Genetically Engineered Bacteria Identify Prime Numbers, Vowels, and Answer Math Questions

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Performing cellular computations with engineered bacteria has enormous importance in biocomputer technology development at the micron scale, where microprocessor-based computers have limitations due to energy, cost and technological constraints. Here, we designed and built artificial neural networks with genetically engineered bacteria that can identify prime numbers, vowels, and even determine the maximum number of pieces of pizza or pie that can be obtained from a given number of straight cuts. In addition, the genetically modified bacteria are able to answer mathematical questions such as whether a number n's factorial is divisible by n × (n + 1)/2 OR whether a number n's square can be expressed as the sum of three factorials. All those problems are classic abstract computational problems and are solved by a computer by writing codes in Python or C. Introducing such abstract computational capability in living cells, will be a step forward in biocomputer technology development and may help understanding the biochemical nature of 'intelligence'.