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Sustainable participation of Artificial Intelligence in design process

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ABSTRACT

The rise of AI has been in the core of several speculations about it taking over all the jobs from humans, however, Artificial intelligence is also recognized as one of the most disruptive technological advancement of the 21st century. This paper talks about the role of AI in the process of design, considering the role of human intelligence and artificial intelligence in an eco-system of the design process. Paper articulates conclusive note postulating sustainable roles of artificial intelligence in the design process. The paper should be helpful for professional designers, engineers, developers, visionaries, academicians and CXOs to understand and define the future scope of artificial intelligence in design. It should also be helpful to students and practitioners interested in the subject to understand, dream and imagine new aspects of human-machine interactions.

Keywords— *Artificial Intelligence, Design process, Sustainability, Human intelligence*

1. BRIEF INTRODUCTION TO DESIGN

There are as many definitions to define design as many perspectives to design practices. For this paper, a more generic and focused definition is considered, where design is considered as a systematic approach for an effective solution against an identified problem. However for design as a noun oxford dictionary defines it as 'Purpose or planning that exists behind an action, fact, or object.' To obtain an effective solution a set of activities needs to be performed and this collective set of activities is called design process where oxford dictionary defines it for a verb as 'Do or plan (something) with a specific purpose in mind.'

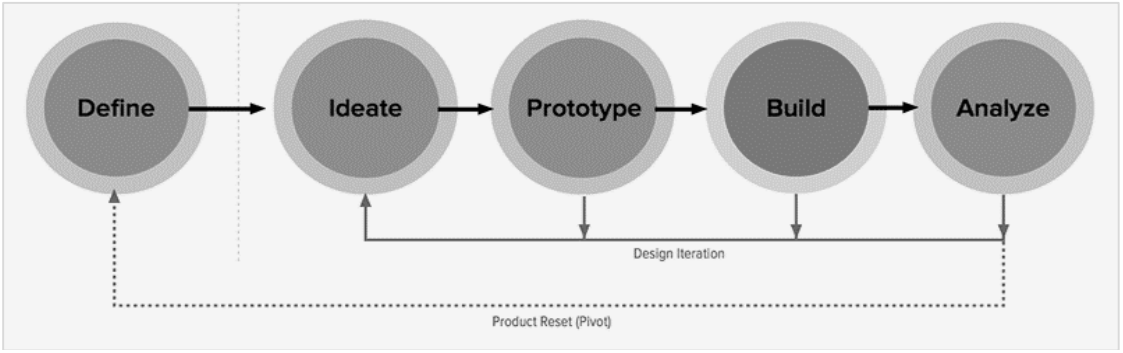

Fig.1: Illustration of design process

Design process steps shown in figure1 above shall be followed to come up with a solution, in this section paper will talk in brief about the process steps in design.

1.1 Define

Step of defining the problem statement may include identification and validation of the problem before defining it. This stage sets a base for the next steps in the process by providing a reference to the designer or the team.

1.2 Ideate

At the stage of ideation, designers put their creativity, imagination and problem-solving abilities to come up with ideas which may help in deriving a viable solution for the identified problem. Ideas generated in this stage are carefully sorted for various parameters of feasibility, requirement, and user acceptance etc. and the best identified idea is selected for the next stage. In some cases, ideas are analyzed as per the parameters and a solution carrying different attributes from different ideas are combined as one.

1.3 Prototype

Ideas are converted into working concepts which are capable of demonstrating the abilities of solution. Prototyping helps designers to understand more about the proposed solution. It also helps designers to make the stakeholders understand the solution. Prototypes can be low fidelity, high fidelity, digital simulation etc. They are tested for their derived attributes and improved upon till they match the acceptable parameters of the thought off solution.

1.4 Build

Designer or team is when confident about their concept by testing and iterating the prototypes for several cycles they proceed for building an actual solution. The actual solution is built using the real material and scale which may include the help of various teams and experts.

1.5 Analyze

These builds can't say to be perfect in the first time and hence tested in actual conditions several times and perfected for getting deployed. These builds are analyzed for various engineering, design, legal, environmental and safety parameters. Perfected builds, when accepted against all the parameters of acceptance, are considered for further action of deployment.

2. EXPLORATION NOTE

Creative ability is something is still related to living neurons and conscious beings, in the simplest terms it could be understood as the ability to find and solve the problem through in genuine method. Human's distinguishability in this age of artificial intelligence is their creative ability. Creativity will be the 3rd most important skill in the workplace in 2020, vaulting in importance from 10th position in 2015 according to the 2016 World Economic Forum report.

Design is considered a task which requires creativity and intelligence, in order to be a designer consciousness and curiosity are considered as basic attributes. A conscious and curious system must have the ability and attributes to observe, understand, analyze, process, establish correlations, imagine, hypothesize, think, plan, learn, make decisions and improve irrespective of environment, condition and situation.

A system having all of these basic abilities shall considerably able to design, what complexity of problems it can solve may not be predicted in the scope of this paper but out of all the mentioned abilities and attributes there are few which are achieved by artificial intelligence. Hence as not all the humans are designers but they pose the abilities and can play a role in the process of design, one cannot negate a role for artificial intelligence in the design process as there are certain attributes and abilities possessed by the developed systems.

3. BRIEF ABOUT AI SYSTEM

Any device or system which has capabilities to perceive, learn and upgrade from its surrounding environment and takes actions that maximize the probability of successfully achieving its goals can be considered as an artificially intelligent system. In more easy term we can say "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" makes it an intelligent system.

John McCarthy is one of the "founding fathers" of artificial intelligence, together with Marvin Minsky, Allen Newell, and Herbert A. Simon. McCarthy coined the term "artificial intelligence" in 1955 and organized the famous Dartmouth Conference in summer 1956. It is a combination of philosophical, theoretical and practical development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

Importance and impact of AI in human life, business and technology can be understood by in the following statement by Klaus Schwab, Founder and Executive Chairman, World Economic Forum Geneva, he stated "We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before."

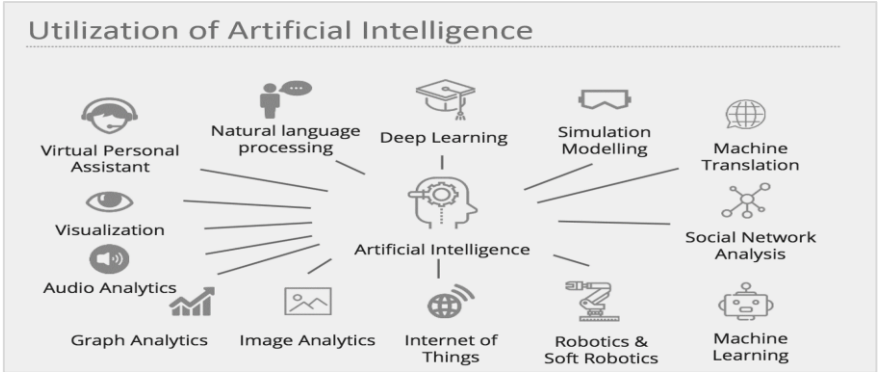

Fig. 2: Illustration showing utilization of artificial intelligence in various domains

Figure 2 shows an illustration showing major technological domains under the broader scope of artificial intelligence. However artificial is spreading across domains which may not be listed in the figure 2 and may go beyond the scope.

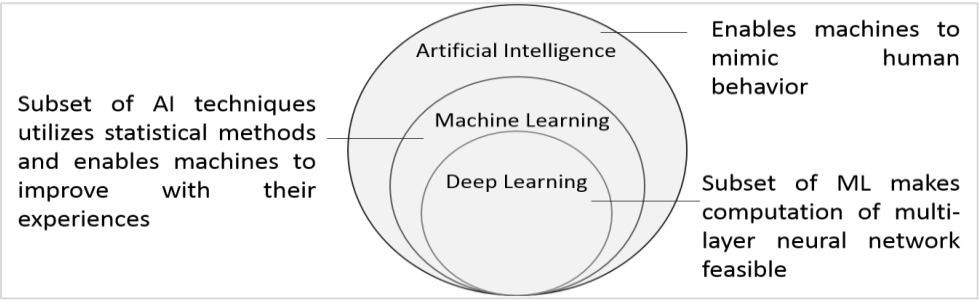

Fig. 3: AI and its technological subsets

Companies that fail to adopt AI and machine learning technologies are fated to be left behind, a report by IDC media center estimated that global spending on AI will grow 50% compounded annually and will reach $57.6 billion by 2021 which in the current scenario seems to be a valid prediction. Companies driven by insights from data will take $1.2 trillion a year from non-insight driven companies by 2020 as stated in a report by Forrester group.

4. CONCLUSIVE NOTE: ROLE OF ARTIFICIAL INTELLIGENCE IN DESIGN

Stating the artificial intelligence system as a designer will be too early at this stage of technological development. However, in the design process along with human designer, there is the scope of sustainable development through utilizing capabilities of AI in the design process along with human intelligence. The derived scenarios for sustainable co-development are as follows-

- AI as an assistant for a human designer
- AI as a participant in the design process
- AI as a collaborator in the design process
- AI as a research tool for the designer
- As an intelligent prototyping assistant
- As a subject matter expert for designer
- AI as a resource manager
- AI as a product tester
- AI as a reference librarian for concepts and ideas created by designer
- AI as a replicator

There can be more micro models for the mentioned roles of AI in the design process as it will branch in deeper into the steps of execution. For sustainable co-development of artificial intelligence with human intelligence in the design process, it is well reflected from the exploration note that being an autonomous AI designer is beyond the capabilities of current AI systems. However, the contribution of artificial intelligence in the design process to help human designers achieve their design goals in less time, with more efficiency and high accuracy will open path to a sustainable ecosystem of the design process.

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