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Review Article

Is AI Going to Destroy Jobs in Architecture?

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ABSTRACT

Whenever we enquire about the weather forecast, we are already witnessing the effects of AI technology at work. Other professions are also seeing job losses, and research shows that AI's major effects will become evident soon. The current study examines one of the most recent developments in the automating of design and architecture before analysing the usage of artificial intelligence. The research then modifies already used approaches to forecast how AI would affect the employment tasks performed by architects. The findings demonstrate that certain fields will be significantly impacted by AI technology, necessitating changes to how architects are educated at colleges.

Keywords: Artificial intelligence; Architecture; Automated design; Work activities; Automation

INTRODUCTION

Job roles of humans in a future of AI

Numerous research aims to comprehend how AI could affect employment. You may think of a profession as a number of duties. The presumptions for comprehending the likelihood of AI replacing a human operator, and these are founded on two observations:

A technology processes the information by carrying out instructions, but all human professions include collecting and processing knowledge.

Because of this, the ability of computing to replace people must be measured in terms of their ability to carry out deduction directions (such as if then statements) or statistics instructions that are determined by statistical analysis of enormous amounts of raw data. When it is simple to break down a job into deliberate choices, a logical sequence of instructions may be produced.

However if computer software have been in existence for a while, they have not yet been capable of replacing a limited number of people's occupations. By deep learning, machine intelligence is able to automate processes when the natural mind's thoughtless or illogical processing of the essential knowledge is the cause. The potential applications of AI become more significant as a result of its ability to emulate the natural working processes of the neural network [1].

A holistic investigation was done at Oxford university in 2013. An astounding 47% of occupations are presently in danger of being replaced by AI in the near future, according to the study's analysis of the chance that they will be.

Three technology cycles (resulting from significant advancements in AI and technology) were identified in a WPC research that separated anticipated employment losses among industries, vocations, and nations. The percentage of jobs at risk of automation ranges from less over 10% in "teaching" (where interpersonal relationships and people interaction are of the extreme significance) to a rate of more than 50% in the sector of "storage and transport" (with autonomous disrupting a majority of jobs), with "specialists" at a peripheral 15% threat [2].

LITERATURE REVIEW

Architectural design through artificial intelligence

AI has long been used to improve architectural design. The late 1960's saw the first computer-based attempts to mimic an architect's design ability. But despite several periods of rapid deterioration, AI research is currently heading towards a profitable future.

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As a result, and because of the sophisticated capabilities of modern computers, research into the potential use of AI to automate design is succeeding at an extraordinary speed. Newton presents a thorough review of the available research on the technological prospects and various approaches provided by AI in the context of architecture [3].

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As a result, and because of the sophisticated capabilities of modern computers, study into the potential use of AI to automation design is succeeding at an extraordinary speed. Newton presents a thorough review of the available research on the technological prospects and various approaches provided by AI in the context of architecture. In a thesis presented at Harvard, GAN is used to process floor designs in accordance with a tower's size. Arranging furniture, adding windows, and dividing up rooms. In order to create their own ideas, architects are trained to hunt for design references and comprehend the design patterns used by those artists [4]. GAN imitates the way that people's brains learn by discovering statistically significant trends among the input data. A dining room has always been close towards the restaurant, a dining table always has an organic light source, a table has always been present inside the dining room, the table is occasionally close to the screen, etc. It can look across as many references as it is given, and it can decode meaningful patterns with the greatest tools [5].

The use of AI with simulators to generate the feedback loop outlined in a 2013 paper on optimal design is another area of application. This loop involves iterating over design possibilities to find the most advantageous one. AI may quickly pick up on how to modify the input for the following iteration by seeing the results of a specific adjustment. It can swiftly learn how to achieve the greatest results and amass a century's worth of knowledge by doing this [6].

What is missing is the connection between these visuals and the ultimate human inhabitants of the facilities (in the assessed use of artificial intelligence to create architectural drawings). AI can only employ statistically significant phenomena that were found in the inputs used to create the learning algorithm to learn new things [7]. An example of such inputs are building floor plans, which were created by individuals who had previously "digested" the aspects relating a design layout to the behaviour of the users of the system. Such a link has already been established due to two factors, including the architect's innate humanity (and as a result, implicit understanding of the normal aspirations that characterise his species) and the architect's capacity to learn new abilities from information supplied by others that serves as a counter.

Architects and the architecture

The people who practise the discipline of design are called architects. While being the primary emphasis of architects, designing buildings is simply one component of a career that also involves a wide range of extremely diverse responsibilities, from preliminary design through development and building supervision to testing the final structure. The fee structure for architects and engineers (Germany's fee structure for architects and engineers) is used in a recent research on AI's potential to replace humans in architecture to emphasise the four primary design stages that make up an architect or engineer's day to day work while examining the literature in each phase. But, the original study concentrates only on the design aspect of architecture, demonstrating how quick developments in AI design capabilities may someday allow for the replacement of human architects with algorithms, at particular for the most typical projects [8]. Yet, aspects irrelevant to layout are not given enough attention. Although the initial design of such a building is frequently seen as the top discipline, particularly in academia, it is important to consider all the tasks an architect must perform in order to achieve the construction process process if one is interested in comprehending the possibility that architects (as people practising structure) will be replaced by AI.

Based on Frey and Osborne, this article offers the following strategy for achieving the study's goals:

- The 71 tasks an architect does during the whole construction process (from planning to testing) of a public building are listed in the Italian ministerial directive 140/2012.
- The Onet database (O*net, 2020), an open directory that gathers job descriptions, skill qualifications, and duties for all positions open in the United States of America, specifies each of these tasks using one of the three "Swork activities"; in the current study, a panel of practising architects was utilised to select the top three activities employed to carry out the tasks listed in 1), resulting in a range of 213 potential work activities from the database's 41 work activities for architects.
- The same group of architects selected the "intelligence features" of a human mind used in each job activity.
- A research comparing AI and intelligence provides scores based on 19 areas; the report contains a table identifying the form the interpersonal and artificial human brain, pointing out and commenting on the advantages or disadvantages of each; AI and human intelligence must be compared in the study; the study's ratings are used.
- When the AI is obviously better (*i.e.*, in terms of numerical computing capability and response time/speed), a score of -2 is provided; when the human brain performs best (*i.e.*, in regard to innovation and emotional management), a score of +2 is given; and so on.
- Average results are calculated to determine the likelihood of each of the 71 work activities from 1) to be automated.
- Work activities are divided into the different disciplines able to teach in Italian universities for the "L-17 Science of architecture " and the "LM-4 Architecture and building engineering-architecture " courses held in an Italian university.

Limitation of such method to be followed

The proposed study set the ideal to quantify the impact of AI on the future of engineers as rehearsing professionals by modifying the methodology used by Frey and Osborne. Frey and Osborne worked on the possibility of AI displacing all feathers of jobs,

while the present study focuses on the colourful tasks one single job (mastermind) is divided into. The reference methodology starts from homemade labelling of 70 different US jobs, dividing them into those which are automatable and those which are not, and also using the O*net database and a scoring system to correct the preliminarily made private hypotheticals. This study's methodology uses ministerial decree 140/2012 to objectively divide the mastermind's job into colourful tasks, and also to use a panel of levies to subjectively attribute the possibility for each task being done by AI [9].

The main limitations of the proposed methodology are: The comparison of AI and humans is pertained to a 2014 study Komal; considering that calculating speed is adding two fold every two times according to Moore's law, the current comparison may be much further favourable for computers; the work conditioning that describe an mastermind's job in the US job request may differ from those of an mastermind operating in Europe and, specifically, in Italy.

Also, the questionnaire took a normal of 4 hours to complete(it consists in assigning the top 3 situations of intelligence demanded by each of the 3 main chops of the 71 tasks the mastermind's job entails); it was, thus, possible to involve only 10 levies. The involvement of a larger panel of engineers in the description of their job in way of the proposed methodology may lead to different results.

RESULTS AND DISCUSSION

The attached graph summarises the research's conclusions.

Compared to activities with favourable ratings, which are more difficult to automate, work tasks with scores in the graph's lower left corner are more likely to be done so. The results confirm this, despite the volunteers' use of a subjective scoring method.

Using real data from Woods Bagot timesheets over the period of one year, this diagram postulates the gains in productivity that AI could provide by automating repetitive tasks across different project phases. The time freed up could be funnelled back into meaningful design tasks resulting in better use of resources and better outcomes for clients and end users (Figure 1).

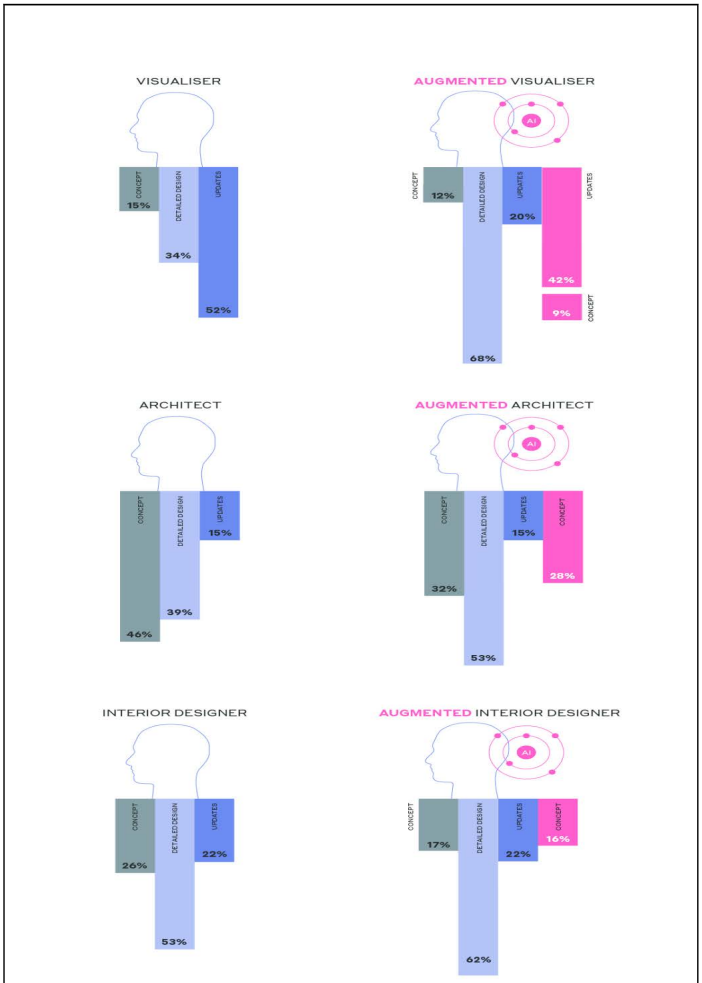

Figure 1: Using real data from Woods Bagot timesheets over the period of one year, this diagram postulates the gains in productivity that AI could provide by automating repetitive tasks across different project phases. The time freed up could be funneled back into meaningful design tasks-resulting in better use of resources and better outcomes for clients and end users.

Yet neither the study's participants nor their knowledge of the different duties involved in becoming an architect was very extensive, nor were they specialists in AI. It would be interesting to watch how the architects of the future, if any, are selected. From a general perspective, engineers are in a fairly calm area, with AI anticipated to have a borderline impact on the profession. This is likely caused by the fact that engineers have veritably diversified tasks, involving a broad diapason of intelligences. It is, thus, delicate to automate the profession as a whole. On the other hand, some tasks are more likely to be converted by AI, and the branch of the work conditioning into disciplines points out some intriguing findings. First, the disciplines related with the profitable aspects of the profession are more likely to be affected by AI. Cost estimation is a practice where general trends, average costs and design specific circumstances are mixed together. All the information pertaining to these three aspects is figures and trends, which make the passage to a computer controlled field of the discipline veritably easy. This aspect seems to be verified by the wide operation of AI in jobs that use the same "tools", similar to banking and insurance [10]. Also erecting drugs and the sector

of law, despite being in the positive area, substantiated a certain degree of query due to the good performance of algorithms in these fields. Suddenly, the conditioning pertaining to the core of the architectural practice (*i.e.* design), shows some concerning results. This is in line with the successful exemplifications of AI-generated armature presented in the literature review.

CONCLUSION

AI will probably have a strong impact on all jobs. Engineers and other professional numbers may witness a weaker impact, if compared with further routine grounded jobs. Still, it's important to start a debate within the profession and university professors on how AI will shape the future of exercising engineers. Of course, the high variability and the cultural content of armature defends the profession from unforeseen changes, but another reason for underestimation of its significance (AI) is the interest (of the engineers) in their tone preservation, which is essential to all professions, thus also engineers. This bus centric interest can beget general ignorance of one's own subject. Architecture universities can start looking into this future, modifying classes and the "spirit" of the profession to incorporate AI to achieve other results than the bare negotiation of mortal intelligence with computer work. Numerous computer backed design studies are applicable only insofar as they present more fashionable and briskly ways to do what contrivers formerly do. And since what contrivers formerly do doesn't feel to work, we will get ingrained bad armature, unresponsive armature, and indeed more fat. This judgement, which dates back to 1970, is intriguing to understand how AI and humans can work together in the future, rather than as indispensable, contending rudiments. Computers have the capacity to assay data in a more effective, unprejudiced and important briskly fashion than humans. This information can also be used to ameliorate the mastermind's human capacities to interpret data to either prognosticate trends or to pierce a variety of information that isn't manageable by a mortal brain. Still, it's the author's strong belief that unborn engineers (and therefore current programmes in armature universities) should retain, and indeed ameliorate, the choice of disciplines that form the current programmes of armature as a specialised humanistic discipline. At the same time, the understating of the AI revolution, data analysis, ICT etc. has to be significantly enhanced.

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