Consumer Data Research Centre

An ESRC Data Investment

Sainsbury's

# Customer pathway and in-store activity

Ulzhan Bissarinova[1], Daniel Hulme[1], Constantinos Gavriel[2] and Emilie Lhomme[2]
[1]University College London, [2]Sainsbury's

## Project Background

It is desirable for retailers to understand the pathways customers use to move around the store while purchasing their products. Pathway information gives insights on the space occupancy rate and might allow store plans to be reallocated more efficiently. The most promising state-of-the-art indoor tracking methods involve usage of closed-circuit television cameras (CCTV), Wi-Fi, Bluetooth, ultra wide-band, Long-Term Evolution, inertial measurement units and near-field communication, whose work principle is based on electromagnetic fields. These methods come with a high cost of implementation, as well as inaccuracy problems related to the distortion of signals. Unlike the signal-based methods, the method proposed in this work does not require involvement of any additional hardware and relies purely on transactions and floor-plan data.

## Data and Methods

The floor plan of one specific store along with its transaction data recorded during a four week period were analysed for this research. The analysis included obtaining x, y-coordinates of customers along their predicted paths, creating clusters of similarly visited sections and generation of association rules for the products frequently bought together. The family of shortest path algorithms was considered to estimate the potential path of clients, among which included Dijkstra's algorithm. A K-means algorithm was implemented to form clusters based on the numbers of "views" and sales volume of each section. Number of "views" indicates how frequently a particular section was passed by and therefore was viewed by a visitor. Finally, the association rules were used to identify strongly related product pairs and to observe how distant those products are located from each other.

## Key Findings

Aggregated pathways show that overall, mornings were less busy and the store was busiest during the lunchtime rush. A clear path that was followed by the majority of the visitors during lunchtimes on weekdays included sections "Snacking & Sharing", "Fresh Pizza Bread & Pasta", "Fresh Fish", "Fresh Poultry", "Bacon", as well as "Yogurts" and "Cheese". Figure 1 illustrates the strength of related products against the distance between them. The product pairs that have high confidence and high distance values could potentially be placed more closely together to improve their sales. The top 3 examples with highest confidence and traveled distance values (distance>164m, confidence>0.75) include sections "Fresh Fish" -"Veg & Salad", "Fish Counter"- "Veg & Salad", "Potatoes" – "Veg & Salad".

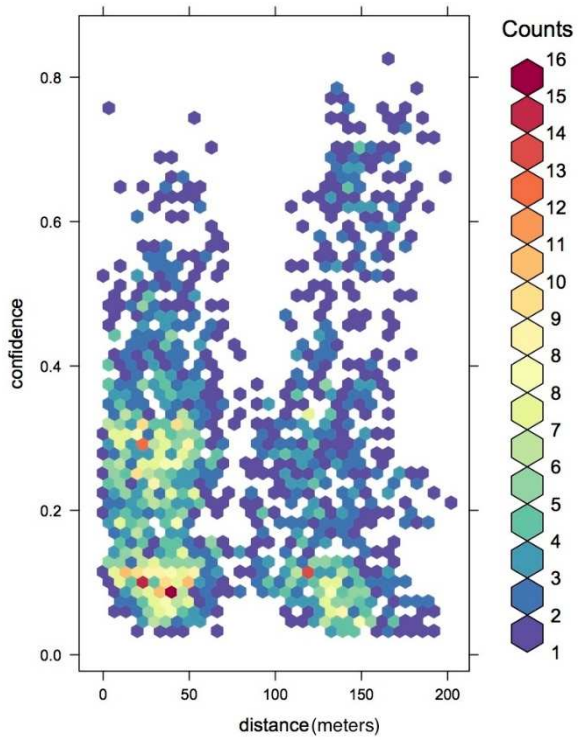


*Figure 1. Confidence of associated products (>0.01) against distance between them*

## Value of the Research

This methodology has several benefits. First of all, it presents a tool to visually represent the customer pathways within a given store. This can be used to estimate how customers navigate a store and occupancy rate of areas according to seasons, days of week and times of day. This insight could be used to create recommendations on better store layouts and to understand the effectiveness of promotions. A better understanding of customer pathways may allow stores to increase the sales of complementary products and impulsive purchases. In addition, it could be used to minimise congestion and improve customer satisfaction.

Generally, the methods discussed in this work are applicable to all types of retail stores where consumers browse items across the store floor. The core advantage of the approach is that the retailers don't need to invest in expensive (and potentially undesirable) tracking technologies and can instead take advantage of data which are routinely collected by transactions.