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**TakeAIM Winner 2017:**  
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Although we may not realise it, our experience online is becoming increasingly tailored to our own wants and needs. Movies, music, hotels, and news are all examples of products that are often personalised for each user; think about navigating websites such as Netflix, Spotify, Expedia, or the BBC.

In my research, I use network science to study the interactions between users and items, focusing on grocery purchases. A network model of shopping activity consists of customers connected to products that they previously purchased. Densely connected clusters or "communities" in these networks reveal customers with similar preferences and the products that they buy the most. "Missing links" within these communities then form the basis of new product recommendations. Because consumer preferences evolve constantly, part of my work has been to develop methods that reveal meaningful changes in the structure of time-dependent networks. This approach helps uncover seasonal shopping patterns (e.g. turkey in the winter, Pimm's in the summer) as well as more lasting changes in consumer preference (e.g. gluten-free options, health-conscious eating).

The beauty of network science is that methods are rarely application-dependent. My work therefore applies to any network where connections occur between two types of entities, such as actors and movies that they acted in, plants and their pollinators, or airlines and airports that they serve. And while we are not about to recommend bees new flowers that they should pollinate, the mathematics of networks can offer insights into the resilience of ecosystems or the efficiency of transportation routes.

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The Smith Institute, enabled by the generous sponsorship of our leading corporate partners, ran the TakeAIM competition in 2017 to make visible the crucial role that mathematics will increasingly play in all aspects of our lives. The competition was open to undergraduate and postgraduate students working in the mathematical sciences. First prize was £1,250 of Apple vouchers, second prize £500 of Apple vouchers and six runners-up each received £150 of Amazon vouchers.