Adversity is the genesis of discovery

BASEF

Error 404 .. Covid not responding!

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Purpose

The coronavirus disease 2019 (COVID-19) outbreak has created a global health crisis that has profoundly impacted how we perceive our world and our everyday lives. Since the first appearance of the covid-19 on 31 December 2019, the number of infected people has been in continuous growth, and today, in 2021, the number of infections has reached over 450 million cases and over 6 million death cases. What makes it even worse is the virus mutants, such as what appeared in South Africa last November, SARS-CoV-2. Most people infected with the virus experience mild to moderate respiratory illness and recover without special treatment. However, some become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop severe illnesses. Anyone can get sick with COVID-19 and become seriously ill or die at any age, and to avoid being infected, the world declared the global pandemic. This interrupted the social gathering and face-to-face communication. Thus, people couldn't go to work or school offline, so they had to learn or work remotely, which decreased the efficiency of working or learning and resulted in a substantial economic loss. However, despite all of these problems, the public isn't taking this crisis seriously, which makes this crisis more dangerous and hard to solve. If we can raise the public's awareness, the number of cases will decrease dramatically and, thus, will make the crisis easier to solve.

Software Used

Table(1): Software that was used

Software	*Usage*	*Picture*
Python	The language was used to code the Backend in the system.	python
OpenCV	The python library was used to provide the required functions for computer vision & object detection.	OpenCV
Additional Python Packages	Different python packages were required to implement additional functions.	
Web Development Tools	HTML, CSS, JavaScript languages were used to code the GUI of the mobile application.	HTML CSS JS

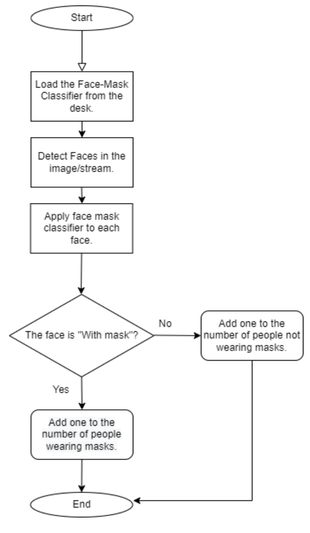
Abstract

The global pandemic we all live in today is due to the appearance of COVID-19. COVID-19 resulted in a massive fall in all the communities: economy, health, and mental health. The longer it exists, the more people get infected or even die by it. Scientists developed many drugs and vaccines, like Moderna. These vaccines showed promising results in fighting COVID-19, but the problem is that COVID-19, like all viruses, evolves quickly, adapts to the changes, and becomes immune to these vaccines. The second major problem is that the public isn't taking this crisis seriously: they don't follow the safety procedures in public or closed areas, and many don't take the vaccines, as they see that the vaccines are not safe. It is critical to raise public awareness as it will be a significant factor in solving this problem. A solution is proposed to help solve this problem by using computer software and cameras to track each person and indicate if he is following safety procedures. This will help supermarkets and any closed building keep the place safe for all the visitors. This program will also be used in our daily life as a mobile application to track how many people are there in particular places and the risks of getting infected so that we can stay safe.

Procedures

To complete our project, we have followed the Engineering Design Processes (EDP) steps as follows:

- **First**: We have identified the problem, which is the massive increase in the number of Covid-19 infections with the lack of a 100% effective vaccine.
- **Second**: We have searched about the prior solutions that attempted to provide a solution for this problem. The majority of attempts focused on making a vaccine for the virus instead of reducing the number of cases. The problem with vaccines is that the virus constantly changes its genetic material to ensure its continued resistance to new vaccines. We decided that we would try to solve the problem differently: continuing to apply strict precautionary measures.
- **Third**: After that, we have made the flowchart for the algorithm we will use and we have searched about the required technologies.
- **Fourth**: In this step, we searched for a free dataset containing photos for both people wearing masks and people without masks to be used in the training model.
- **Fifth**: Coding process: We started to install the required technologies: Python, TensorFlow, NodeJS, and we have written the codes, both for the training model and the main code that will connect the model to the live camera. (shown in figure 2)
- **Sixth**: We started to build the GUI for the program that will present this data to the users using the web technologies: HTML, CSS, JavaScript.
- **Seventh**: We started to build the server that connects the system to the program using Python programming language.



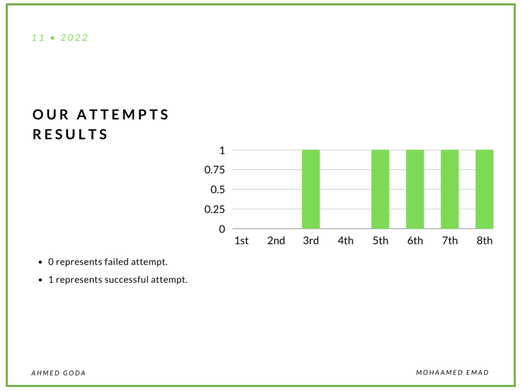
Figure(1): The flowchart of the mask detector

Applications

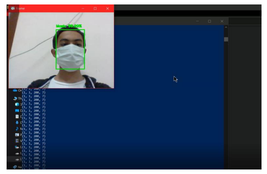
Applying this project will help increase public awareness by making most people wear masks and adhere to safety precautions. Thus, it will decrease the number of infections and help solve the crisis. The project has many applications:

- In big supermarket's cameras, to track the customers.
- In schools, it will help keep the kid's health in good condition.
- In any closed area to limit the gatherings.
- For personal usage, people can use the app to see the risks of getting infected while visiting a specific place.

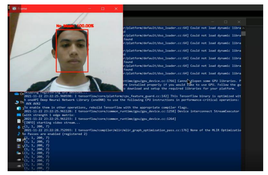
Graphs & Data Collection



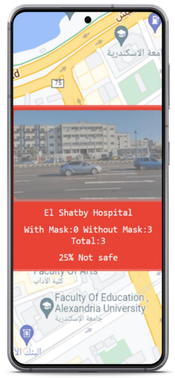
Figure(2): Our test plan results



Figure(3): Testing the prototype (mask detected)



Figure(4): Testing the prototype (no mask detected)



Figure(5): Our final mobile application

Conclusion

From all the research and procedures, it was concluded that one of the best solutions for the pandemic problem is building a system that can detect people who do not wear protective masks or do not adhere to the application of preventive measures in general, and then connecting this to a mobile application to obtain the live data from places that use the system and serve it to the user who can benefits from it in protecting himself from being infected. This can be done using the technologies of machine learning and computer vision (Python and OpenCV) and web-development tools (HTML, CSS, JavaScript). The application can determine the number of people in the place and whether they are wearing masks or not. The system can be used in commercial centers, hospitals, or even schools. The generalization of this project means reducing the enormous inflation of the number of corona cases. The application was tested, proving that it is efficient and a big deal accurate. Applying this project to a broader market will contribute to solving the global pandemic or at least reducing its negative consequences.

Future Plans

To continue resisting COVID-19, Future improvements and plans are required. It is planned to do execute some steps that will help us improve our project:

- E-mailing the World Health Organization (WHO) to ask them how we can obtain the expected risk of getting infected using the data provided by the system.
- To connect the application with a robot that will act as a security man to force people to wear their masks while in public places such as supermarkets.
- It is also planned to continually improve the project until it becomes a complete security system to defend both public health and public safety.

Resources

*The following is a list of the resources we have used in **APA** format:*

- Cassimiro, G. (2021, July 16). *Object detection with Tensorflow model and OpenCV*. Medium. https://towardsdatascience.com/object-detection-with-tensorflow-model-and-opencv-d839f3e42849
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- *Real-time Human Detection with OpenCV*. (n.d.). Retrieved December 19, 2021, from https://thedatafrog.com/en/articles/human-detection-video/

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