Self-assembly is a process by which supramolecular species form spontaneously from their components. This process is ubiquitous throughout the life chemistry and is central to biological information processing. It has been predicted that in future self-assembly will become an important tool in the fields of bio-molecular computation, nano-technology and medicine. However robustness (i.e. error correction) is a key challenge in realizing the potential of self-assembly. In earlier works many authors have proposed several combinatorial error correction schemes to control errors having a close analogy with the coding theory such as Winfree’s proofreading scheme and its generalizations by Chen and Goel and compact scheme of Reif, Sahu and Yin. In this work, we report an error correction package XTile that can be used to create input tiles to the Xgrow simulator of Erik Winfree by providing the design logic of the tiles and it also allows the user to apply proofreading, snake and compact error correction schemes. We also give a tile set for multiplying two binary numbers.

Algorithmic Self-Assembly

1980: DNA Nanotechnology N. Seeman
1994: DNA Computing L. Adleman
1963: Wang Tiles S. Wang
1996: Algorithmic Self-Assembly Erik Winfree

First Problem Solved by DNA Computing

Bio-Molecule used for DNA Self Assembly

Wang Tiles can Simulate Turing Machine

Acknowledgements

The authors would like to thank Archit Jain and Vinay Agarwal for useful discussions.

References


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