Discuss the importance of a postgraduate degree in the Computer Science field

Introduction

This essay focuses on Artificial Intelligence (AI) within the field of computer science and the importance of an MSc.

In order to discuss the importance of an MSc in AI, we should first understand what AI is. Second we should understand the importance of AI to society. Then finally we can judge the relevance of an MSc.

What is AI?

A simple definition of AI from Haenlein & Kaplan (2019: 5) is

> "a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation".

That definition masks many complexities. The European Commission operationally defined AI in Samoili et al (2021) with the input of 65 documents to create a detailed taxonomy of AI, only to caveat "as AI is a dynamic field, we propose an iterative method that can be updated over time to capture the rapid AI evolution".

The taxonomy, summarised in figure 1, shows domains and sub-domains necessary to bring to life Haenlein & Kaplan (2019)'s 'simple' definition. To interpret external data it must first be ingested through communication or perception. To learn from data requires learning and reasoning. To achieve specific goals might require integration and interaction. The taxonomy also highlights that AI solutions must be ethical; another layer of complexity.

	AI taxonomy	
	AI domain	**AI subdomain**
Core	**Reasoning**	Knowledge representation
		Automated reasoning
		Common sense reasoning
	Planning	Planning and Scheduling
		Searching
		Optimisation
	Learning	Machine learning
	Communication	Natural language processing
	Perception	Computer vision
		Audio processing
Transversal	**Integration and Interaction**	Multi-agent systems
		Robotics and Automation
		Connected and Automated vehicles
	Services	AI Services
	Ethics and Philosophy	AI Ethics
		Philosophy of AI

Figure 1. AI taxonomy (Samoili et al, 2021: 5)

AI in society

AI is increasingly prevalent in society. Easton (2021) estimated that more than half of UK homes had voice assistants in 2019 which use conversational AI (Ponnusamy et al 2020). Netflix uses AI to recommend what to watch next (Steck et al, 2021). Websites use AI to personalise advertising (Mogaji et al, 2020). The list goes on.

Ethics plays an important role too though, and AI can have undesired consequences. Amazon was forced to scrap a recruiting tool that used AI because it became unintentionally biased against women (Dastin 2022).

Importance of postgraduate study in AI

An increasing number of people are graduating each year in the UK. Figure 2 shows a 7% increase from 2015/16 to 2020/21 growing every year apart from a small drop in 2019/20 due to the pandemic (Fennell, 2022). The percentage of people obtaining a first class or upper second class degree has also been rising, from 66% in 2011/12 to 82% in 2020/21 as shown in figure 3 (Clark, 2022). With more people obtaining degrees each year, and proportionally more obtaining higher classes, it is natural that postgraduate qualifications are becoming increasingly important to differentiate.

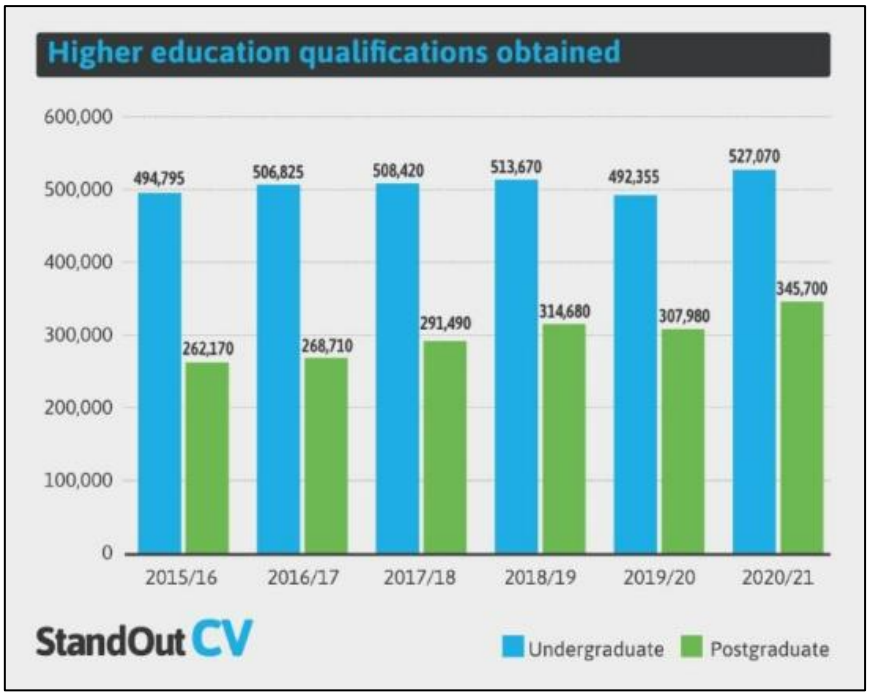

Figure 2. UK higher education qualifications obtained (Fennell, 2022)

The Department of Education (2022) concurs with an analysis of labour force and salary data from 2021 showing 77.4% of postgraduates of working age were in high-skilled employment compared to 65.2% of graduates (figure 4) leading to a median salary of £42,000 for postgraduates and £36,000 for graduates (figure 5). Postgraduate qualifications evidentially provide a higher earning potential.

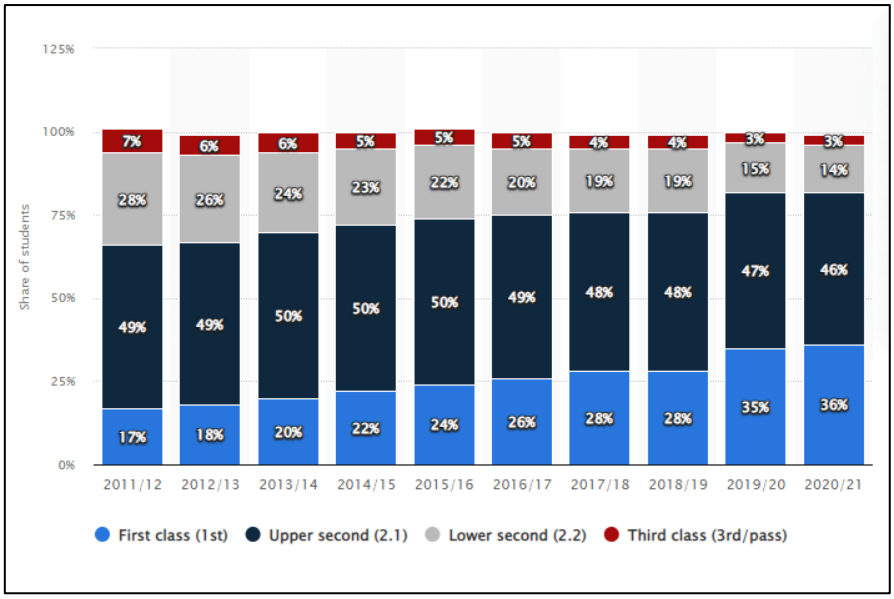

Figure 3. Percentage of UK graduates by class (Clark, 2022)

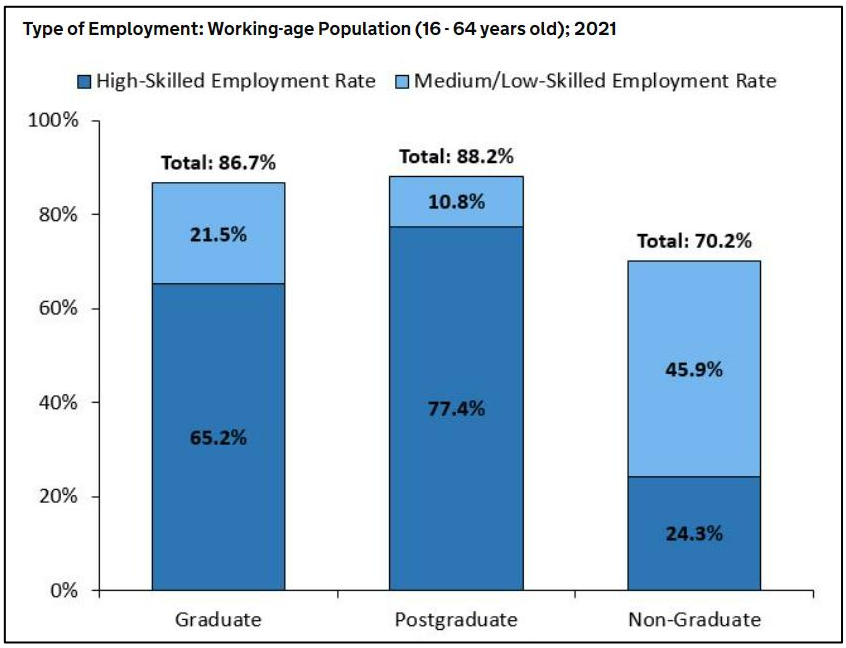

Figure 4. Labour Force Survey (Department of Education, 2022)

The degree subject should also be considered. Rasheed (2021) states that computer science is the seventh best postgraduate subject to increase employability citing "Those with expertise in this field can find postgraduate jobs in practically any industry."

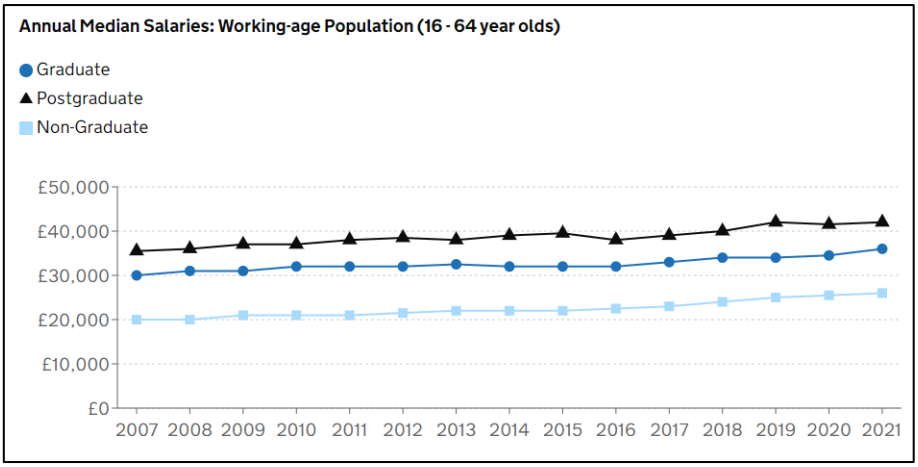

Figure 5. Salary Survey (Department of Education, 2022)

Another factor is the importance of postgraduate study to the field itself. AI is rapidly evolving with much still to discover. Industry is leading on how to monetise AI solutions but independent research is also needed to explore opportunities that may not have an obvious financial benefit. PhD research is critical to keep testing the boundaries, and the MSc in AI provides a useful pipeline of potential PhD students.

Finally, Hall & Pesenti (2017) recognise the social and economic value that AI can bring to the UK and suggest that targeted interventions are needed ensure that the UK continues to be a pioneer in AI, including “an industry-funded Masters programme in AI” and “200 more PhD places in AI at leading UK universities”.

Conclusions

AI is complex both because it covers many different but interdependent sub-domains and because the implications of its outputs means that ethics also need to be carefully considered. The more that AI grows in breadth and depth the more impactful these ethical considerations become.

An MSc in AI helps to address some of the challenges by providing people with the skills to further the field, helping both the industry to accelerate and the individual to earn more money. It also helps by being the step before a PhD, where PhD research is also pushing the boundaries of AI, which in turn could become the next big idea to be monetised and need skilled people to deliver.

So postgraduate study in AI is both beneficial to the individuals studying and to the domain as a whole.

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