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Heuristics Approach Based Expert System for Covid-19 Infection Susceptibility

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ABSTRACT

A heuristic approach-based top-down automaton for assessing the potential risk of covid-19 is presented here. A set of non-obvious factors are employed to assess the risk of covid-19 infection in a person. A minimum of five factors are used as input factors for this algorithmic flow. One example is the number of close relatives the person has being taken as a input for risk calculation of covid-19.

Keywords: Top-down approach, Covid-19, ML

1. INTRODUCTION

We live inside the advanced period, where a large portion of the emergency clinics in the created countries are keeping the clinical records of the patients. In view of the clinical records along these lines created, it is available on different stages over the web. The clinical meaning of the proposed work is to notice the early screening of the COVID-19 disease. To conquer the confusion of the later stage identification of infection. In this paper, a work has been made to propose a man-made consciousness based self-testing procedure that can anticipate the patients who ought to go for COVID-19 testing. This paper presents a conviction rule-based master framework to anticipate the probability of the individual to be tried for COVID-19. Without the mediation of a subsequent individual, the testing system can be screened without any problem. In view of the outcomes the individual can be additionally tried to affirm the event of COVID-19 disease. This strategy will be practical; it will likewise end in wasteful use of the scant asset of clinical testing kits.[1] The conventional estimate based techniques were heuristic-based during which the improvement issue is helpfully handled component by component until a whole arrangement is reached. Improvement is the most common way of finding the best constitution inside the restricted assets regarding predefined limitations. Heuristic-based approaches can undoubtedly track down an answer for the advancement issue, and the nature of the developed arrangement.[2]

2. WORKING

The mobile application presented here works on simple majority based heuristics approach. The dataset consists of individual's habit and then their susceptibility to Covid-19 infection. Totally six input parameters pertaining to lifestyle are employed to predict if a person is susceptible to covid-19 immediately or not. A simple majority of four out of six parameters is used. Apart from that a linear regression algorithm is employed to map how much exercise can improve immunity against covid-19. Linear Regression is a regression machine learning algorithm. In this paper, two-dimensional Linear Regression is employed. That is, one input parameter and one

output parameter is taken and the given dataset is plotted in a 2D graph. The output model of Linear regression is the best fit line, which is the line with 'y = mx + c' equation passing closest to all the given points of the dataset. The model of this machine learning algorithm with just one input and one output parameter can be described with the value of the slope 'm' and the value of the y-intercept 'c'. This algorithm maps the proportionality, be it direct or inverse, between the input and the output parameter. The exercise done is plotted in x axis with respect to percentage of how much a person is susceptible to covid-19. The trained linear regression Model is incorporated into the top-down model of the mobile application.

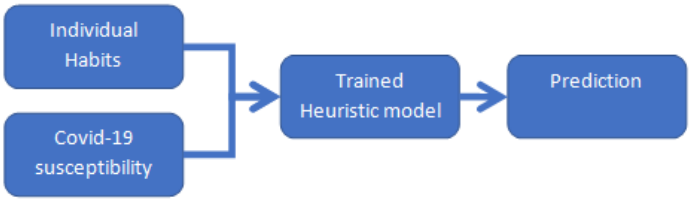

Figure 1. Block Diagram

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3. ARTIFICIAL INTELLIGENCE

The algorithmic flow presented in this paper falls under the field of Artificial Intelligence and Machine Learning. Presented below is an outline of those technologies.

Artificial Intelligence (AI) is understanding shown by machines, not the slightest bit like the ordinary information displayed by individuals and animals, which incorporates mindfulness and emotionality. The separation between the past and the last arrangements is a significant part of the time uncovered by the shortened form picked. Strong AI is typically named as phony general understanding (AGI) while tries to mimic 'ordinary' information have been called fake natural knowledge (ABI). Driving AI course readings portray the field as the examination of cunning trained professionals: any device that sees environment and takes actions extend its chance achieving its targets, the term man-made thinking is often used to depict machines that imitate intellectual abilities that individuals cooperate with the human mind, for instance, learning and decisive reasoning.[4]

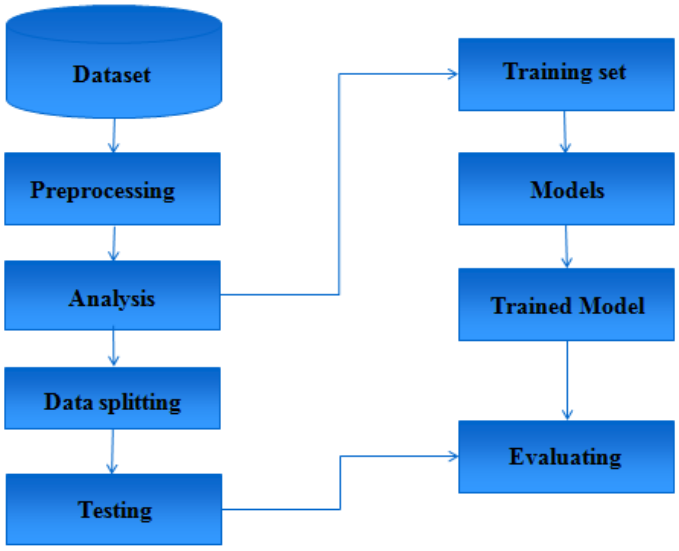

Figure 2. Flow Chart

With the impact of AI, Machines that required prior information of the process to complete the task are taken out. AI can predict and produce the results. A quip in Tesler's Theorem says AI is whatever hasn't been done yet. For instance, optical character recognition is frequently excluded from things considered to be AI, having become a routine technology. Modern machine capabilities generally classified as AI include successfully understanding human speech, In strategic games like Chess and GO competing at the highest level, and also imperfect-information games like poker, self-driving cars, intelligent routing in content delivery networks, and military simulations. [4]

The standard issues (or goals) of AI research include consolidate thinking, planning, representation of knowledge, Natural language processing, learning, wisdom and the ability to move as well as control and manipulate the objects. AGI is among the field's of long term goals. Approaches consolidate quantifiable strategies, computational understanding, and standard agent AI. Many instruments are used in AI, including transformations of search and mathematical progression, counterfeit cerebrum associations, and procedures considering bits of knowledge, probability and monetary issues. The AI field draws upon computer programming, information planning, science, mind research, historical underpinnings, thinking, and various fields.[4]

In the twenty-first century, AI strategies are playing a dominant role in the advancements of PC Utilization, AI methods are turned into fundamentals for different business organizations in handling and testing the issues related with software engineering, computer programming and research activities[4].

4. MACHINE LEARNING

Machine learning (ML) is the study of PC estimations that work on normally through experience and by the use of data. It is seen as a piece of electronic thinking. Machine learning estimations collect a model considering test data, known as getting ready data, to seek after assumptions or decisions without being explicitly altered to do thusly. Machine learning estimations are used in a wide grouping of usages, for instance, in medicine, email filtering, talk affirmation, and PC vision, where it is inconvenient or difficult to cultivate customary computations to play out the necessary tasks.[5]

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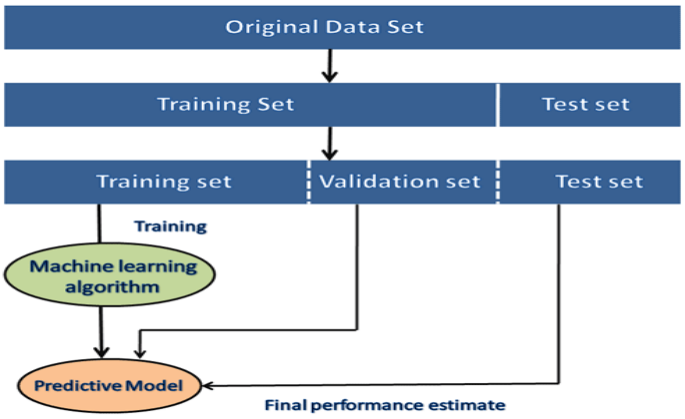

Figure 3. Machine learning Dataset

A subset of ML is solidly associated with computational estimations, which bases on making figures using PCs; but not all machine learning is verifiable learning. The examination of mathematical progression conveys methods, theory and application regions to the field of machine learning. Data mining is an associated field of study, focusing in on exploratory data examination through performance learning.[5]

5. RESULTS AND DISCUSSION

Running/Push-ups	Covid Infection Susceptibility
5	21.4
7	55.4
6	60.9
3	72.1
1	80.5
4	66.6
8	50.2
2	76.5
11	42
15	33.5
10	46
20	25.5
12	40.3
13	38.3
16	30.5
13	38.1
14	36.5
18	27.5
19	26.2
17	28.9
21	24.5
25	21.5
30	16.2
23	22.4
26	20.2
28	18.2
22	23.6
24	21.4
27	19.4
29	17.1
9	44.2

Figure 5. Input Sample Dataset

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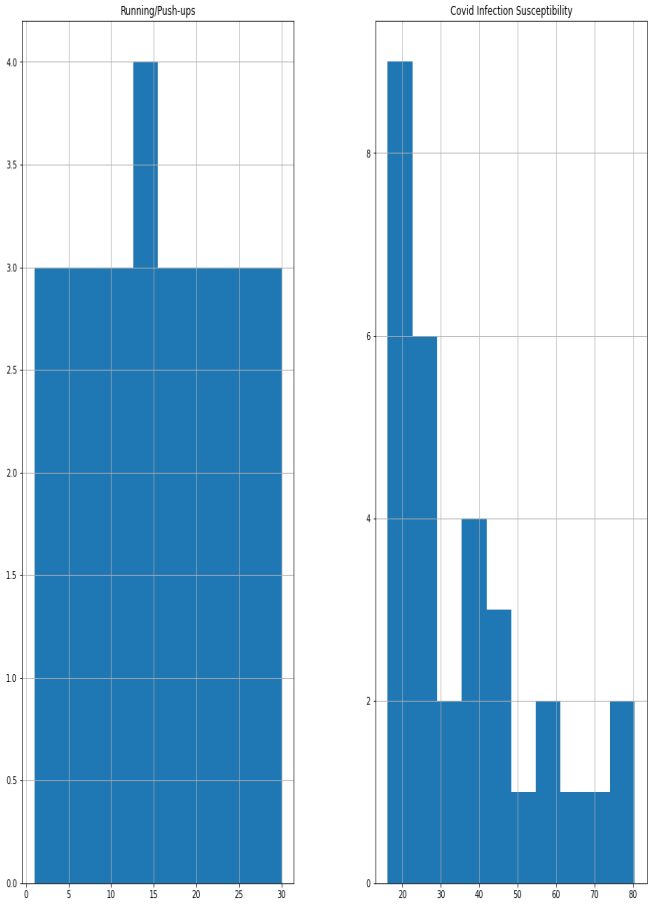

Figure 6. Output graph 1

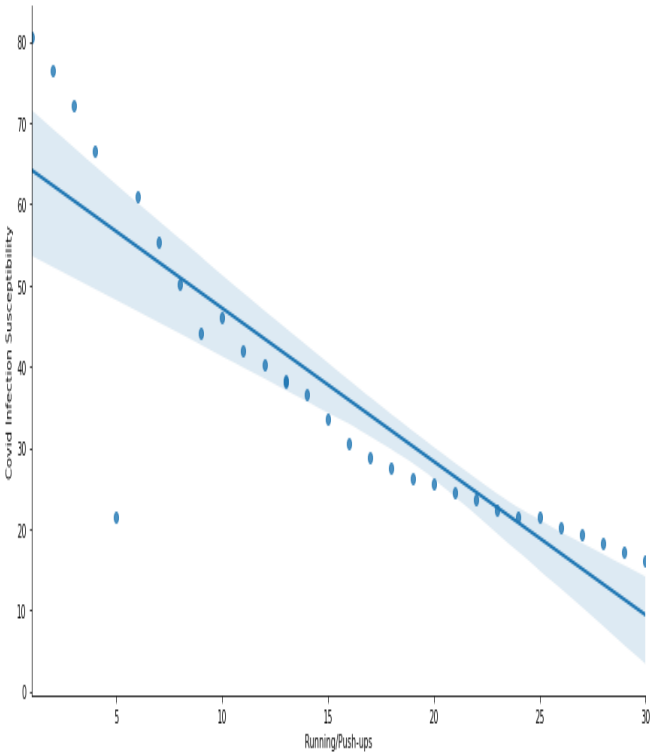

Figure 7. Output graph 2

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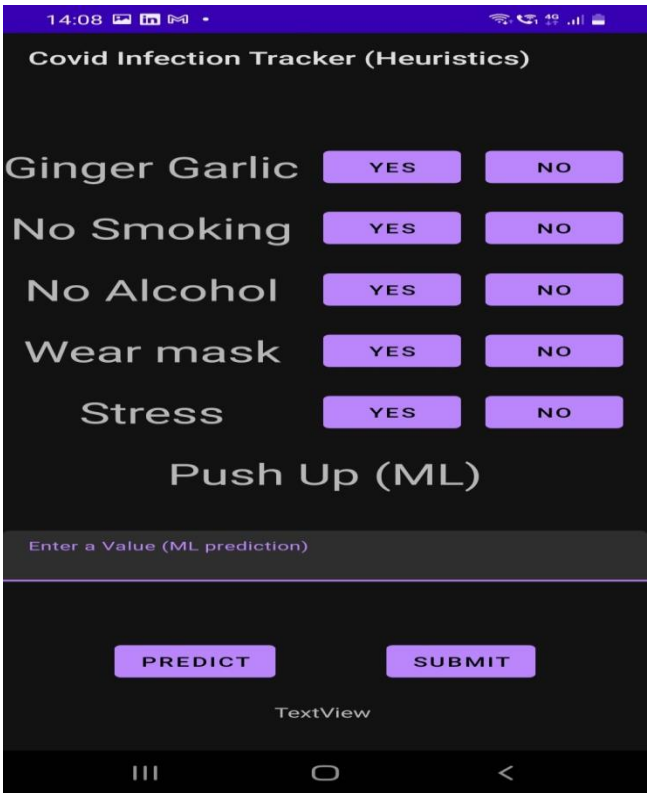

Figure 8. Mobile App – Input data

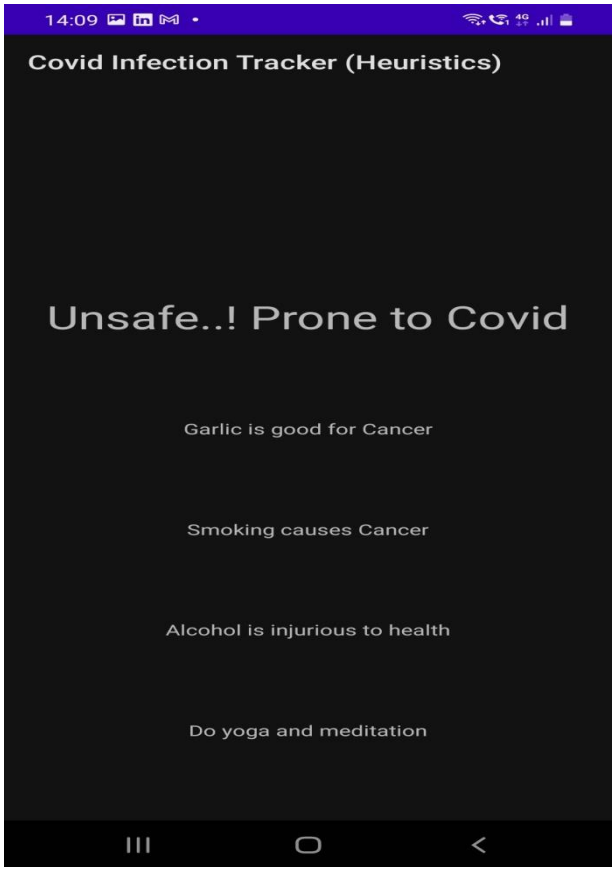

Figure 9. Status Output 1

This top down approach presented here is an algorithmic flow that generates the output based on a logical series of conditional statements. Most of the infrastructure systems still use an expert designed top-down approach. Since the infrastructure solutions are all very well defined, the top-down approach is still the status quo method for developing software. In this particular project, an effective mobile application for showing susceptibility for covid-19 infection is presented. Heuristics is a top-down algorithmic approach that follows a simple thumb rule based approach. Multiple conditional clauses can be incorporated with strong domain knowledge to create powerful top-down software automata.

6. CONCLUSION AND FUTURE WORK

The heuristic based approach is successfully carried out. The model uptakes one's lifestyle habits and gives one's susceptibility towards Covid-19 infection. The model can mention out important parameters that have drastic effects on the output i.e., one's susceptibility to Covid-19 infection. A total of six parameters are used and by simple majority count of four parameters the person is declared as either susceptible or not for covid-19 infection. The future works can be carried out using this model by employing it in mass gathering places such as schools colleges etc., and thus tracking using important parameters gives us away the correct prediction thus enabling us to prevent the spread of Covid-19. A trained linear regression model is also incorporated as a top-down sub-module into this project. It maps the inverse proportionality between exercise and covid-19 susceptibility.

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