Editorial

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Algorithms in Computer Systems

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I. Introduction

BASIC definition of algorithm in mathematics is step by step procedure to solve a problem. Algorithms are basic and most important area in a writing an error free programs. Fig. 1 illustrates flow chart of a computer algorithm. One of the most essential thing to remember is that there can be various algorithms for the same problem but some algorithms are much better than others. Technically, algorithm and programs are actually not the same thing, they differ at the level of precision. It is often expressed loosely defined format called "pseudo code" which matches programming language closely leaving out specific details that can be added later. Pseudo code doesn't have hard and fast rules about commands, but it is halfway between an information instruction and specific program. [1]

Although, there are plenty of algorithms that are already there and are yet to be implemented, designed with various methods, techniques and composition of various methods. This editorial paper gives brief insights about few from plethora of various algorithms in computer systems; for instance, algorithm that can predict growth of cities, algorithms that can create three dimensional shapes, algorithm for customization of video game difficulty using big data, algorithms in the smart watch and finally algorithm to detect fake users on social networks.

II. An Algorithm That Predicts Growth of Cities

Increase in skyscrapers in a city denotes the development of living systems. Scientists have created a novel genetic algorithm based on the historical and economic data of an urban area that can predict skyline would look like in future. This method was successfully accomplished for Minato Ward in Tokyo. Fig. 2 illustrates three dimensional representation of the Minato Ward in Tokyo used for experiment.

Researchers understood that the growth of cities follows patterns similar to those of specific self-organized biological systems. Scientist were inspired by the nature and created a generic algorithm that can calculate how the number of skyscrapers and other buildings in an urban area will increase. In this research, a team from the University of A Coruña (Spain) developed a novel algorithm based on the standard genetic algorithms. According to the authors, this novel algorithm not only estimates the number of future skyscrapers in a neighborhood of the city but also the certain areas where they will be most likely located. [3, 4].

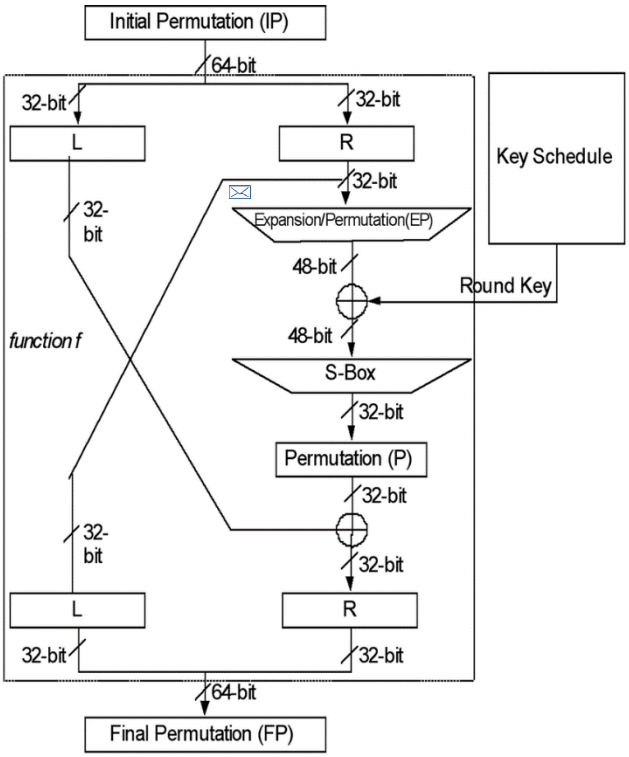

Figure 1. Illustrates a flowchart of a computer algorithm. Image from Ref. [2].

Figure 2. Illustrates 3D representation of the Minato Ward (Tokyo) used for the study. Image Credit: Ivan Pazos et al. [4]

III. Algorithms That Can Recreate 3-Dimensional Shapes

A computer researcher at University of British Columbia developed a new and novel program that can sketch of an everyday object, addressing the issue of accurately describing shapes. This software is called "FlowRep" by a computer science professor Alla Sheffer, in collaboration with Adobe Research and Washington University in St. Louis.

To develop the program, Professor Alla used understandings from a field of psychology known as Gestalt psychology; it explains how humans interpret visual size and understand depth from two dimensional drawings. The algorithms that was developed from these technique helps to turn diverse shapes like cars, airplanes, coffee makers, mugs into sketch drawings. This algorithm builds on earlier research that Professor Alla and her team members created that can turn sketches and drawings into 3 dimensional shapes. With this technique, together this method can be used to recreate objects and also has implications for fields like 3 dimensional printing and fabrication. Since this novel algorithm is best suited for human rather than natural shapes, Alla is also looking for improvements and other methods to produce high quality sketches of natural shapes. [5]. Fig. 3 gives more information of new software that design sketch of an everyday object.

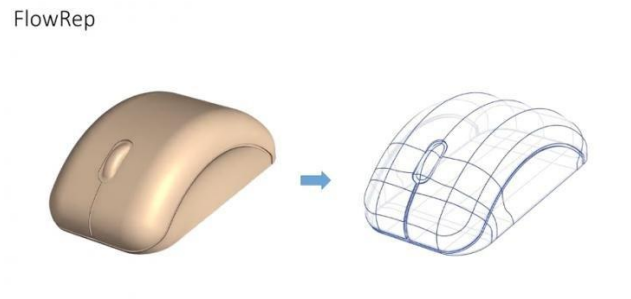

Figure 3. Illustrates Flow Rep is a new software that can create a design sketch of an everyday object. Image Credit: Alla Sheffer [5]

IV. Customization of Video Game Difficulty Level Using 'Big Data' Algorithm

Experts at Georgia Tech programmers created a new algorithm that can calculate video game player's in-game performance and provides equivalent challenge they can beat, leading to mastery of new skills. This advance in technology not only helps to improve user experience with video games but also applications beyond gaming world.

Digital gaming has increased in recent years and is being embraced almost as fast as mobile devices, enabling its growth. Researchers at Georgia Tech created a simple turn based game then used contender's scores to apply algorithms that predict others with similar skill sets would perform and adjust difficulty consequently. Experts used a technique called "collaborative filtering" a process employed by Netflix and Amazon in product ratings and recommendations. Whereas Netflix recommends movies similarly, gaming model recommends the challenge for players adjusting game difficulty by computationally predicting in-game performance. This gaming technique also includes performance arc which an algorithm selects in-game events for games that gets the anticipated player performance in line with the developer's specifications for target performance. Current games use player progress to make minor adjustments to the game, sometimes called "rubber banding." [6] Fig 4. Depicts the researcher Mark Riedl, developed a computational model that can predict video game performance that provide challenge they can beat, leading to mastery of new skill levels.

Figure 4. Illustrates Georgia Tech researcher Mark Riedl has developed a computational model that can predict video game players' in-game performance and provide a corresponding challenge they can beat, leading to quicker mastery of new skills. Image Credit: Georgia Tech [6]

V. Smart Watch Algorithms Can Identify Poor Sleep Conditions

New algorithms take benefit of multiple smart sensors to accurately monitor wearer's sleep conditions. To obtain information on wearer's sleep, a software called "Sleep

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Guard" was created by the researchers from Lancaster University in UK. It can estimate sleep quality and provide users with practical advice to get better night's sleep.

Sleep Guard tracks a combination of different non biomedical factors including but not limited to body movements, sounds related to sleep disorders and ambient lighting. The research team hopes that this technology would help users to have a more comprehensive understanding of their sleep and enable them to take arrangements to improve quality of their sleep and as a result their health. Sensors within a smartwatch like accelerometer, gyroscope and orientation sensor, were used to identify body and movements during sleep. Watch's microphone collects information about ambient noise and wearer's snoring and talking while sleep. In addition, light sensor captures illumination in the sleeping environment. [7, 8]

VI. Algorithm to Identify Fake Users on Social Networks

Researchers at Ben-Gurion University of the Negev in collaboration with University of Washington created a new generic algorithm to discover fake accounts on most of social networks including Facebook and Twitter.

New research revealed by the scientists in Social Network Analysis and mining a new method is based on the assumption that fake accounts tend to establish improbable links to other users in the network. This algorithm comprises of two major iterations based on machine learning algorithms. The first concepts on a link prediction classifier that can estimate with high accuracy and the probability of a link existing between two users. The second restatement creates a new set of meta-features based on features created by the link prediction classifier. Finally, scientist used these meta-features and created a generic classifier that can detect fake profiles in a variety of online social networks. [9, 10]

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