Big Data Analytics of Socio-Economic Impact on UK University Graduates

Jack Morgan  
BSc Computer Science  
University of WolverhamptonWulfruna Street, Wolverhampton, WV1 1LY  
J.M.Morgan@wlv.ac.uk Kieron Ransley  
BSc Computing and Information Technology  
University of WolverhamptonWulfruna Steet, Wolverhampton, WV1 1LY  
K.D.Ransley@wlv.ac.uk

*Abstract*—The following report details how the socio-economic status of major UK towns and cities affects its universities and the students who are graduating from them. University is the biggest challenge that students will face in their academic careers, and for some, it is also a major financial decision. Students coming from more difficult backgrounds, or a lower financial standing may struggle with the challenges they face in this academic environment.

Utilizing datasets from various sources, which were subsequently read, explored, and visualized using a machine learning model, and then further cleaned and analyzed using a predictive model, demonstrates that students who study in an area with lower socio-economic standing tend to perform at a lower level. This argues that not enough support is given to students or the University institutions themselves by local councils due to insufficient funding requirements or substandard facilities surrounding campuses. Further concerns need to be raised with local councils or the wider government to ensure more awareness and support is raised.

Keywords— socio-economic status, graduating, financial standing, academic environment, machine learning model, predictive model, awareness and support.

# Introduction

## Opening

A big step in any academic career is attending a university. As of 2023, there are currently 166 registered Universities in the United Kingdom, with eleven of which occupying a space on the Times Higher Education[1] top one hundred University rankings. University is frequently a significant personal and financial decision for many students. Given that only a select few institutions exist across the country, students often find themselves having to relocate to attend. This relocation, coupled with course fees, can result in a substantial cost. Some students can often find this a struggle and end up with concerns about finances throughout their degree. While there are options such as the Student Loans Company and other government assistance, concerns can still arise due to the substantial costs associated not only with attending university but also with living and thriving in the nearby campus area. While these costs are increased for the nearly 700,000 international students[2] (data accurate as of 2022), It continues to pose challenges for domestic students, which will be the focus of this report.

## Problem Statement

Approximately one million students in the UK earn some form of an undergraduate degree annually. With a further 400,000 more obtaining a postgraduate degree. However, almost 1 in 10 students who attend University drop out, with one-third of those being first-generation students leaving in the very first year[3]. One might attribute a significant contribution to these statistics to the financial struggles faced by university students. In January 2023, a report stated that 41% of students were considering dropping out of university due to surmounting financial worries[4]. University life is stressful as is, with assignments, deadlines, and working towards a career. Adding financial stress on top of that can set students on the edge and prove to be disruptive to their academia. However, how much do these financial issues disrupt students, and are they self-inflicted, or is it a product of the environment and institution?

## Aims and Objectives

This report aims to research, investigate, and comprehend data and statistics related to UK university graduates, as well as the socio-economic status of each university institution’s geographical location. One will attempt to understand if these standings indeed influence graduation rates and the performance of student’s post-graduation.

The report will assess this hypothesis by acquiring appropriate datasets from various sources and importing said data into a deep learning model. The model will then be manipulated to clean the data, and potentially predict any missing data from the datasets. Conclusions will be provided by visualizing the cleaned data in a suitable format.

## Contribution Statement

### Jack Morgan

### Kieron Ransley

## Report Outline

# Background Study

## Literature Review

After reviewing various sources of literature, the consensus amongst all writers is that students that come from a lower socio-economic background and standing tend to perform much worse at University than those who come from a higher socio-economic background, and post-education life is of a much lower value as well. An article from Claire Crawford[5] gives one some statistics to backup this information, stating that those from lower socio-economic backgrounds are 3.4% more likely to drop out, 5.3% less likely to graduate, and 3.7% less likely to graduate with a Second Class Degree or better. The literature also states that more students from lower-economic backgrounds are attending Universities, having an increased percentage of members of the public coming from an area of a lower socio-economic standing. In an article by Hazel McCafferty[6], the author explains that even within similar institutions, those from disadvantaged backgrounds fall shorter than their colleagues from better advantaged backgrounds, suggesting that those from higher socio-economic backgrounds find it better and quicker to establish themselves within University, possibly due to better financial funds which can contribute to travel (and thus attendance), living situations and life costs, as well as equipment.

Some sources of literature do not just look at the socio-economic status of University students, but some literature also looks at the performance rankings of University institutions and the socio-economic status of the location of each University campus. In an article by Jack Britton[7] *et al,* it was found that students who attended higher class University would perform better. By looking at average wages and wage premiums of University graduates, those who attended private schools and higher-class Universities earn on average a 10% higher salary. From a previously referenced article by Claire Crawford[8], she finds that students from lower ranking and worse performing Universities are less likely to drop out regardless of socio-economic status. Suggesting that those University institutions offer much easier to pass courses, or understanding their poor performances tend to receive and accept applications from students that come from a disadvantaged background. One would suggest that these University institutions are based in areas with a worse socio-economic standing, but the current articles do nothing to suggest that.

Other articles continue to explore potential other factors and data points to determine what affects student performance. While most authors look at other social factors like sex, ethnicity, or academic factors like course and institution attended, others take a less data driven approach. Jones[9] *et al* find links between non-academic profiles and academic performance, as well as looking at other sources that may display poor socio-economic standing such as if the student qualifies for free school meals. Another article by Claire Crawford and Laura van der Erve[10] look at family background, understanding that if a student is a first generation does that affect University performance and graduation opportunities. This is another factor that could potentially show socio-economic standing, as those from a lower standing produce the least number of University students and thus graduation, being a first-generation student may be an indicator of this. One especially important article that must be considering as well is understanding why students look to University, and how socio-economic standing can affect outlooks and attitudes towards obtaining degrees. Steve Cook[11] *et al* explore the value of attending University, and often find dissatisfaction in potential jobs post education, rising costs in attending and then lack of financial support both during and post gradation. The article concludes that these factors are most prevalent in lower socio-economic groups and add to division in performance and acceptance in University students across different socio-economic groups. The article once again proves that those from lower socio-economic backgrounds prove harder to succeed at Universities due to factors that typically stack the odds against them.

## Summary

The literature that has been reviewed all tend to acquire their data and draw their conclusions via the same methods. All articles use a mixture of developing graphs for their data inferencing other data from various tables and other figures that have been found via online sources. For example, in Crawford’s *Socio-Economic Differences In University Outcomes in the UK,* the authors uses the HESA database to plot a dataset into a line graph that depicts the drop-out, completion, and graduation rates of higher education students, but in the next chapter plots data of education systems and the time frame of students attended in a table format for better readability.

The authors also do their own share of cleaning the data, removing groups that they find necessary. A lot of the data found seems to include students from courses that have no relevance to the studies, vocational students, or non-domiciled students. A similar process will be taken in our own methodology, cleaning the data to ensure that only UK home students are included in the data as we will be focused on the socio-economic standing of UK towns and cities only. Most articles as well only focus on full-time students and courses, one way in which our report will differ is that one wants to include those that are part-time, as we have the hypothesis that students from a lower socio-economic background would prefer part-time courses due to better financial stability in securing additional funds through part-time work.

Another way one’s studies will differ from those previously completed is by using data surrounding the socio-economic standings of UK towns and cities using local council data or nation-wide government data. One of the original hypotheses for the report was suggesting that socio-economic standing of the area that a University institution resides in could impact student performance. One believes that lack of funding, lack of acceptable facilities, and overall perceptions and environmental influence of the surrounding area could be one of many reasons for poor performance amongst students. While similar ideas are touched on in some articles, there is no data presented to support this.

None of the articles reference any predictive learning algorithms deployed either. Most articles are able to strictly employ machine learning models to clean and visualize the data at hand. One believes this because that all datasets found for the subject area contain completed and efficient data, so no additional data is needed to be predicted to complete the report. One could additionally employ predictive algorithms to predict trends in later years based on current data supplied, this way the current report will differentiate from others by seeing if current trends carry on, attempting to preemptively conclude how socio-economic standings affect future student performance.

# Methodology

# Results

# Further Discussion

# Conclusions

# References

1. World University Rankings (2023) Times Higher Education (THE). Available at: https://www.timeshighereducation.com/world-university-rankings/2024/world-ranking (Accessed: 26th February 2024).
2. Gent (2023) International Student Statistics in UK 2023, Study in UK. Available at: https://www.studying-in-uk.org/international-student-statistics-in-uk/#:~:text=Statistics%20show%20that%20the%20total,outside%20of%20the%20European%20Union. (Accessed: 26th February 2024).
3. Tagliaferro, L. (2023) *Graduation statistics and Fun Facts in 2024*, *Future Fit*. Available at: https://www.futurefit.co.uk/blog/graduation-statistics-and-facts/#:~:text=Key%20Uni%20graduation%20statistics%20in%20the%20UK&text=22.6%25%20of%20British%20adults%20attained,University%20within%20the%20first%20year. (Accessed: 04 March 2024).
4. *41% of students consider dropping out due to money worries as new term starts* (2023) *FE News*. Available at: https://www.fenews.co.uk/education/students-consider-dropping-out-due-to-money-worries-as-new-term-starts/ (Accessed: 04 March 2024).
5. Crawford, C. (2014). *Socio-Economic Differences in University Outcomes in the UK*. Institure for Fiscal Studies. DOI: 10.1920/wp.ifs.2014.1431.
6. McCafferty, H. (2022). *A Systematic Review of the Employability Perceptions of UK Undergraduates from Disadvantaged Socio-Economic Backgrounds*. Research in Post-Compulsary Education. Volume 27. Pages 570-593. DOI: 10.1080/13596748.2022.2110774.
7. Britton, J., et al. (2016). *How English Domiciled Graduate Earnings Vary With Gender, Institution Attended, Subject, and Socio-Economic Background.* Institute for Fiscal Studies. DOI: 10.1920/wp.ifs.2016.1606.
8. Crawford, C. (2014). *Socio-Economic Differences in University Outcomes in the UK*. Institure for Fiscal Studies. DOI: 10.1920/wp.ifs.2014.1431.
9. Jones, S., et al. (2017). *Contextualising Degree-Level Achievement.* Research in Post-Compulsary Education. Volume 22, Issue 4. Pages 455-476. DOI: 10.1080/13596748.2017.1381287.
10. Crawford, C., Van der Erve, L. (2015). *Does Higher Education Level the Playing Field?* Education Sciences. Volume 5, Issue 4. Pages 380-412. DOI: 10.3390/educsci5040380.
11. Cook, S., Watson, D., Webb, R. (2018). *Investigating Perceptions of the Value in Attending University.* Studies in Higher Education. Volume 44, Issue 7. Pages 1256-1267. DOI: 10.1080/03075079.2018.1434616.