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## Predicting befriending scheme success using machine learning and neodemographic information

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### Introduction & Background

The study of loneliness and social networks has largely involved social media analysis for both social circle insights and loneliness predictions from language. While geospatial data have also been used to investigate loneliness, the approach has predominantly involved a traditional investigation of geolocations per se. Few studies have focused on the factors contributing to the success of human relationships and the associated loneliness reduction – which was the objective of this project.

### Objectives & Approach

The data were obtained from B:friend – a wellbeing charity dedicated to tackling loneliness through befriending schemes for Older Adults – and joined with the Index of Multiple Deprivation (2019) for feature engineering. The objective was to identify features which contributed to a successful friendship. The dataset included neodemographic information: geospatial and demographic data for both sides of each pair (the Older Adult (Older Neighbour) and the paired Volunteer); as well as preference features for a potential pairing. Machine learning classification models (logistic regression, decision trees, random forest, support vector machines and xgboost) were used to determine which features contributed to successful short- and long-term befriending schemes. A total of 805 pairings were analysed.

### Relevance to Digital Footprints

The project used geospatial information paired with demographic records collected by B:friend digitally to identify the features which contributed to a successful friendship.

### Results

The preliminary results offer insight into the features which contribute to short- and long-term friendships, with variables such as house suitability, third COVID-19 lockdown and income decile difference driving the predictions. On average, a third of the friendships appear to succeed. Additionally, we use

a series of variable importance measures to rank order variables which contribute to successful befriending of the pairings.

### Conclusions & Implications

Combining demographic and geospatial information for machine learning helps identify important factors which contribute to short- and long-term relationships, and, by extension, to tackling loneliness. This novel approach can benefit the public, as well as professionals, by offering tailored suggestions for loneliness interventions, utilising factors contributing to the specific requirements of various individuals, as well as their preferences, thus further expanding on the pre-established findings such as homophily.

### Keywords

geospatial data, digital footprints, machine learning, friendship, social relationships

