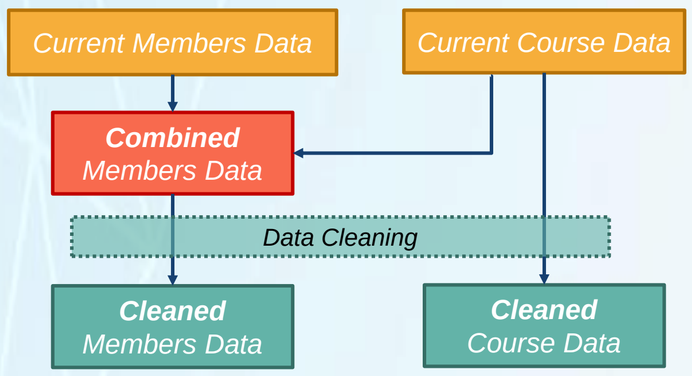
Predicting ISCA's Customers' Behaviour & Preferences for CPE Courses

An ISCA-SMU Data Analytics Capstone Project for the Continuing Professional Education (CPE) department of Institute of Singapore Chartered Accountants (ISCA).

BUSINESS PROBLEM: ISCA wishes to segment its members to increase member engagement through targeted marketing, as well as to predict future CPE courses uptake to support the effectiveness and efficiency of decision-making.

Data Cleaning and Manipulation



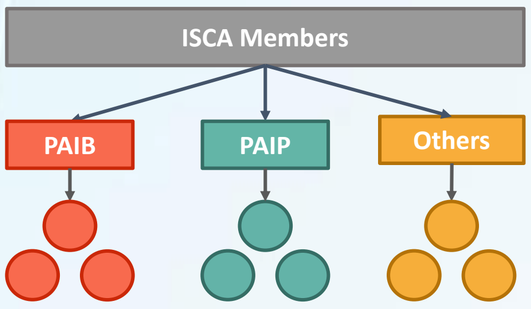
Being provided with ISCA's historical CPE course enrolment data and ISCA's current members' data, they were further processed to engineer variables that are used for clustering and predictive models.

Variables are classified as Members' Psychographic, Demographic, and Behavioural data. For Behavioural data, historical CPE course enrolment data are processed for each individual member to produce more meaningful information such as course counts, averages, percentages, differences.

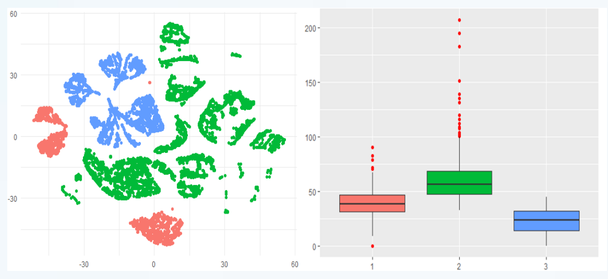
Lastly, both current members and historical course data are cleaned by filtering data using certain conditions related to members' Psychographic, Demographic, and Behaviour patterns.

Members Segmentation

Members are initially split into three distinct categories, which represents the different types of accountants. Each category of members are then further segmented using the clustering algorithm KAMILA.



Effectiveness of the clustering is analyzed using a t-SNE plot, following which interpretation of the clusters are done using charts and summary statistics of the variables.



Insights are then derived for each cluster based on their members' characteristics. A ***Cluster Updating Tool*** is then created, which allows ISCA to update each cluster's membership on a regular basis.

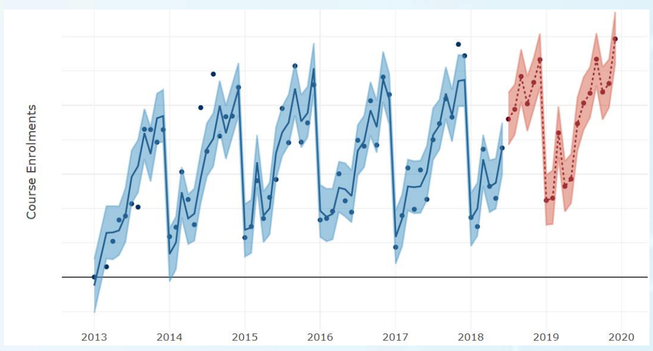
Cluster	Insights
Staunch Supporters	ISCA's loyal customers. Provides opportunity for cross selling and bundling courses.
Bare Minimum	Least likely to buy CPE courses. Explore incentives to get them re-started to buying courses.
Untapped Potential	Members who buys a small number of CPE courses each, aim to retain these customers and increase their interests via online and bundled courses.

Forecasting Enrolments

The CPE department of ISCA conducts courses throughout the year to meet the training needs of accounting professionals in Singapore. The department takes part in ISCA's annual budgeting exercise, where CPE planners would analyse a multitude of factors to forecast the following year's course enrolments, that is used to form ISCA's budget.

This segment of the project aims to supplement this budgeting process, by using a data-driven approach to forecast future course demand, for the many different course categories. The forecasts are created using the *R* implementation of Prophet, a univariate time-series forecasting method created by Facebook Core Data Science Team.

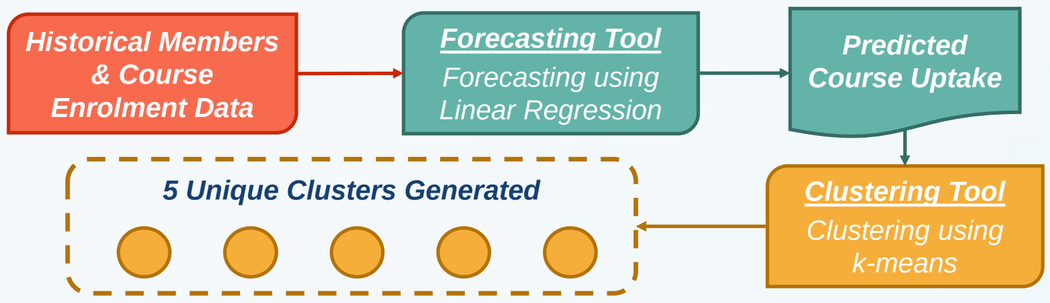
The end product is a ***Forecasting Tool*** that automates this forecasting process, and would generate a ***Forecast Report***, suitable for management's immediate use.



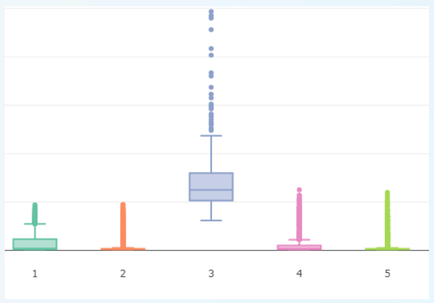
Clustering via Regression Predictions

To capture a different perspective on segmenting ISCA's members, an additional clustering is done *after* forecasting (using a regression method). Segmentation via each member's predicted behaviour would provide a different view on how each segment of members are likely to react when certain categories of courses are offered in the next year.

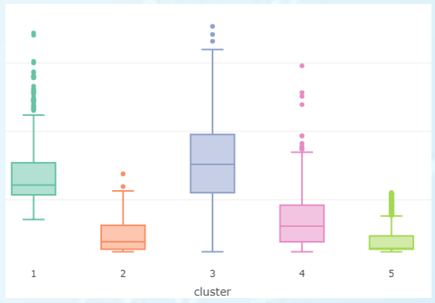
The ***Clustering via Regression Predictions Tool*** would function as follows:



Clusters are interpreted via their predicted likelihood to sign up for each type of category of courses, identifying different segments of members and their likelihood of signing up for certain types of courses. This provides ISCA with the insight on what courses each group is likely to sign up for, helping to focus their marketing efforts to groups that are more likely to sign up for a particular course category.



Course Category A



Course Category B

INSTRUCTOR: Professor Benjamin LEE

TEAM: Jonathan Dexter WANG Jingxue | LIEW Chun Kit | NEO Yi Ren | ONG Zhong Ting