Predicting Outcomes of Apprenticeships Delivered within Sheffield City Region using Machine Learning

Shivani Sickotra
Sheffield Methods Institute
ssickotra1@sheffield.ac.uk

Introduction

Sheffield City Region, currently face many economic challenges within the skills sector, particularly within education, youth unemployment and training. As a result, there is an initiative to increase investment into the regions vocational educational structure (SCR, 2020).

Aims and Objectives

This poster aims to understand outcomes of apprenticeship programmes delivered in South Yorkshire, through exploratory data analysis, and proposes an ordinal logistic supervised machine learning model to predict these outcomes.

This modelling can be used to reveal areas in apprenticeship programmes where individuals are failing to achieve a qualification, aiding in informing skills funding and policy decisions to maximise completions.

Data

Department for Education

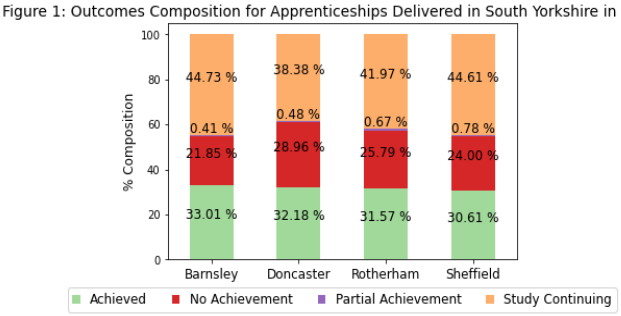
Individualised Learner Records collected in the 2017/18 academic year (ESFA, 2017).

Methodology

1. Extract learners enrolled and completed apprenticeship programmes delivered within Sheffield City Region
2. Perform exploratory data analysis
3. Select model predictor variables and pre-process categorical data
   Program specific: *Apprenticeship Type, Tier 1 Sector Subject Area, Programme Level, Provider Type, Funding*
   Socioeconomic: *Gender, Age, Prior Attainment Level, Ethnicity, Learner Disability*
4. Build an Ordinal Logistic Regression model with completed apprenticeships, perform cross validation and evaluate using model accuracy
   Model accuracy: 70.4%
5. Deploy model to predict the final outcomes of learners recorded as continuing study

Exploratory Data Analysis

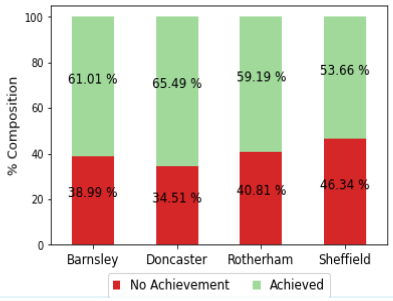
Figure 1: Outcomes Composition for Apprenticeships Delivered in South Yorkshire in 2017/18



From the learners who completed their programme at the end of the 2017/18 academic year, 54.9% of individuals successfully achieved their apprenticeship qualification, 1.1% had a partial achievement and 44.0% received no achievement

Results

Figure 2: Model Predicted Outcomes for Individuals Marked as Continuing Study or Unknown



Across South Yorkshire, on average 59.8% of individuals who were still continuing their study were expected to complete their apprenticeship successfully and 40.2% were expected to fail. It was also forecasted that 64.2% of individuals undertaking an apprenticeship at **Level 4 and above**, as well as 93.4% with **prior attainment Level 4** and above would **not** gain a qualification.

Conclusions and Recommendations

From the predictions generated, investment into Level 4 and above apprenticeships should be prioritised as most individuals within this group were expected to receive no qualification at the end of their programme.

It is recommended that a more robust supervised machine learning model be built by conducting comparative model analysis, feature selection and hyperparameter tuning. Recent data should be used for this, to account for apprenticeship programme restructuring following the 2017/18 academic year (Powell, 2020) and to account for the COVID-19 pandemic.

Further investigation into solely Higher Level and Degree apprenticeships delivered in South Yorkshire could be pursued to extend and validate the findings of this report.

Previous analysis of UK apprenticeship completions of disadvantaged learners, through linking of several Individualised Learner Records, business and longitudinal education data (Battiston et al., 2020) could be recreated for the South Yorkshire region to identify further areas prohibiting successful completions and improve social mobility.

References

Battiston, A., Williams, R., Patrignani, P. & Conlon, G., 2020. *Apprenticeships and Social Mobility: Fulfilling Potential*, London: Social Mobility Commission.

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Powell, A., 2020. *Apprenticeships and skills policy in England.* [Online]. Available at: https://dera.ioe.ac.uk/37402/2/SN03052.pdf. [Accessed 14 May 2021].

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