

Generative Art and Design for Re-rendering the Handicrafts industry

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Abstract

Both, handcrafted art and generative art, find a common basis in the idea that they are non-repeatable, one-of-a-kind objects in time and space – one carefully crafted and curated by human hands, the latter carefully crafted by algorithms which are in turn tuned by humans. This dichotomy is nothing but inspirational. These two very distinct forms of ‘crafting’ lie on two opposite extremes of the product design timescale – handicrafts are losing

importance every passing day and indigenous artisans are suffering more than ever; generative art is gaining momentum each passing day and slowly infiltrating our daily lives. There is immense potential in combining these two methods of artistic product design – handcrafting techniques can present an exceptionally unique and ingenious way for generative artists to potentially realise their designs/art in a physical form while generative art and design tools can help facelift the handicrafts industry by breathing in a much needed contemporary air and providing revolutionary technical solutions to problems of economic, cultural and aesthetic sustainability of handicrafts.

This paper aims to curate methodologies to integrate generative art, AI and handicrafts to form a synergetic relationship – that of culture, technological and social advancements in the field of product design. Highlighting the potentials of both these methods and pulling attention to how they can benefit each other, the paper also identifies crucial gaps in the handicrafts industry that need immediate attention from the artists and design communities around the world – it is no longer valid to only romanticize hand made products and herald them as symbols of tradition and patriotism, but we also need to

acknowledge that they are systems of labour exploitation in today's world – attention has to be brought to this and technology has to find a way re-render the handicrafts industry.

Key words: generative art, AI, computational design, handicrafts

1. Introduction

The premise for writing this paper began with a deep dissonance – in July 2020, India dissolved the All India Handicrafts Board (AIHB). AIHB was a government advisory body and a forum to represent weavers and artisans', vocalize their issues to the authorities and advice the government in formulation of development programs in the handicrafts sectors. Even though watered down, this was the only official forum to represent a community of craftsmen, a sector which is still one of the largest employment generators in the country. Not just in India, but many other countries and numerous traditional handicrafts are now lost or have declined. There are several reasons – economic unsustainability in the face of machine production, crafting is a time taking process, present day lack of material knowledge, translation in the aesthetic choices of people, needs for rapid production and 'function' over 'form', etc. Some of these reasons will be scrutinized in the paper and methodologies to resolve them with help of generative art and design will be discussed.

Simultaneously, designers and artists are increasingly adopting generative systems for creating work across various disciplines. Software and parametric tools are readily available for everyone to use, creating a barrage of visually chaotic and

abstract artefacts with little basis of design practices and thinking as we explore these various 'tech' tools of designing and visualizing [2]. In a way, generative art is changing the foundational meanings of design.

While advances are being made to make generatively designed products more functional but currently, both handicrafts and generative art are seen as 'non-essential' processes in space and time rather than viewing them as something functional – one wouldn't possibly drink coffee from a hand-crafted heirloom ceramic pot, but choose the mundane steel factory made glass. The paper seeks to explore how can both these practices of crafting be seen in a functional manner if they were to merge and form a synergetic process.

For purposes of clarity, the following definitions for the keyword terms will be used for further discussion:

Craft: It is a very contested term especially in the era of machine production but broadly, this paper refers to craft as a making approach, either by hand or machines, which is guided by tradition, is sensitive to materials and has intentions for novelty rather than mass-production.

Generative Art: Refers to any art practice where the artist cedes partial or total control to a system, such as a set of natural language rules, a computer program, a machine or other procedural invention. This system is set into motion with some degree of autonomy contributing to or resulting in a completed work of art [1]. The generative system may or may not be 'high' tech.

Digital Crafts: In the context of this paper, this term refers to machine made

objects but not those that are mass-produced. Digital tools like 3d-printing, CNC machining and laser cutting have paved the way for rapid manufacturing of objects which are unique from one to other, imparting 'personality' in the age of individualism.

A.I: Artificial intelligence, it will be used interchangeably with *neural networks*, *style transfer algorithms* and *machine learning*.

In the subsequent sections, there is a brief discussion on the post-industrial debate on machine-made goods v/s those that are handcrafted; about how digital fabrication was able to refute the most contested drawback of mass-production – lack of 'uniqueness'. After this discussion, an attempt is made to curate a list of characteristics and thus the different ways in which both these separate practices of crafting – hand-made and generative – can complement one another and create potentials for augmentation.

2. Handicrafts in the post-industrial world

It is the Arts and Crafts movement (flourished between 1880 and 1920) that demarcates a pre and a post period for handicrafts. Strongly anti-industrial in its ideologies, the movement advocated social and economic reform of the crafts sector. Originating in the British Isles, it subsequently spread to the entire British Empire, Europe and America. The reformers associated mass production and industry made goods with a decline in standard of designed objects. John Ruskin, one of the founders of the movement, argued that the separation of

intellectual act of design from the manual act of physical creation was socially and aesthetically damaging [3]. Ruskin, William Morris and other co reformers attached words like "dishonest" and "alienating" to machine made goods - attempting to define the purpose of crafts as for "fulfilment" and being "true". These are a highly tangible and affectual set of words - dishonest and alienating; true and fulfilling - that have been attached to these two distinct methods of object design and production. The movement was highly radical and extremely critical of the modern ways of manufacturing and wanted to completely free away from industrial methods. But the factory had its benefits - which were multi-fold for many people - speed, reduced cost and large quantities - all of which spoke to the consumerist population. These benefits could not have been replaced by the traditional craft and hand making techniques! There was no seeming competition between them.

But with the advent of rapid prototyping it was made possible to conceive a notion of 'digital craft'. Desktop 3D printers have become more accessible than ever, people can now quickly fabricate any object that they want to use or customize. This is just one of the many examples where designers and non-designers alike are taking advantage of these newer crafting techniques. Although this shines greater light on the hand-crafting techniques and issues they are facing. Handmade went from daily need and riches to 'intellectual' diminish and then was deemed as mere 'luxury' – due to the high costs of production.

It is not this paper's aim to be critical of the modern manufacturing and mass production techniques; rather, the aim is

to find a common ground between these technologies and the hand crafts in order to create a synergetic system where in one complements the other.

3. Points of overlap and possible augmentation

There are evident overlaps that one can draw between digital craft and handicraft and there are also very visible differences between the two – and those gaps, I believe, can be filled with the help of generative art.

3.1 Novelty and Uniqueness

Artefacts resulting from both, hand-crafts and generative art processes are extremely unique. One ceramic pot is different from the very next by the same artist – uniqueness brought about by human hands. One drawing is very different from the other but both resulting from the same algorithmic system – uniqueness brought about by introducing randomness in the algorithm which lets it run wild. And the intention of novelty is what separates craft from mass-production!

Two expert interviews were conducted for research purposes. Kopal Sheth, a ceramicist who graduated from RISD and is now an artist in residence in Philadelphia, posits that there is a need for aesthetic revolution in the traditional handicrafts industry. As she puts it, people's 'tastes' have changed – for décor, for daily products as well as for art. The notion of 'contemporary' is what she feels is missing in the traditional crafting industries of India. Also, a lot of the handcrafted produce (apart from handloom and textiles) are seen as 'non-essential' items which further aggravates the problem of reduced sales and high

costs. This is where generative design can step in – to create the much-required aesthetic revolution.

An interesting precedent study that I undertook was that of **the chAIR project** by Philipp Schmitt. He created the four classic, AI-designed but human manufactured chairs - thus reversing the roles of man and machine in the design process and industrial production. Though not speaking about an existing handicraft, the project infuses technology in the process of wood and metal work for furniture. The resulting chairs, manufactured by human hands, materialize contradictions of form and automation into an irony of AI solutionism [4]. This precedent is of importance to my processes and concept in order to understand how man and machine can co-step and tango together and upend our conventional understanding of handicrafts and technology. The handicrafts industry today has been reduced to a form of hobby or folk art - often bought off as souvenirs by foreigners visiting a country or as a statement and pieces of luxury - Patola sarees in India are hand woven and come at a price of 3000\$ which is affordable only to about 1% of the nation's population. The commonplace occurring and functional uses of the hand produced goods has declined. They need a lot of time to be conceived; they come costly and lastly may feel "outdated".

Technologies like AI and generative design can help envision hand crafted goods with the modern aesthetic. A project prototype was undertaken wherein a neural network was trained on a dataset of 400 images of traditional Indian and Islamic tile patterns.



Fig 1 Geometric Ceramic Tile patterns

The model was running on a StyleGAN algorithm (GAN – Generative Adversarial Networks) and was pre-trained on a dataset of nature scenes and mountains. This provided an interesting cross over conceptually – fusing organic patterns of nature with this highly geometric dataset of tiles.

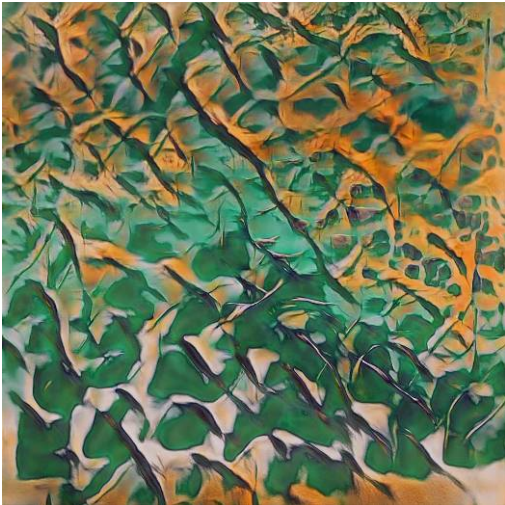


Fig 2a Tile Patterns generated by AI

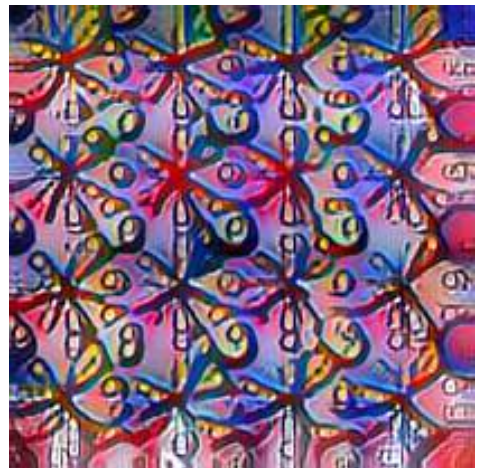


Fig 2b Tile patterns generated by AI

These are just some of the patterns that the AI generated. What is extremely intriguing is the abstractness of these images and the simultaneous complexity and intricacy. How would one go about producing these tiles for real? To actually clad on walls?

Machines and digital fabrication can only do so much. Even the most advanced of robotic 6-arm machines cannot do undercuts as beautifully as human hands

can. There is a limit (at least in today's time) to how 'finished' products machines can fabricate. This is where handicrafts can augment the field – hand techniques of carving and subsequent finishing of fabricated products.

In conclusion, this section posits that generative art can infuse a breath of fresh air in the aesthetics of traditional handicrafts while hand crafting techniques can help us realize generatively designed artefacts tangibly with all the intricacy and complexity manifested in the generative designs.

3.2 Craft – A Wasteful endeavour

We humans are incredibly wasteful creatures; in order to perfect a making skill like handcrafting wood or ceramics, one would need to practice and practice and fail before eventually succeeding. In this sense, we generate a lot of 'waste' in terms of the discarded material, time and resources spent over learning a skill. Generative art as well can be extremely wasteful in terms of the effort we spend in writing and tweaking the algorithm and its results again and again until we reach a desired outcome. But this waste is not physical. Generative art does not waste 'materials'.

This provides an interesting intervention point for technologies like virtual reality combined with haptics and touch sensitivity, which can be employed to 'practice' virtually until you get perfect and then start making things. In April 2010, Emi Tamaki, Takashi Miyaki and Jun Rekimoto developed a piece called Possessed Hand [5]; which was A Hand Gesture Manipulation System using Electrical Stimuli. It was posited on the fact that acquiring knowledge about the

speed and timing of hand gestures is extremely important in order to learn skills like playing musical instruments, performing arts and making handicrafts. To solve these problems, they proposed PossessedHand, a device with a forearm belt, for controlling a user's hand by applying electrical stimulus to the muscles around the forearm of the user. Envisioned applications of this device were that it would help a beginner in learning musical instruments [5].

The digital waste of generative art practices can be leveraged for human learning and skill development when it comes to 'making' something.

This section hence concludes by stating a need to explore, design and leverage various technologies which can help people learn hand-crafting techniques but waste less material. The Possessed Hand is just one of the ways in which this interaction can be imagined. This section thinks about the paper concept with a different approach - one that focuses on using technology to *learn methodologies* of handcrafting rather than using technology to *make* or *design* crafted products.

3.3 Slowness and Reach

Handicrafts and generative art are both slow processes – in terms of the time it takes to master the skills. Even then, one can never know the full potential or the myriad of ways these techniques can be used. While learning a single handicraft technique starts with really knowing and understanding the material, excelling at generative art requires understanding generative systems – be it code, algorithms, sensors or simple rule sets. And both are not easy for beginners.

There is one key difference though – once you know and can make a generative system, time is not too long to produce the artwork – often it takes minutes to generate the final visual output. But most handicrafts on the other hand, take a long time to fabricate something – even though you know very well how to make a wooden chair, the process is not going to be much faster for making even the 100th one. There is an added slowness in making of handicrafts.

But in the age of efficiency, the acceptance for slow crafting is being embraced. Many artisans really enjoy the work they do as they feel 'closer to customs and their ancestors'[6]. There is also a satisfaction that is attached to making with one's hands. But a lot of novices who start learning handicraft techniques from scratch find it a little overwhelming to do so. A lot of the handicraft forms in a country like India are community based – a sect of people, a village or cultural community – are skilled in making crafts. They often pass down these techniques to new generations within the community itself. This narrows the reach of skilled crafts. Not many people in the world can hand weave Patola sarees.

This is one more difference - between the reach of generative art and that of traditional crafting techniques. Digital communities have made it possible for generative art skills to be far and wide reaching – it is not limited to a geographical area or a community. Can handicraft techniques be as wide reaching as generative art? It seems like a tough feat but isn't one that is unachievable.

Collaborative teams which comprise of artisans and generative designers can be

of huge potential to achieve the above posed feat. Moreover, AI and machine learning couple with robotics and haptic electronics can enable handicrafts to reach more people. I almost conjure up a teaching machine that has learnt gesture control and skills from the most exceptional artisans all over the world and can teach complete novices – this builds up an entire generative system, where the initial rules or algorithm is provided by human artisans; codified and then being learnt by others; the output is a result *generated* due to the teaching machine.

4. Conclusion

Employing, reviving and re-rendering handicrafts has extreme significance in the contemporary culture and society.

Pre-industrial process of making relied on local procurement of raw materials, using indigenous skills and human resources and is inherently more sustainable than the current practices of machine making.

The strong rooting in tradition and culture is something that is required in the extremely impersonal societies we live in today. Craft products can help us ground in our roots.

With a world geared towards efficiency, more and more people are stressing on the need to slow down, to reflect and have moments of mental rest. Being able to 'make' or as I say, 'craft' something comes with a sense of satisfaction, a sense of belonging and to some, even as a form of meditating.

Generative art has the potential to, and should, start creating a contemporary history; artists need to learn from craft

communities about how to involve and manifest tradition in the works produced. Like handicrafts, generative art too should be building a community that is driven by a similar ethos and passion – that of making and striving for novelty.

Re-iterating above mentioned similarities and possibilities for intermingling of two forms of art, generative art has the capacity to impart a much needed aesthetic revolution to handcrafted art – which is not to say that we uproot tradition out of it. Simultaneously, handicrafts and making techniques could give generative artists very unique and novel ways of tangibly manifesting their generative artworks into materials and forms in space and time. A lot of experiments have already been done in the realm of hand-woven textiles and pattern design by infusing traditional making for algorithmically generated patterns. There is immense potential for even more types and skills of handcrafting.

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