

Abstract (Format 1)

Application of Artificial Intelligence in Persian Carpet Design and Production

Essad Carter^{1*}, Fred Thompson², Sara Patel³

¹Department of Computer Science, University of Edinburgh, Edinburgh, UK

²Faculty of Art and Design, Royal College of Art, London, UK

³Department of Textile and Material Engineering, University of Manchester, Manchester, UK

Background and Aim

Persian carpets are renowned worldwide for their intricate designs, historical significance, and cultural value. Traditional carpet production relies heavily on skilled artisans and time-intensive processes, which pose challenges for mass production and customization. This study aims to explore the role of artificial intelligence (AI) in enhancing design efficiency, pattern generation, and quality control within the Persian carpet industry, bridging the gap between heritage craftsmanship and modern technological advancements.

Methods

A deep learning model was developed and trained using a dataset of traditional Persian carpet patterns. Various AI techniques, including generative adversarial networks (GANs) and machine learning algorithms, were utilized to analyze design features, suggest color palettes, and generate new patterns inspired by Persian motifs. Additionally, computer vision algorithms were applied to detect defects and ensure quality consistency in the manufacturing process.

Results

The AI model successfully generated high-quality Persian-inspired designs that adhered to cultural motifs while introducing innovative patterns. Pattern diversity and color suggestions exceeded expectations, offering artisans creative options without compromising traditional aesthetics. Furthermore, the AI-assisted quality control system identified irregularities with high accuracy, reducing manual inspection time and enhancing overall production efficiency.

Conclusion

AI applications have significant potential to revolutionize the Persian carpet industry, balancing tradition with technology. By aiding in design innovation and improving quality assurance, AI can empower artisans and manufacturers to meet modern demands while preserving cultural authenticity.

Keywords: *Artificial Intelligence, Persian Carpet, Pattern Generation, Quality Control, Cultural Heritage*

***Corresponding author:** Essad Carter, Department of Computer Science, University of Edinburgh, Edinburgh, UK.

E-mail address: ecarter@gmail.com

Abstract (Format 2)

The History and Evolution of Persian Carpets

Essad Carter^{1*}, Fred Thompson², Sara Patel³

¹Department of Computer Science, University of Edinburgh, Edinburgh, UK

²Faculty of Art and Design, Royal College of Art, London, UK

³Department of Textile and Material Engineering, University of Manchester, Manchester, UK

Persian carpets have a rich history that spans over 2,500 years, reflecting the cultural, social, and artistic heritage of Iran. Initially woven as functional items for warmth and comfort, Persian carpets evolved into luxurious works of art, symbolizing status and wealth. Historical records trace the development of carpet weaving to ancient Persia, where it was supported by royal patronage and became an integral part of Persian life. Various dynasties, including the Safavid, Qajar, and Pahlavi, contributed significantly to the craft, each leaving a distinctive mark on carpet design, materials, and weaving techniques. Under the Safavid Empire (1501-1736), for instance, carpet weaving reached a golden age, with complex patterns and the use of natural dyes that continue to influence modern designs.

Persian carpets are characterized by intricate floral and geometric motifs, each region of Iran producing unique styles reflective of local traditions. The craft has been passed down through generations, preserving a blend of tribal and courtly influences. Despite industrialization, traditional Persian carpet weaving remains a valuable cultural practice, symbolizing identity and artistry. Today, Persian carpets are prized worldwide for their quality, craftsmanship, and historical significance, attracting collectors and art lovers. This paper traces the journey of Persian carpet weaving from its origins to its current status, examining its role in both historical and contemporary contexts.

Keywords: *Persian Carpet, History, Cultural heritage, Traditional art, Weaving techniques*

Corresponding author: Essad Carter, Department of Computer Science, University of Edinburgh, Edinburgh, UK.

E-mail address: ecarter@gmail.com