EPSRC CDT in Distributed Algorithms

PhD Project: Data Science and Artificial Intelligence for Smart Sustainable Plastic Packaging

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Project Description

My project aims to use Topological Data Analysis (TDA) to improve the sustainability and recyclability of plastics worldwide.

High-density polyethylene (HDPE) is widely used in plastic production. It can be recycled to produce a post-consumer resin (PCR), which can then be used to make new plastic products. However, this PCR may contain differing grades of plastic, and may become contaminated with other materials. These factors affect the performance of the end product. At present, the more favourable solution for companies is to make new virgin plastic rather than recycling.

In order to improve the viability of PCR recycling, we must understand how the chemical structure controls the performance of a polymer. By analysing experimental data on recycled plastics, we hope to be able to predictively link the chemical composition of a PCR, to its structural properties (e.g. density, degree of crystallinity) and hence determine the performance of the resulting recycled plastic (e.g. stability, crack resistance). This will be done with TDA, capitalising on High Performance Computing to perform at the desired scale.

This understanding could be used to inform the selection of PCR for use in packaging, increasing sustainability and reducing plastic waste worldwide.

Go to the EPSRC CDT In Distributed Algorithms website.