

# Continuous Assessment 2

Author: Ciara O'Hara

Programme: MSc in Data Analytics May 2023

Student ID: sbs23015

Email: sbs23015@student.cct.ie

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# Contents

0.1	brief . . . . .	2
<b>1</b>	<b>Abstract</b>	<b>3</b>
<b>2</b>	<b>Introduction</b>	<b>4</b>
<b>3</b>	<b>Materials and Methods</b>	<b>5</b>
3.1	Data sources . . . . .	7
3.2	Programming . . . . .	7
3.2.1	Python libraries used . . . . .	7
3.3	Data preparation . . . . .	7
3.3.1	Cleaning the data . . . . .	7
3.3.2	Data visualisation . . . . .	7
3.4	Statistics . . . . .	7
3.4.1	Python libraries . . . . .	7
3.4.2	Statistical analysis . . . . .	7
3.5	Machine learning . . . . .	8
3.5.1	Machine learning methods used . . . . .	8
<b>4</b>	<b>Results</b>	<b>9</b>
<b>5</b>	<b>Conclusion</b>	<b>10</b>

## **0.1 brief**

You have been tasked with analysing Ireland's Construction data and comparing the Irish Construction sector with other countries worldwide. This analysis should also include forecasting, sentiment analysis and evidence-based recommendations for the sector as well as a complete rationale of the entire process used to discover your findings. Your Research could include export, import, trade imbalance, house production, material stock, labour/skill pool, etc. (or any other relevant topic EXCEPT Climate change) with Ireland as your base line.

## **Abstract**

# Introduction

Info:

<https://oecd ecoscope.blog/2021/12/13/finlands-zero-homeless-strategy-lessons-from-a-success-story/comment-page-1/>

<https://www.oecd.org/housing/policy-toolkit/data-dashboard/boosting-efficiency/>

<https://www.linesight.com/insights/regional-report/europe-2021/>

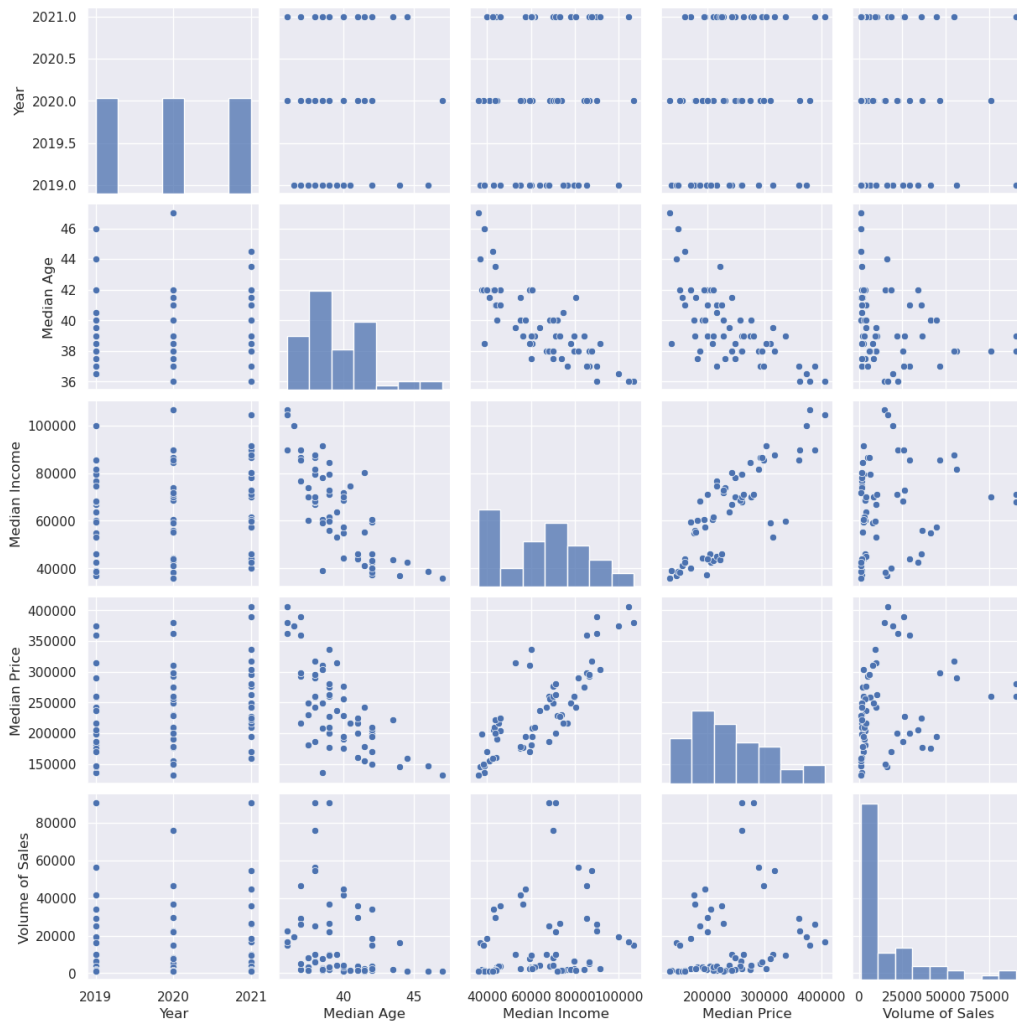
<https://www.geeksforgeeks.org/newspaper-scraping-using-python-and-news-api/>

<https://towardsdatascience.com/web-scraping-news-articles-in-python-9dd605799558>

<https://www.geeksforgeeks.org/newspaper-article-scraping-curation-python/>

## **Materials and Methods**

First steps were to determine and identify an appropriate Irish dataset under the theme of Constrction. There were two datasets found: A House Construction Cost Index from 1975 - 2017, and a social housing construction status reports from 2017 - 2021. Homelessness in Ireland is an issue of major significance and public importance at the moment. In fact, this is an issue across Europe to varying degrees, with the excpetion of Finland. It was decided to try to determine - from publicly available data - what Finland has done differently, the factors that may have impacted that, and to attempt a sentiment analysis around the topic in both Ireland and Finland. As such, the next step was to gather appropriate and complementary Finnish data. Statistics Finland's free-of-charge statistical databases, Tilastokeskus was found, which included ... in JSON format, accessed via APIs.



**Figure 3.1:** *Sample figure.*

## **3.1 Data sources**

## **3.2 Programming**

### **3.2.1 Python libraries used**

## **3.3 Data preparation**

### **3.3.1 Cleaning the data**

### **3.3.2 Data visualisation**

## **3.4 Statistics**

### **3.4.1 Python libraries**

### **3.4.2 Statistical analysis**

ARIMA is an appropriate tool for modelling regular-interval, non-seasonal, time-series data, and may be used to predict data in the series into the future (*What Is ARIMA Modeling?* 2023). Univariate analysis was employed here, in that only previous values in the time series were used to predict future ones. First an augmented Dickey-Fuller test was carried out to determine whether the data was stationary. This test showed that it was not stationary ( $p = 0.6$ ,  $DF\tau = -1.33$ ), i.e. it had some time-dependent structure (*Augmented Dickey-Fuller Test in Python (With Example)* 2023). Autocorrelation and augmented Dickey-Fuller were used to determine the order of differencing (Raval, 2023), which was 1 (augmented Dickey-Fuller:  $p = 1.0 \times 10^{-5}$ ,  $DF\tau = -5.17$ ), and the most significant degree of lag was determined from the autocorrelation plot (taken to be 50) (Raval, 2023; Nadeem, 2021). Maximising the goodness-of-fit of the ARIMA model is done by determining the best values for  $p$ ,  $d$  and  $q$  and this was done by minimising the RMSE (Raval, 2023; *How to do cross validation for time series?* 2023) using cross-validation on a rolling basis, which ensures that no 'future' data is used in



the training of the model (Shrivastava, 2020; Hyndman and Athanasopoulos, 2018).

**Table 3.1:** *Table template.*

Variable	W Test statistic	p-value
Median Age	0.93	$3.18 \times 10^{-35}$
Median Income	0.94	$2.22 \times 10^{-33}$
Median Price	0.87	$4.34 \times 10^{-44}$
Volume of Sales	0.86	0

## 3.5 Machine learning

### 3.5.1 Machine learning methods used

**Results**

## **Conclusion**

## References

- What Is ARIMA Modeling?* (2023). Master's in Data Science. URL: <https://www.mastersindata-science.org/learning/statistics-data-science/what-is-arima-modeling/> (visited on 05/11/2023).
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- Raval, P. (2023). *How to Build ARIMA Model in Python for time series forecasting?* ProjectPro. URL: <https://www.projectpro.io/article/how-to-build-arima-model-in-python/544> (visited on 05/11/2023).
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- Hyndman, R. J. and G. Athanasopoulos (2018). *Forecasting: Principles and Practice*. Melbourne, Australia: OTexts.