# Geekland: STEM knowledge is needed to apply for 1 in 6 non-tech UK jobs

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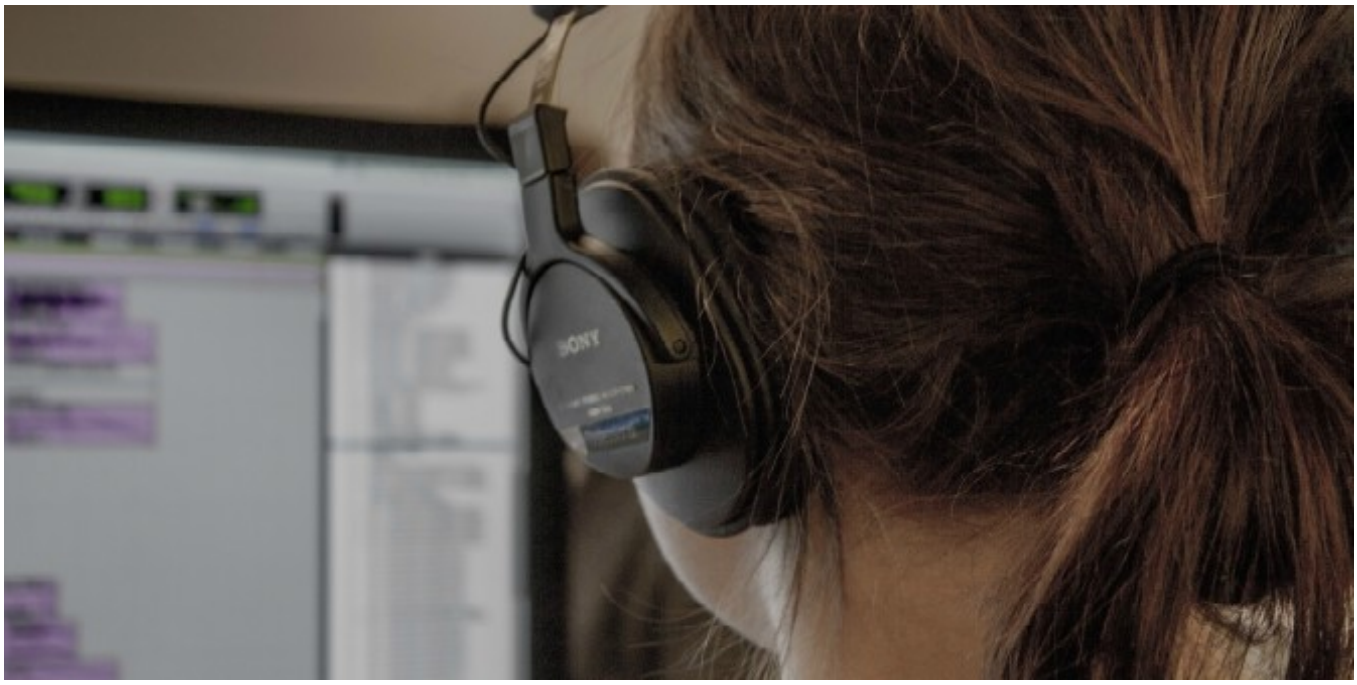


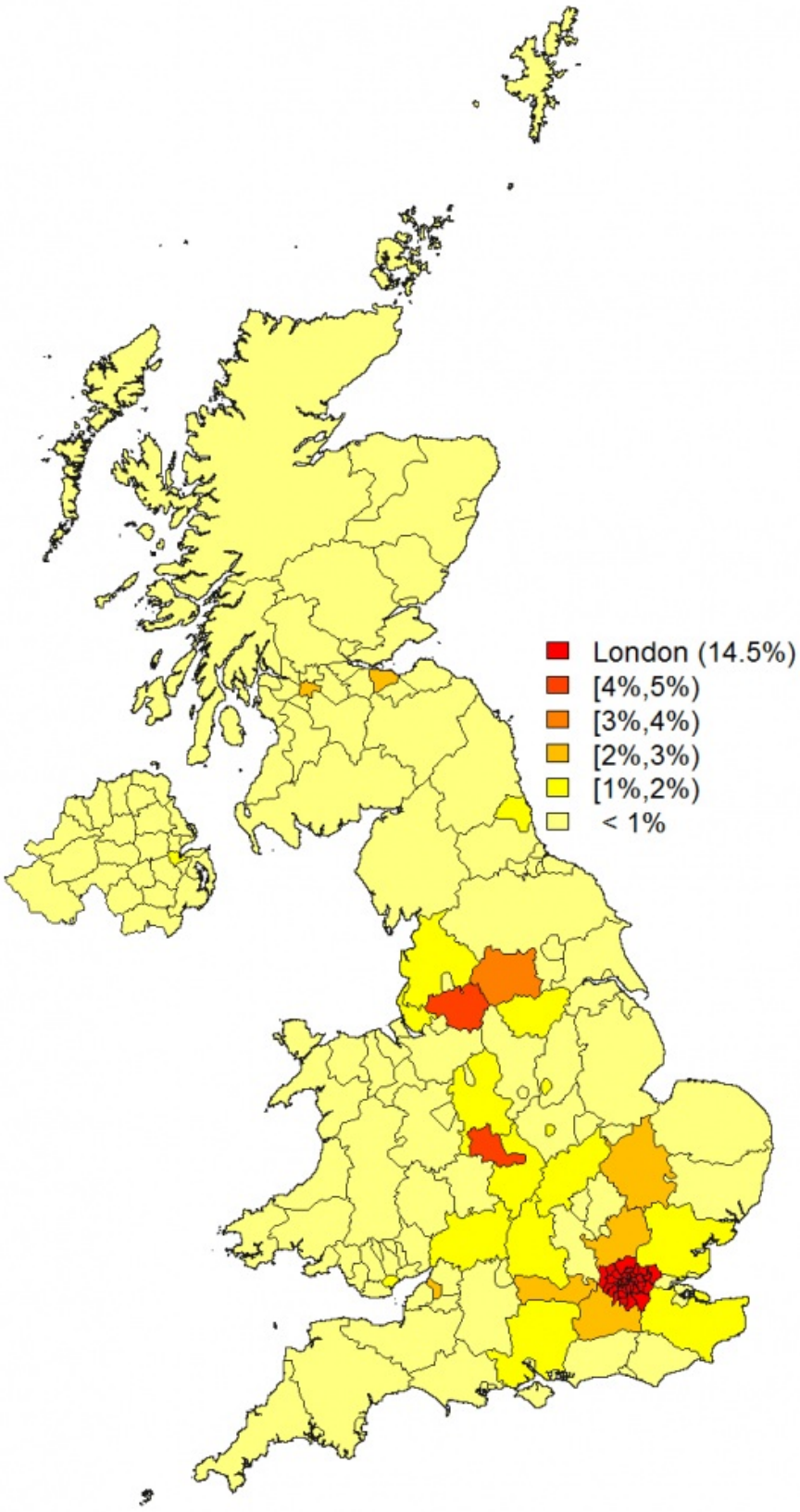

In the UK, less than half of science, technology, engineering, and mathematics (STEM) graduates work in so-called 'STEM occupations' (such as scientists or engineers). If, as is often thought, all recruiters in 'non-STEM' occupations (for example, graphic designers or economists) neither require nor value science and technology skills, and simply like hiring science graduates for their problem solving and analytical abilities, this apparent leakage from the 'STEM pipeline' should be considered as problematic because a STEM education is more expensive and difficult to acquire than a non-STEM one.

My paper sheds new light on the issue by developing a novel approach to identifying science and tech jobs through the keywords collected from online vacancy descriptions, and not, as is typically done, by classifying occupations discretely into STEM versus non-STEM, then considering all the jobs belonging to the first group as 'STEM' and the rest as 'non-STEM'.

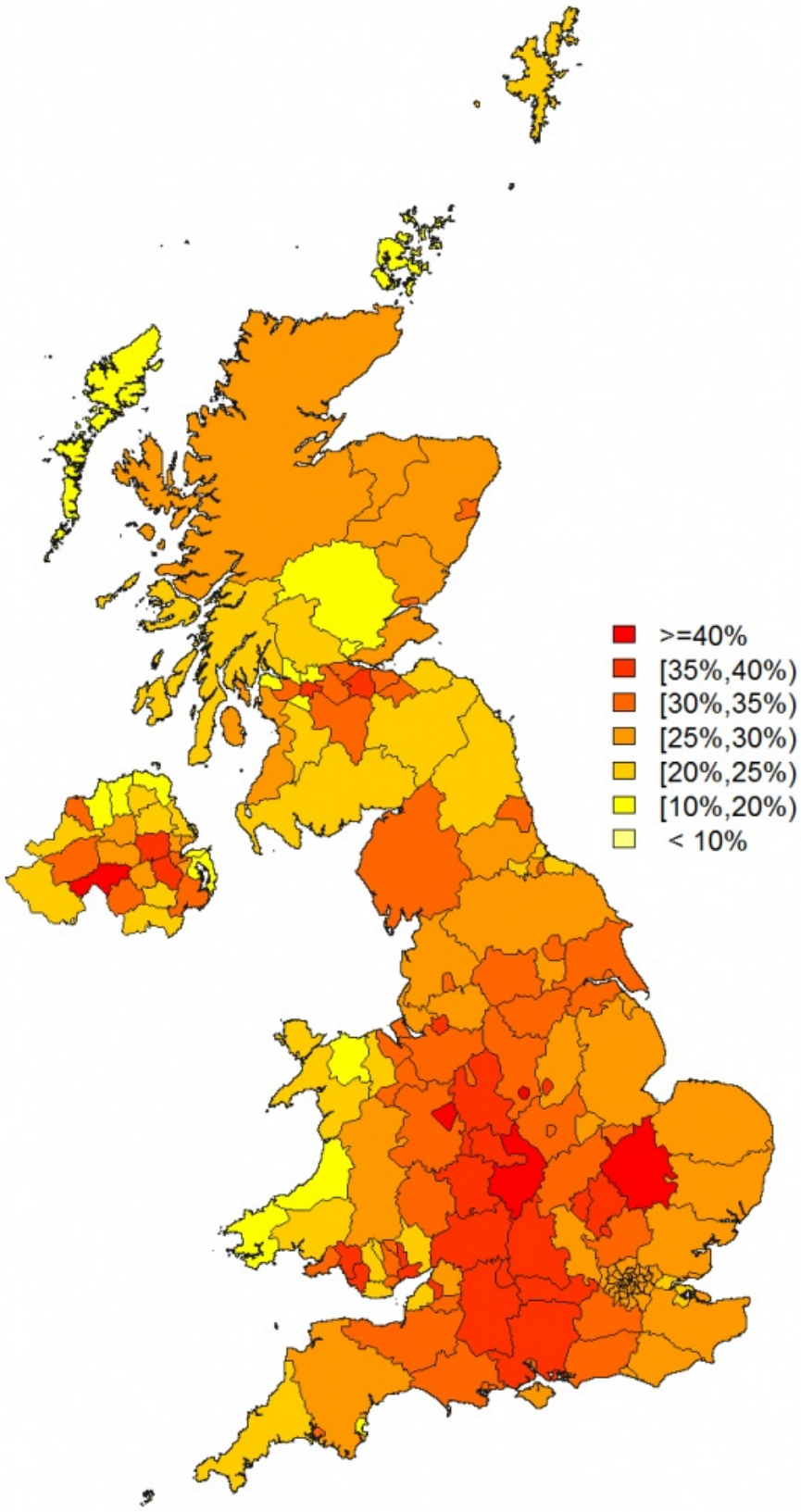
This approach is made possible by having access to a large dataset collected by the firm Burning Glass Technologies, which contains information on all vacancies posted online in the UK between 2012 and 2016.

I design and evaluate machine learning algorithms to identify STEM jobs as those whose recruiters are more likely to look for STEM rather than non-STEM graduates because the advertised position requires certain skills and knowledge that are exclusively or much more likely to be taught in scientific disciplines (for example, 'systems engineering'), and/or involves job tasks, tools and technologies for which a STEM education is typically required (e.g. 'C++', 'design software').

### Figure 1. The geographical locations of STEM vacancies in 2015. 1a) % of STEM jobs in each county




**1b) STEM density of each county**




***Notes: Based on the sample of 77.8% of all vacancies with County identifiers in 2015. London includes the 32 London boroughs and the City of London. STEM density is the % of jobs within a county that are classified as STEM. The left map is re-weighted using the 2015 Annual Survey of Hours and Earnings produced by the Office of National Statistics.***

This job-level analysis reveals that STEM jobs should not be equated with STEM occupations. In fact, 35 per cent of all science and tech jobs belong to non-STEM occupations and 15 per cent of all postings in non-STEM occupations are tech.

Moreover, equating jobs with occupations leads to underestimating the overall demand for science and tech skills since STEM jobs outnumber jobs in STEM occupations, for example, by half a million employment opportunities in 2015.

I also find that tech jobs are associated with higher wages within both STEM and non-STEM occupations, even after controlling for detailed occupations, education, experience requirements, etc.

Although, overall, my findings suggest that the leakage from the 'STEM pipeline' may be less wasteful than typically thought because a significant number of recruiters in non-tech occupations do require and value science and tech skills, the issue remains problematic for two main reasons.

First, nothing prevents STEM-educated job seekers from taking up non-tech jobs within non-STEM occupations, for which non-STEM graduates are also qualified and no wage premium is offered.

Second, by exploring the keywords from the job postings, I find that the technical skills and knowledge posted in STEM vacancies within non-STEM occupations could, in many cases, be acquired with less training than a full-time science degree – for example, learning how to code in 'C++' does not necessitate a Bachelor in Computer Sciences.

Hence, a more efficient way of satisfying STEM demand within non-STEM occupations could be to teach more science and tech skills in non-STEM disciplines. As I show abstractly, this education policy could reduce skills shortages in both STEM and non-STEM occupations.

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*Notes:*

- *This blog post is based on the author's paper The STEM Requirements of `Non-STEM' Jobs: Evidence from UK Online Vacancy Postings and Implications for Skills & Knowledge Shortages, presented at the Royal Economic Society's annual conference at the University of Bristol in April 2017*
- *The post gives the views of its author, not the position of LSE Business Review or the London School of Economics.*
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