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Charles F. Stevens and **Sanjoy Dasgupta**. *A neural algorithm for similarity search*.

Similarity search, such as identifying similar images in a database or similar documents on the Web, is a fundamental computing problem faced by many large-scale information retrieval systems. We discovered that the fly’s olfactory circuit solves this problem using a novel variant of a traditional computer science algorithm (called locality-sensitive hashing). The fly’s circuit assigns similar neural activity patterns to similar input stimuli (odors), so that behaviors learned from one odor can be applied when a similar odor is experienced. The fly’s algorithm, however, uses three new computational ingredients that depart from traditional approaches. We show that these ingredients can be translated to improve the performance of similarity search compared to traditional algorithms when evaluated on several benchmark datasets. Overall, this perspective helps illuminate the logic supporting an important sensory function (olfaction), and it provides a conceptually new algorithm for solving a fundamental computational problem. (Received September 25, 2017)