**ANL488 Project List for Jan 2021 Semester**

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| **No** | **Project Title** | **Description** |
| **1** | Modelling and Forecasting Time Series  (Supervisor: Dr Karl Wu) | This project focuses on modelling and forecasting time series using preferably ARIMA models (or other techniques that we have learned in ANL317 Business Forecasting). We will conduct a complete time series analysis including examining the properties of the series such as stationarity, seasonality, the periodogram (ACF and PACF), the goodness of fit of the estimated ARIMA models as well as the residuals. Eventually, we will try to obtain a reliable prediction of the future outcomes of the series. If we discover volatility in the time series, we may also try to implement some more challenging models such as the GARCH/ARCH as a complementary element to the conventional ARIMA approach.  The time series we are going to work with should be univariate, meaning that it will be a series of a single variable. The series can be either from the fields of social science (e.g. studies on education, observations of political issues), economics (e.g. consumer price index), finance (e.g. stock prices), medicine (e.g. epidemic study) etc. You are also most welcome to suggest a certain field or topic where we can find time series for forecasting.  We will be using either SAS Forecast Studio and/or R for this project. Those interested please email Dr. Wu at karlwuky@suss.edu.sg by 30 Nov 2020 (cc leeyh@suss.edu.sg). |
| **2** | Analysing zero-inflated data with R  (Supervisor: Dr Karl Wu) | Zero-inflation occurs when there are more zeros observed in a variable of interest than expected. Zero-inflated data are e.g. daily precipitation data (there are days in which 0mm rainfall are recorded), household income data (data could be zero-inflated if the unemployment rate during a certain period is high), number of defective items in production batches (some machines take longer to produce defective items than others). Zero-inflation is not a desirable feature since we cannot use traditional statistical approaches for our analysis. The normality assumption is usually violated here. In fact, zero-inflated data follow their own probability distribution. Analysing this type of data requires specific models which are integrated in most of the software nowadays.  This project will focus on using R programming language to model zero-inflated data. The R package “zeroinfl” is specifically designed for modelling zero-inflated count data. Depending on the dataset to be analysed eventually, interested students may also try to develop their own R code for existing zero-inflation models. Hence, students should be preferably interested in mathematics/statistics and learning/using R. Those interested are to email Dr Wu at [karlwuky@suss.edu.sg](mailto:karlwuky@suss.edu.sg) by 30 Nov 2020(cc leeyh@suss.edu.sg). |
| **3** | Pricing Analytics for Food and Beverage Business  (Supervisor: Dr Liu Wenting) | This project requires the student to work with Revenue Management Solutions (a consulting firm focused on data-driven pricing strategies and data analytics for Food & Beverage business).  This project will focus on the Food & Beverage business. The major purpose is to analyse the existing data hosted by the company, e.g., POS data, consumer satisfaction data or demographics, and optimize pricing, make recommendation to menu design, provide analytical support to marketing and financial reporting which collectively deliver a profit gain. Hence, the project will involve qualitative and quantitative analyses, with the objective of delivering set of recommendations in one of the key strategic area – value-based pricing, operation analysis, customer segmentation, or competitor insights.  Students who are strong/comfortable with Python/R programming are to send their CV to [wentingliu@suss.edu.sg](mailto:wentingliu@suss.edu.sg)(cc leeyh@suss.edu.sg) by 30 Nov 2020. Selection will be competitive. Those working in the same industry as this company will not be selected for this project to avoid any conflict of interest. |
| **4** | Advanced analytics to assess Corporate Risk and predict default  (Supervisor: Mr Chua Poh Chai) | Traditional Corporate Risk models are too slow to respond to the changing business environment. By the time, the distress corporates are identified and downgraded, they are almost in default. This results in substantial credit losses for the banks and financial institutions.  This project aims to develop advanced analytical models which are more responsive to market conditions and can predict distress/default in a more-timely manner so that banks and financial institutions can respond much earlier and reduce credit losses.  This project will investigate various machine learning techniques, including deep learning, to build predictive corporate risk models. More importantly, it will break down the predictive model metrics into intelligible terms which practitioners can understand so as to achieve buy-in and deployment in banks and financial institutions.  With reference to the Monetary Authority of Singapore (MAS) Financial Stability Review (FSR) 2018, P73-77, data can be obtained from providers like Bloomberg and Refinitiv (for publicly traded companies), Accounting and Corporate Regulatory Authority of Singapore (ACRA) and Ministry of Law.  Students who are keen in this project can email Chua Poh Chai at [pcchua002@suss.edu.sg](mailto:pcchua002@suss.edu.sg) by 30 Nov 2020 with their CV and copy [leeyh@suss.edu.sg](mailto:leeyh@suss.edu.sg). As this project focuses on financial analytics, students’ knowledge in finance, statistics and machine learning, together with strong Python/R programming, will be helpful. |
| **5** | Learning Analytics: Predictive Model on at-risk students  (Supervisor: Mr Edwin Seng) | Research on the use and application of learning analytics and how learning analytics can be implemented in the higher education sector, and its expected benefits and interventions. Through preliminary research, learning analytics can facilitate evaluation of the effectiveness of pedagogies and instructional designs for improvement, help to monitor students’ learning and persistence, predict students’ performance, detect undesirable learning behaviours and emotional states, and identify students at risk. Learning analytics can also provide students with insightful information about their learning characteristics and patterns, which can make their learning experiences more personal and engaging, and promote their reflection and improvement.  With the accessibility of big data and the digitalisation in the educational setting, Institute of Higher Learning (IHLs) is keen to look at what Learning Analytics may mean to lecturers and students. Particularly, on how teaching and learning experiences may present itself with the adoption of Learning Analytics.  Those interested in this project please contact Mr Edwin Seng ( edwinseng001@suss.edu.sg) with your CV by 30 Nov 2020 (cc leeyh@suss.edu.sg). |
| **6** | Modelling and analysis of FX and Equity Derivatives  (Supervisor: Dr Wang Zhe) | This project focuses on using the Python programming  language to realize the payoff of several FX and equity derivatives such as FX Barrier Option, Equity Vanilla Option etc.. Risk analysis will be conducted based on the built models under different market scenarios.  In this project, the object oriented design pattern should be implemented to build a framework to handle market data and product details.  Students who are comfortable with Python programming and interested in financial products are encouraged to apply. Please feel free to email [zhewang001@suss.edu.sg](mailto:zhewang001@suss.edu.sg) for more details if interested by 30 Nov 2020 (cc leeyh@suss.edu.sg). |
| **7** | Econometric model building with regression analysis  (Supervisor: Dr Tan Khay Boon) | This project allows students to build econometric models using cross sectional data or time series data. Students need to identify the dependent variable of interest and search for explanatory variables to explain the dependent variable, build the econometric model using regression analysis and evaluate the adequacy of the model.  Students should be familiar with statistical software such as JMP, SAS or EViews which can perform regression analysis.  Those interested in this project please contact Dr Tan Khay Boon at kbtan010@suss.edu.sg with your CV by 30 Nov 20202020 (cc leeyh@suss.edu.sg). |
| **8** | Forecasting using time series data  (Supervisor: Dr Tan Khay Boon) | This project focus on forecasting the price, quantity, profit, revenue or other quantitative values of a company, an industry or an economy using time series data. Students are expected to obtain the time series data of their interest and build time series model for forecasting the future values. The time series model include regression models, smoothing models and ARIMA models.  Students should be familiar with statistical software such as SAS or EViews which can perform regression and forecasts.  Those interested in this project please contact Dr Tan Khay Boon at kbtan010@suss.edu.sg with your CV by 30 Nov 20202020 (cc leeyh@suss.edu.sg). |
| **9** | Emerging Online Datafication on the Consumer Behaviors  (Supervisor: Mr Victor Yiew) | Singapore and millions of people all over the world are forced to change our lifestyle habits during the COVID-19 pandemic. Challenges arising from this outbreak had accelerated the use of existing and new technologies and tools that a new digital spending norm has emerged.  The six key consumer behavior threshold levels have identified an early signal of spending patterns, particularly for emergency pantry items and health supplies, and these patterns are being mirrored across multiple markets. Consumer ease of convenience and accessibility have increased existing online spending as well as converted many offline shoppers to online. This trend is unlikely to return to the same levels of online shopping before the outbreak. This insights to these new digital spending trends could be useful to eCommerce strategy, resources and logistics design blueprint on the 5G technology and network integration. https://www.bestinsingapore.co/best-online-shopping-sites-singapore/ and https://data.gov.sg/dataset/online-shoppers?resource\_id=3038ccbd-a78e-4fbe-a9a4-fde9230f480a  The student to use the IBM SPSS Modeler and CRISP-DM framework to examine qualitative dataset from https://data.gov.sg or https://www.singstat.gov.sg/ or approved sites to derive on insightful and actionable value proposition.  Those interested in this project please contact Victor Yiew at victoryiew002@suss.edu.sg with your CV by 30 Nov 2020 (cc leeyh@suss.edu.sg). |
| **10** | Apply Predictive Analytics on the S-REIT Performa  (Supervisor: Mr Victor Yiew) | Two of Singaporeans’ top concerns: Retirement-readiness and affordable medical care. The Singapore government started the Supplementary Retirement Scheme (SRS) to complement the Central Provident Fund (CPF) in helping Singaporeans meet their retirement needs. Is there more that could be done?  Growing old gracefully in Singapore requires early financial planning to prepare a steady stream of sustainable passive income. Certainly, application on effectual data analytics can prove to be useful in participating dividend-yielding stocks. https://www.syfe.com/magazine/why-singapore-reits-are-still-a-buy-despite-covid-19/  The student to use the IBM SPSS Modeler and CRISP-DM framework, apply predictive analytics on Singapore real estate investment trusts (S-REITs) and generate” easy-to-use” dashboard analysis and trend for decision making to offer low-risk passive income stream to complement on retirement needs.  Those interested in this project please contact Victor Yiew at victoryiew002@suss.edu.sg with your CV by 30 Nov 2020 (cc leeyh@suss.edu.sg). |
| **11** | The 7 Habits of Highly Effective Data Analysis  (Supervisor: Mr Victor Yiew) | Well known TikTok, as known as Douyin in its home market in China province, was launched on September 2016 and globally rolled out in the following year. This was a strategic triumph.  TikTok/ Douyin parent company ByteDance also owns hugely popular Chinese AI-powered news aggregation platform Toutiao. Notably, the company was not backed by either Alibaba or Tencent. In November 2017 ByteDance acquired the popular would-be rival app Musical.ly app for reported $1 billion. TikTok merged with Musical.ly in August 2018, with app users’ accounts migrated to the TikTok accounts & this was seen as a way for the Chinese app to enter the US market – with Musical.ly already boasting a considerable American audience.  As of 2020, TikTok is one of the world’s best-loved apps, its success was powered by some of the world’s most sophisticated “The Future of Work - Artificial Intelligence”.  The student to use the IBM SPSS Modeler and 7 Habits of Highly Effective Data Analysis: The Art and Science of Effective Data Visualization to categorize groups of qualitative social media information into insightful and actionable categories from https://data.gov.sg or https://www.singstat.gov.sg/ or approved sites and graphical charts on the TikTok User Statistics, TikTok Usage Statistics and TikTok Revenue Statistics to design inforgraphical themes.  Those interested in this project please contact Victor Yiew at victoryiew002@suss.edu.sg with your CV by 01 Jun 2020(cc leeyh@suss.edu.sg). |
| **12** | Use of Predictive Modeling on Housing Prices in Singapore  (Supervisor: Mr Victor Yiew) | Uniquely Singapore, most prices for our daily necessities such as food, clothing, public transport, basic education and household utilities are quite moderate. The pricing of our public transport and taxis are considerably affordable among the world as well. In the comparison on pricing of housing, private schooling and maintaining an automobile can be shockingly expensive in Singapore.  The data analytics objective is aims to predict Singapore housing resale prices: both 'hdb' and 'private' housing, include 'New Sale', 'Resale' and 'Subsale' and some consideration is needed on possible and different distributions in these three sale types when doing predictions.  The student to use the IBM SPSS Modeler and CRISP-DM framework, apply predictive modeling on Singapore Property datasets from https://data.gov.sg or https://www.singstat.gov.sg/ or approved sites and include advanced analytics using not limited to the https://data.gov.sg/dataset?q=Property+Price+Index  structured data to exploit useful insights for future property pricing research.  Those interested in this project please contact Victor Yiew at victoryiew002@suss.edu.sg with your CV by 30 Nov 2020 (cc leeyh@suss.edu.sg). |
| **13** | Analytical Insights on Self-driving Autonomous Taxis in Singapore  (Supervisor: Mr Victor Yiew) | In a few years' time, thousands of driverless taxis with the autonomous vehicle (AV) capabilities are self-driven on Singapore's roads, becoming the first in the world to roll out a driverless taxi system.  This project to focus on text mining application to uncover qualitative concerns and responses from public and community to address on area under discussion prior to the inaugural launching.  https://www.youtube.com/watch?v=wnEHnmeIf1E  The student to use the IBM SPSS Modeler Text Analytics to categorize groups of qualitative response into insightful, actionable categories and conduct advance analyses with structured data to support the rationale of the responses.  Those interested in this project please contact Victor Yiew at victoryiew002@suss.edu.sg with your CV by 30 Nov 2020 (cc leeyh@suss.edu.sg). |
| **14** | Modelling, analysis and regression based on time-series data  (Supervisor: Dr Chris Ho) | This project focuses on the analysis of time-series data such as revenue, market and stock pricing using ARIMA models, and prediction of future trends using time-series regression.  Students who are strong/comfortable with Python/R programming, and interest in data science, analytics and machine learning are preferred. Please email Dr. Chris Ho (jhho003@suss.edu.sg) directly to express your interest in working on this project by 30 Nov 2020(cc leeyh@suss.edu.sg). |
| **15** | Customer insights analytics  (Supervisor: Zhang Shuai) | Customer behavior analysis is not conducted regularly nowadays. A huge amount of time is needed for manual data extraction & preparation to understand customer behaviors. The lack of information may cause the following issues such as 1. Lack of customer buying pattern visibility, 2. Lack of customer growth, churn & revenue impact trends/knowledge, 3. Difficulty in developing the right strategies to tackle business challenges.  This project aims to analyze customer data to identify customer behaviors to drive growth. With the proper study of customer behaviors, the company can prioritize their business strategy to facilitate business growth. The analytics result can be derived (no limit) from the following aspects, customer churn, credit analytics, customer segmentation, etc.  This project will evaluate students’ capability from different areas, including business case studies, exploratory data analysis, machine learning techniques (Random forest, decision tree, regression, classification, etc.) In the end, students are expected to provide suggestions to the management team on the business direction based on analytics results.  The student who are interested in this project and are conversant feel free with python programming please contact Zhang Shuai at sazhang001@suss.edu.sg with your CV by 30 Nov 2020(cc leeyh@suss.edu.sg). |

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