**ABSTRACT:**

This research aims in predicting the screening colonoscopy numbers across Ireland. Bowel screening aims to detect signs of bowel cancer at an early stage, where there are no symptoms. Bowel Cancer is currently available to all people aged 60 to 69 living in Ireland. The clients who have taken part in the program and whose faecal test shows higher haemoglobin count (than a defined level) will be sent for colonoscopy for polyp detection and other pathology tests to identify cancer. National Cancer Strategy 2021 recommends expansion of the age limit to 55-74. In order to assist in the decision making it is critical to understand the expected colonoscopy counts across the country. The study makes use of the existing screening colonoscopy for each age and gender and combined with the census data 2022, variations of the colonoscopies for each age and gender are identified. In-depth Interviews are done with the subject matter experts, the features that should be used for the study are discussed. Hypothesis testing are done to back this primary research. Co-relation between the features is obtained, several machine learning regression models are compared along with time-series regression models. The best model will be used to predict the colonoscopy numbers. The results and conclusions are provided in the relevant sections in the report.

**Introduction:**

The topic for this research is machine learning predictions in the area of bowel screening colonoscopy, the features impacting colonoscopy, machine learning models for the prediction, statistical analysis. Machine Learning model development involves feature engineering where the features impacting colonoscopy numbers are technically identified. The research makes use of CRISP framework which involves the steps data gathering, data cleansing, data enrichment, statistical analysis, feature engineering, model building, analysing the model, predictions, and deployment. Most of the steps above are iterative in nature in order to get the best model for prediction. In-depth interviews are used as the primary research methodology for this research. Data enhancements are done based on the outcomes of this primary research. Hypothesis testing are applied in order to technically test the details suggested in the interviews.