AN EMPIRICAL STUDY ON THE USE OF AI IN UI/UX DESIGN

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Degree of Masters of Science in Computer Science and Engineering

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APPROVAL

This Thesis titled **"An Empirical Study on the Use of AI in UI/UX"**, submitted by Md Sohanur Rahman Sohan, ID No: 182-25-677 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of M.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 06-12-2019.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Dr. Sheak Rashed Haider Noori, Associate Professor and Associate Head, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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DEDICATION

This study is wholeheartedly dedicated to my lovely parents, who have been my source of inspiration and gave me strength, who frequently provide good, psychic, emotional. My beloved Mother **Khadiza Begum** a strong and gently soul who taught me to trust in Allah, believe in myself and my father **Md Mohsin Hossain Babu** who taught me the reality of the life and support me all aspect of my life.

ABSTRACT

Today, UI/UX or Branding design is a big challenge due to cost, quality, time and most importantly customer's satisfaction. Another challenge is to select the right brand name, color, font, shapes, and images. But the current system of design is not sufficient to fulfill those requirements. It is important to search for an updated solution to overcome those challenges. AI will help designers to select one of the best solutions.

While Artificial intelligence (AI) is used mainly for counting human actions based on data analytics and interpretation, the User Experience (UX)/Branding principle also focuses on anticipating the course of user behavior. So, they have a connection, right? How can Artificial Intelligence solve the most common UX problems today and what accurately? Many companies are using AI as a virtual assistant. How it will work as a virtual assistant? Will, AI spoils the UI/UX designer's job? Will it make us in danger?

There have been many discussions happening nowadays about this. But my opinion is, it doesn't mean that AI will design/make something. It will depend on how we will use AI. It will help the designer to make a website easier. In my research, I will discuss, what will be the roles of UI/UX designers and AI? And How AI will help the designer to do unique and user-friendly UI/UX design.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

We couldn't imagine that How AI products have started entering our era now a day. We found Artificial intelligence in various industries.AI influences even the most unexpected areas of our lives - From toilet cleaning to autopilots in Airplanes. UI/UX design is not an omission. Entering this industry has given launch to the concept of AI-based Design.

Wired magazine named it AI-Driven Design, while others call it 'Algorithm-Driven Design. However, some people call it 'Design Intelligence. But it's not our topic. what is the name. Our topic is how non-human intelligence/AI able to produce creative outcomes that look genuine to the human eye or How AI will help the Designer in the future to design UI/UX. [1]

1.2 Motivation

When I started thinking about my thesis topic, I didn't make the right decision about what would be my thesis topic. Then I talked to my supervisor. I wanted a topic that is related to my expertise. As a designer, Sir told me to do something that will help you design quickly and the user will be happy to access a website or app.

Sir also provided me a website link named "UX matter" where I can get huge idea about UI/UX related thesis. I was studying that website and suddenly I got an article about AI-based UI/UX design. Then I took the decision that I will work on this topic. Because still now we have huge think to research on this field.

1.3 Rationale of the Study

AI-based UX design has not only been discussing for the latest futurist prediction nowadays. Meanwhile, some startups and brands are using this technology in their existing operations. Uizard is the first company to make a machine learning algorithm that reads a single UI image and designs a platform-specific code. But my target is to use AI as the assistant of the designer not work as main designer. [2]

I associate my career aspirations with becoming a design professional, and accordingly, conducting research in this topic can lead me gaining in-depth knowledge and motivation in this field to contribute my chances of success in this chosen career path.

1.4 Research Questions

1. How AI will help designer or influence designing sector?

2. What will be the relation between humans and AI in the future?

3. Will AI replace the designer?

1.5 Expected Output

➢ To find many kind of use of AI in UI/UX design.

➢ AI will work together and AI will work as the assistant of designer.

➢ No AI will not replace designer but Designer should learn many new technologies to survive.

1.6 Report layout

Chapter one: represents introduction of the study, motivations, problem definition, research objectives, research questions, significance of the study, and scope of the study and report layout.

Chapter two: conceptual framework, background and literature review.

Chapter three: research methodology, research design, research instruments, data collection procedures, reliability and validity of the instruments and data analysis.

Chapter four: data presentation, analysis and interpretation, demographic responses and background of the respondents.

Chapter five: summary, findings and conclusion.

CHAPTER 2
BACKGROUND

2.1 Introduction

In this chapter, I will discuss Related Works about AI-based UI/UX design and Scopes of this field and what kind of problem can be faced in the future.

2.2 Related Works

There is a lot of conversation occurring about Artificial Intelligence, Machine Learning, and applying algorithms to shape the aspects of Design and the role of the designer. But how is that changing the working principle in the near future? [3]

Artificial Intelligence (AI) impacts extensive and consentaneous, in the present day. It has induced revolutionary movement in the field of technology, worldwide. Moreover, AI may perhaps rule most of the industries and sectors, at present, owing to its upsurge consumption. It is presumed that the impacts and expediency of AI will have an immense indulgence in human life.

The technological industry, today, advocates AI to transpire as a rising star. Increased pertinence of AI signifies that this novel technology may soon overtake human adeptness and capabilities throughout distinctive grounds. This technology may have an intense impact on our lives in terms of automating vehicles and home systems to enhancing security systems and much more.

AI has attained triumph in numerous fields that include entertainment, medical, sports, and engineering. In real terms, complete standpoints of AI are yet undiscovered, they can be either enthusing or distressing. Artificial Intelligence (AI) is now akin to an axiom in various industries, and the design industry has no exception to it.

Researchers often deliberate that in the near future almost every task will be enacted through a computerized system. The most awful impression that AI can have on every industry is making all errands automated. Companies will not require manpower for any of its jobs, because houses will have fully computerized security, so no guards needed. Chores alike financing, assessment and accounting will be performed by automated mechanical devices, so no workforce required. [4]

2.2.1 Existing top AI-Based tools

1. Uizard: Uizard is a popular stage that directs machines to read (GUI) graphical user interfaces in the same way mankind does. Using AI, people can create mobile applications straight from a drawing.

2. Airbnb's AI: American hospitality services company, Airbnb has created an AI process that aids designers to take ideas directly from the sketch to reality.

3. Mockplus: It is a strong tool that permits designers to automate design and transport design right from platforms such as Photoshop or Adobe XD.

4.InVision: Over 2 million users all over the world have been using InVision. In order to test and present a design to the customer or the clients, it basically permits a designer to build clickable versions of it.

5. Balsamiq: It is one of the top feathers that how simple the design is? And how the end product would look? If most of the prototyping tools appear with a colorful and fancy interface, it allows the designer to focus more on the content at first, rather than the colors that could be done anyway at the end.

2.3 Research Summary

AI (artificial intelligence) has become a top talk in various industries and the design world is no exception. There are continuous discussions among designers and developers

all around the world about the future influence of AI and how our jobs may be shifting. New relationships will build between user and products and designers, with AI. But one things should be clear that Designer will not replace by AI.AI will help designer in different aspect of design. In my thesis I will try to clear it.

2.4 Scope of the Problem

The increase of automation and Artificial Intelligence getting involved in our day to day lives over the last some years, we're no longer discussing imagination because AI-related work is happening here and now. In the near future, designers and robots will be working together and In lieu of some problem, a series of opportunities will come. This quick improve has influenced an entirely new generation of designers to expect user-centered solutions through the scope of these new technologies. Sometimes, Designers have to do teamwork. Taking that on our priority, we can solve our problem will easily by a robot with artificial intelligence. Artificial intelligence would aid in doing your design system even more strong. AI can help the designer to draw a picture easily. AI can help the designer to draw a picture easily. It will also help to experiment with large numbers of data within a very little time to aid the designer in making the right decision. It will also help the developer to make a more user-friendly user experience. I will try to discuss in details these benefits in this thesis. [5]

2.5 Challenges

The challenge of intelligent technologies into people's lives can be extracted into the automation debate between 'is it for us' and 'is it work for myself', or the challenge of when automation is useful and when people want to feel in control. It will be tough to create trust in the user because People are uncertain about AI how it makes decisions and whether all its decisions are appropriate or not! Moreover, this kind of suspicion has closed the thinking of people.

Intelligent systems now and then may be inspired by unbelievable thinking that sometimes makes some funny or something unexpected or funny outputs. Most of the people are not familiar with this term and does not have sufficient use cases in the market. There are very few companies now who want to invest in this sector and expert people will be needed who can work with AI.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, I will detail the explanation of the study methodology. It will discover the study methodology, Instruments, Data collection procedure, Statistical Analysis, and the trustworthiness of the study.

3.2 The research design

A research design is a particular plan or protocol to conduct the study, which allows the researcher to translate the conceptual hypothesis into a real one. It authorizes the researcher to anticipate what the proper study choices should be like to extend the legitimacy of the results.

There are two types of research design Qualitative and Quantitative. I've followed here Qualitative method where I done a Survey/questionnaires among different kind of people. This examination has been fixed to learn how the student of daffodil international University will take AI as UI/UX design assistant.

3.3 Research Instrumentation

The research instrument is known as the tools that can be needed for collecting data and how those instruments will be made. The most renowned tools for data gathering in meaningful inquiries are surveys, meetings, recognition, and record examination. Anyway, the researcher of investigation uses the survey as vital equipment for social case data, which is used in Quantitative research. It can be online or offline and I used offline survey as my main Research Instrument.

3.4 Data Collection Procedure

In terms of AI technology, I desired to evaluate where the UX design community is currently. My motivation in choosing a survey to collect data for this study was that it would provide us to quickly gain the advantage of AI in this field. But It was not possible now in our country because still now I don't found any community on this field who are working with this field. That's why I had to only relay on some paper from the internet. Here I will provide such a survey. They do their survey by mailing lists for the Interaction Design Association, User Experience, and Professionals Association. That survey was online for a term of two weeks, during that time they collected fifty-one completed replies.

In my statics I've collected data only from DIU MSC in CSE program students. Because, my research subject is a bit more complex for general students and the people who do not know about UI/UX designs I ignored them. I've selected 10 questions for this survey and all question multiple choice question. I've printed 50 copies of question and distribute my entire classmate. They were so willing to attend that questionnaire and backed me all copies. I myself have only collected that paper from them.

3.5 Data Analysis

Data collection builds a key part of the research procedure. The Data, however, have to be analyzed to create a feeling. There are many ways of analyzing quantitative data collected in surveys. The most extensively used quantitative data analysis method is Cross-tabulation. It is a favorite method since it applies a primary tabular form to draw a conclusion between several data-sets in the research study. [6]

CHAPTER 4

EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Introduction

In this chapter, I want to discuss about the uses of AI in details. As I didn't do any real-time survey, that's why I won't discuss the survey results. Then I will try to answer the research questions, descriptive results and summary according to the discussion of uses of AI.

4.2 Experimental Results

Actually my topic is the use of AI in UI/UX design that's why in this section I will provide the use of this. For better presentation I divide it into two sections one is the benefit of AI in UX design sector and another is UI design.

Usability is the dimension of how easily a website or app can be used by individual users with effectiveness, efficiency, and satisfaction in a quantified context of the use. [7]

To facilitate more customized experiences for the users, Websites are being smarter and take into account multiple constellations of user data points. Multiple data points that we get from user research help obtain creative insights into what users are more possibly to be searching for. If machine takes over the part of user research, the ability to calculate use cases becomes more optical and reachable to more users. Websites are enlarging and getting more intelligent in dealing with complex tasks with the help of the AI intelligent. Intelligent agents can answer users' questions in real-time rather than using the written script to answer back to users. AI can help in different ways to improve usability. [8]

Due to the absolute ability for data processing, AI is a strong tool to have for any kind of testing. AI professionals can use machine learning-based systems to keep and analyze a huge amount of crucial UX metrics for user usability of a website.

4.2.1 Different Ways Companies use AI with UI/UX

Emotional AI:

Annette Zimmermann, The vice president of Gartner, said *"By 2022, your personal device will know more about your emotional state than your own family."* Through facial recognition and computer vision AI is capable of recognize gender, age, location context, and the present mood of the user. AI is an exciting new field that is capable of learning from humans and influencing them, though AI robots aren't capable of showing actual emotion like humans, emotion. But UX Designers can provide more customized experiences based on this information. It will be possible to with the combination of three technologies.

➢ Data analysis
➢ Machine learning algorithms
➢ Facial recognition software

Businesses can take these to improve their marketing plan by recognizing designs and content that show more promise for clouds.
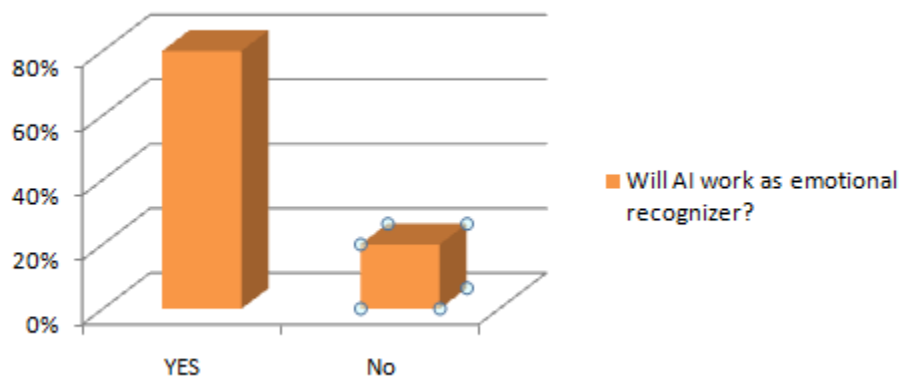

Figure 4.1 Will AI work as emotional recognizer?

Complex Data Analysis:

Usually, UX teams look to heat maps and split testing when they are aiming to increase user involving. Analyzing the huge amount of data, AI assists designers to create higher-performing products depend on the best-existing designs. This offers the superb potential for UX teams, as they can use deep learning technology to track and analyze big data sets. Already, many e-commerce businesses make use of the capacity of AI to enhance UX in this way, learning more from user attitude. Now, traders can respond in real-time to deliver a frequently improving user experience. Before AI, this complex data analysis was so tough. [9] Machines will be capable to:

A. Read potential parts of optimization in the product,

B. Catch how this optimization can occur,

C. Execute that change and run the A/B test,

D. Analyze the outputs and find which model is working best,

E. Upgrade the design with the new result, and then restart the cycle.

Increasingly we'll hear about "websites are optimizing themselves". Actually Machines will do almost all the works and designers will become the strategist's organizer all of the optimization works. [3]
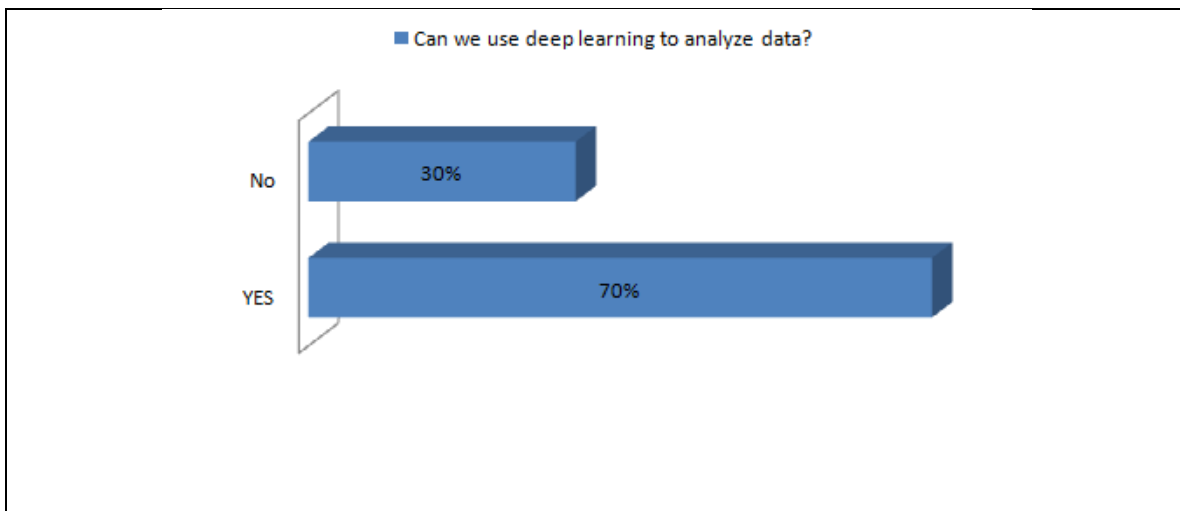
Figure 4.2 Possibility to use deep learning to analyze data.

Customize Advertising:

Now, marketers require to be more innovative in their strategies. In a research of Researchscape International, 74 percent of 300 marketers surveyed said personalization in this area has powerfully aided their clients in advancing customer relationships. It also discovered that 54% said their customers experienced a 10% growth in sales, while 13% of marketers surveyed reported a more than 30% left.

On the basis of the above-noted research, AI-driven marketing solution would make it easier for businesses to communicate with target markets by using the analyzed data. [10] Social media platforms are a hidden treasure for marketers, offering up a huge number of information about customers' interests and priorities. With this data, companies can improve UX with AI. Suppose, many times a user likes a page, shares a photo, makes a comment, or shows interest in products online, the AI system will grab the data. Day by day, with more data, it can divide users into interested, more more-interested and the most-keener until it offers marketing and advertising on a one-to-one level.

Chatbots:

A Chatbot is just a computer program that basically simulates human interactions. It gives a form of a conversation between a human and a machine, which can be conducted via messages or voice commands. These virtual assistants are now common, taking customers to assist in new levels through natural language processing. Combining AI with voice recognition and chatbots allows UX designers to generate fast, more suitable and personalized experiences. One of the reports tells that 75% of businesses applying chatbots and at least a 10% boost in customer satisfaction by it. It is also being ever smarter and fit to have more natural conversations with users. It's not only can work 24/7, but they also decrease frustration and stress from rowdy customers. It's impossible that AI will totally replace humans in customer service, but it's already clear we can robustly improve UX with AI chatbots.
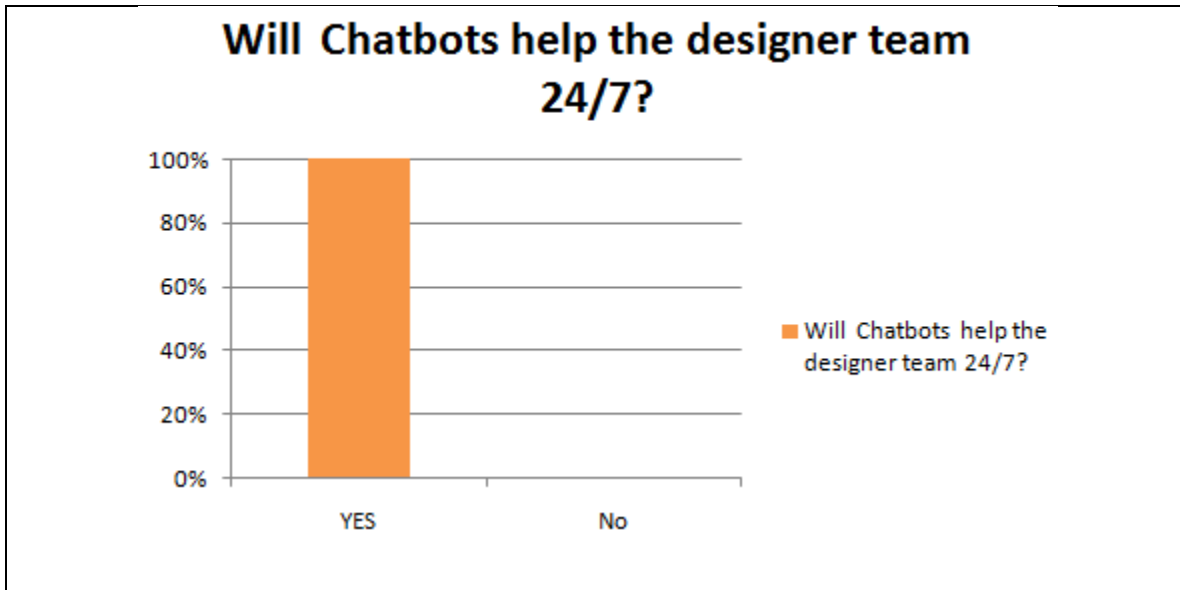
Figure 4.3 Possibility to use of chatbots in the futre.

Automation:

User experience design is already strongly automated, while we may not imagine it that way. Software, from previous basic tools like the Adobe Creative Suite to the most recent and best such as Figma, Sketch, and Framer, has increased laborious physical design tasks into fast and easy ones. While it would be difficult to think today, as recently as the 1990s designers would put more time using rubber cement and knives than sitting in front of a computer. The designer depends deeply on toolkit for arts and crafts skills. It is actually a physical activity, not a totally digital one though they use a computer or design tab.

The evolution of AI has given a number of advantages. First, it allows user experience designers to extend the scope of their skills and duty to keep step with the environments they were creating for. This has allowed user experience writ large to mature into a well defined and strategically prime profession.

AI generates millions of unique versions of homepages and landing pages for news sites and media brands based on user profiles, preferences and tracking data. Navigational

apps could direct you to your destination effortlessly. With a few taps/clicks, you will receive your favorite meal at your doorstep.

Creating something from zero:

Suppose a person does not exist but using Adobe XD plugin you will get a UI Faces and that UI is unique. With it, UI designers can generate new character like "avatar" in projects without using XD. Easily you have to select two or more shapes that you will like as "avatar" and select filter, you will get your expected character or just only click "generate avatar", you will get a randomly new character. [10] Suppose you want a logo, you just have to select a color and what kind of shapes you want, then you get random designs on the basis of your want.

Visual search

Using AI in e-commerce site it will allow the online consumer to search for their desired product by using image of their phone. AI will pick same product on the basis of the images product colors, textures, shapes, patterns and so on. [12] It will be bifacial for Jewelry product, furniture, showpiece, clothes etc. because it is tough to search by name of different kind of product.
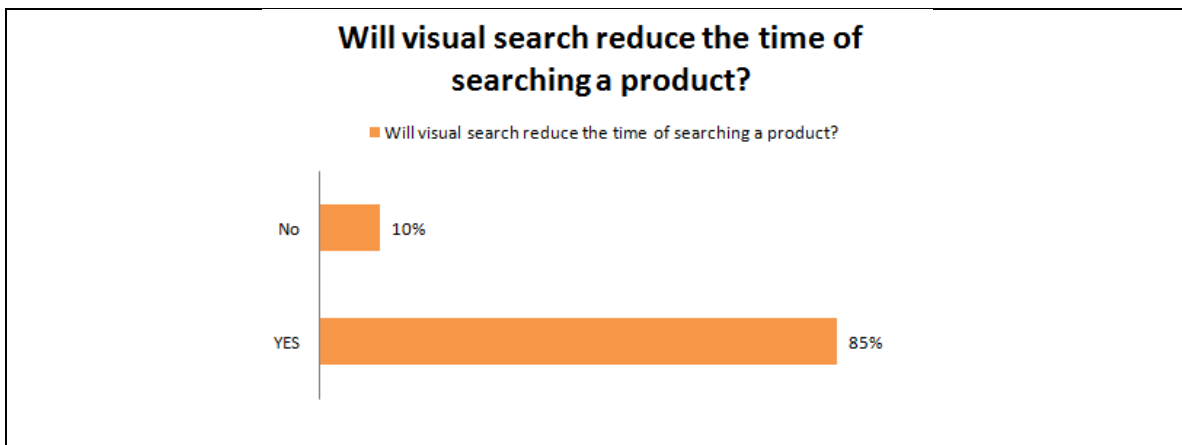

Figure 4.4 Will visual search reduce the time of searching a product

Select pricing and discount of E-commerce business

AI tools can add a progressive pricing layer of an online store. It uses machine learning and data science to read the visitors behaviors and dynamically change the price of a specific product. Some AI advance tools would read competitors pricing and it will suggest you to change the pricing according to your competitor or tell offering some discount in some product. But all things will be done with your permission.

Suggest Recommendation to the shopper of E-commerce site

We know that AI collects all data of a buyer and form that information AI will suggest the shopper according to their interest. Suppose a buyer every time search for features of updated phones AI would provide the buyer some recommend on the basis of his behavior.

Filtering Fake Reviews

It is one of the bitter problems for online retailers and e-commerce brands that they are facing day by day. Sometime competitor of one brand misuse review and provide a better product bad review. At that it will to so hard to sell that product to new seller. When the seller looks many bad review of a product they would discourage to shop that product. AI will filter that kind of fake review form the review section and elect real review form real buyer.

Increase Security of A website:

It is one of the biggest challenges that how to keep the buyer data secured of a e-commerce site. With the involve of AI and deep learning It will be possible for the website to secure all their data and conversation record secured. It can also detect that whether the visitor is a robot or a human being.

4.3 Descriptive Analysis

Descriptive statistics are used to distinguish the primary features of the data in a study. Because my thesis is one the only the empirical study on the use of AI in UI/UX design I only read many paper and find many uses of AI. Here I will provide a survey report of one of that paper.

4.3.1 Area of survey respondents' work

Table 4.1 Area of survey respondents' work [13]

Type of UX Design Work	Quantity
1. UX or Interaction Designer working on commercial or government products and Freelancer.	39
2. Interaction Design researcher working on scholarly research	4
3.Other	7

4.3.2 Involvement of UX team

Table 4.2: The designer and researchers' opinion 43

Type of UX Design Work	Yes (%)	No (%)
1. Have you heard the term **Emotional AI?**	100	0
2. Do you think a designer has the full ability to identify the user's emotions?	18	82
3. Will AI work as emotional recognizer?	80	20
4. Do you think the current system of data analysis will be sufficient for UX researcher?	20	80
5. Can we use deep learning to analyze data?	70	30
6. The way now we use for advertise like add in different website randomly. Will it work in the future?	30	70
7. If a AI will collect data of the user form social media and advertise based on that data. Will it work on the future?	65	35
8. Will Chatbots help the designer team 24/7?	100	0
9. Will visual search reduce the time of searching a product?	85	15
10. From all the question do you think AI will grab all the UX designer's job?	10	90

4.4 Summary

Artificial Intelligence (AI) is now an absolutely established technology, and user experience (UX) designers have begun to use AI services into the things that they design. I have understood that AI represents an immense opportunity, and that's why UX designers and AI researchers are working about the unknown potential as a design material.

CHAPTER 5

SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLICATION FOR FUTURE RESEARCH

5.1 Introduction

In this chapter, I will cover the outcomes of the work then the Summary of the Study. After that the Recommendations and Implication for Further Study.

5.2 Summary of the study

AI is forming your experience day by day. Your Facebook feed, your Spotify playlists, your Amazon recommendations, and more are making a customized window into a world that is driven by algorithms. Algorithms and machine learning help Google Maps find the optimum path for you. When you ask a question, suppose Khichuri or Polaw, algorithms help to make what you ask and the information you get as an answer. It's like a magic that taking us to shake with excitement and scaring us at the same time.

With AI, new relationships will need to be founded between consumers and product. This thesis can direct the designer and the company that AI would be one of the assistants of the UI/UX product. Now I will try answering the research questions:

5.2.1 What will be the relation between humans and AI in the future?

If you want to be a designer you need to be creative, intelligent. This skills need empathy, problem framing, creative problem solving and communication with the buyer. The first impact of the will be that using AI most of the people will try to be a designer using AI feature. A survey of **Harvard Business Review article** find that most of the manager will try to be designer in the future.

So it will be changing for the designer in the future and they should aware from now to grab their job. If they are not dynamic day by day it will so hard for them to survive in their design sector.

Only traditional creativity will now be helpful for them in the near future. But I can't say that AI will thief their job it will make their work easier. So designer required to learn some additional skill on AI and data science in the future to survive. So can say in the future designer will be a curator not really a creator.

5.2.2 Will AI replace Designer?

I already discuss it in the previous paragraph. I saw during my study UX designers are too worried about that will it be the end of a human designing era. I think they should not worried more about that. It is impossible that AI will totally grab the designer's job. AI will just work as the assistant of the designer. So we can say it will not replace designer it will help designer to provide potential design in a very short time period.
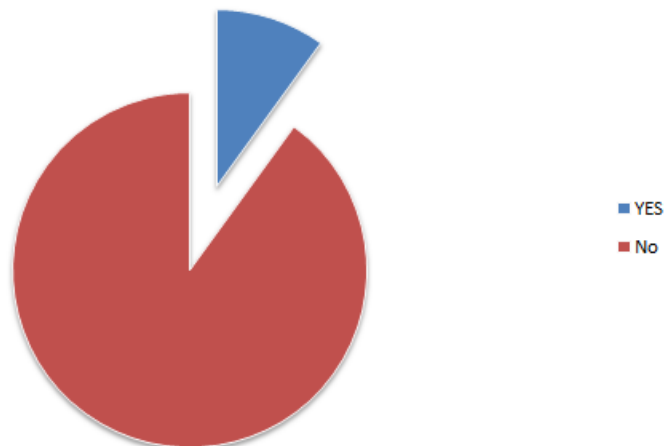

Figure 5.1 Possibility of AI to grab Designer's job

5.3 Conclusion

While Artificial intelligence (AI) will be used mainly for counting human actions based on data analytics and interpretation, the User Experience (UX)/Branding principle also focuses on anticipating the course of user behavior. So, they will be connected each other. Or can say designer will control the AI in the future and use it to help his designing process easier. How can Artificial Intelligence solve the most common UX problems today and what accurately? Many companies are using AI as a virtual assistant. How it will work as a virtual assistant? Will, AI spoils the UI/UX designer's job? Will it make us in danger?

AI and UX are getting strongly involved in today's world where we're now looking at a spin point in the new era of design. [14] They both will affect each other to solve a problem very easy and quickly. Though, some specialist is saying that the designer will be replaced by AI in the future.

But I don't think so it will be possible in the near future. Because during my thesis I tried to show what will the duties of the designer and the AI. I think we should do this kind of thesis and it is continuing. In the near future may be we will get more knowledge about this.

During my study many times I was getting some difficulties and I tried to get good solution to complete the work. My supervisor helped me to complete my study.

5.4 Recommendations

From the result of this study I have some recommendations for the new researcher they could take AI as their thesis project because in Bangladesh this type of research is so rare. Spatially the student of Daffodil International University can take this kind of thesis topic and I hope they will get huge information from my work. This thesis may help the student of Daffodil International University.

I recommended all DIU students to concentrate of the upcoming technology like AI base UI/UX. If they want to be UI/UX designer they should start learning not only design but also AI based design. If they are not aware of this from now it will possible for the student of DIU to grab the design sector.

In my research I didn't do any survey that why recommend them you should study this topic and must do a survey to get more specific result in the future.

5.5 Implication for Further Study

The researcher every time provides implication for the further study.

- In the future we should continue this type study and find some easy way to work with AI. Because it will be tough for the designer to work with AI.

- Security is one of the main issues for AI base UI design.

- They should work to reduce the cost for using AI in their design.

- It will be tough to gather enough user data by using AI. So they should work on this sector.

- Should find a way on how to use less AI and get more output.

- Find an easy to collect data for AI.

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