in vitro* implementation could only be achieved on a small scale and with unimodal data[7], because the number of independent DNA sequences was limited. To learn large scale and multimodal data *in vitro*, a hierarchical method of encoding is needed. In this research, we extracted low-level visual and linguistic signals, and then encoded them into DNA sequences through learning. By further learning processes, high-level visual-linguistic concepts could be evolved from low-level patterns.



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