Machine Intelligence Report

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1. International issues

As there are a lot of international problems that affect the world I tried to select the most five pressing international issues that are related to Egypt , as we will see most of these problems help the another problems to become worse.

1.1 Public Health

Public health promotes and protects the health of people and the communities where they live, learn, work and play. While a doctor treats people who are sick, those of us working in public health try to prevent people from getting sick or injured in the first place. We also promote wellness by encouraging healthy behaviors. Public health works to track disease outbreaks, prevent injuries and shed light on why some of us are more likely to suffer from poor health than others. The many facets of public health include speaking out for laws that promote smoke-free indoor air and seatbelts, spreading the word about ways to stay healthy and giving science-based solutions to problems [1]. From conducting scientific research to educating about health, people in the field of public health work to assure the conditions in which people can be healthy. That can mean vaccinating children and adults to prevent the spread of disease. Or educating people about the risks of alcohol and tobacco. Public health sets safety standards to protect workers and develops school nutrition programs to ensure kids have access to healthy food .Public health saves money, improves our quality of life, helps children thrive and reduces human suffering [1].

The Egyptian health care system faces multiple challenges in improving and ensuring the health and well-being of the Egyptian people. The system faces not only the burden of combating illnesses associated with poverty and lack of education, but it must also respond to emerging diseases and illnesses associated with modern, urban lifestyle. Emerging access to global communications and commerce is raising the expectations of the population for more and better care and for advanced health care technology. A high birth rate combined with a longer life expectancy is increasing the population pressure on the Egyptian health system [2].

1.2 Overpopulation

The world population is growing at a rapid speed, According to World Population Awareness, "We are now using between 1.2 and 1.5 planets worth of resources that can be sustainably supported. Before mid-century we will need the capacity of two Earths to keep up with our level of demand." [3]. In 1900, there were just under two billion people living on earth and somehow, we as a people managed to grow that number by more than 300 percent in just over a hundred years. According to the Population Reference Bureau (PRB), 6.5 percent of the 108 billion people who were ever born are living today. That number might seem small at first glance, but think about it for a minute, that's 6.5 percent of everyone since 50,000 B.C. The problem of overpopulation seems to have a strong correlation to global warming with humans using more than what the Earth can provide for them [3].

Washington, DC- Merza Hasan, the executive director of the World Bank (WB) Group, said that the real challenge before the Egyptian economy at the present time is overpopulation, noting that Egypt's population grows by 2.3% annually, which could destroy any economic progress. "When the population is large, this makes it hard for the economy to achieve the desired growth," Hasan said, adding that it is important to benefit from the Chinese model in this area [4].

1.3 Poverty

Most people in the world live in poverty. Two-thirds of the world population live on less than 10 $-int per day. And every tenth person lives on less than 1.90 $-int per day. Global poverty is one of the very worst problems that the world faces today. The poorest in the world are often hungry, have much less access to education, regularly have no light at night, and suffer from much poorer health. To make progress against poverty is therefore one of the most urgent global goals [5]. During the first half of the last century, the growth of the world population caused the absolute number of extremely poor people in the world to increase, even though the share of people in extreme poverty was going down. After around 1970, the decrease in poverty rates became so steep that the absolute number of people living in extreme poverty started falling as well. This trend of decreasing poverty—both in absolute numbers and as a share of the world population—has been a constant during the last three decades. But as we highlight in the first section of this entry it is unfortunately not what we can expect for the coming decade. It is the fact that still almost every tenth person lives in extreme poverty and the slowing progress against extreme poverty that motivate this entry [5].

One in three Egyptians is living in poverty, the official statistics agency reported Monday, following years of austerity measures aimed at reforming the economy. The report said 32.5% of Egyptians lived below the poverty line in 2018, up from 27.8% in 2015 and 16.7% in 2000. It said 6.2% of Egyptians live in extreme poverty. It set the poverty line at around $1.45 per day and the extreme poverty line at less than a dollar a day [6]. The highest percentage of poverty among 99 million Egyptians was recorded in Upper Egypt, mainly in Assuit and Sohag, with 66.7 percent and 59.6 percent respectively, the survey revealed, adding that poverty rates ranged from 80 to 100 percent in about 46 villages in these two governorates [7].

1.4 Environmental pollution

Environmental pollution has existed for centuries but only started to be significant following the industrial revolution in the 19th century. Pollution occurs when the natural environment cannot destroy an element without creating harm or damage to itself. The elements involved are not produced by nature, and the destroying process can vary from a few days to thousands of years (that is, for instance, the case for radioactive pollutants). In other words, pollution takes place when nature does not know how to decompose an element that has been brought to it in an unnatural way [8]. Pollution must be taken seriously, as it has a negative effect on natural elements that are an absolute need for life to exist on earth, such as water and air. Indeed, without it, or if they were present on different quantities, animals – including humans – and plants could not survive. We can identify several types of pollution on Earth: air pollution, water pollution and soil pollution [8].The effects of environmental pollution on humans are mainly physical, but can also turn into neuro-affections in the long term. The best-known troubles to us are respiratory, in the form of allergies, asthma, irritation of the eyes and nasal passages, or other forms of respiratory infections. Notably, these well-spread affections can be observed when air pollution is high in cities, when the weather gets hot, for instance. On top of that, environmental pollution has been proven to be a major factor in the development of cancer. This can happen for example when we eat reminiscences of pollutants used in the production of processed foods, or pesticides from the crops. Other, rarer, diseases include hepatitis, typhoid affections, diarrhea, and hormonal disruptions [8].

Cairo has been ranked as the second most polluted large city in the world, according to a report issued by the World Health Organization (WHO), which studied air pollution globally from 2011 until 2015. In 2017, the United Nations Environment Programme stated in a report that 40,000 people in different parts of Egypt all died from pollution. The report pointed to the absence of trees within Egypt's capital as leading to the increase of air pollution. The UN report explained that Cairo is similar to Iran's capital Tehran and the US city of Los Angeles in their air pollution ratios. The situation in Cairo differs slightly as the topography allows for an effective decrease in air pollution compared to the other two cities. The WHO report noted that seven million people worldwide die from exposure to polluted air, addeding that nearly 4.2 million people died in 2016 from air pollution; pollution from fuel exhaust also resulted in the death of 3.8 million people in 2016. Being that it is the capital of the country, hosting a population of 19.5 million, Cairo is considered to be the most congested city in Egypt. The Qalyubia, Giza and Cairo provinces together represent what is known as Greater Cairo [9].

1.5 Global warming

The continuous rise in temperature of the planet is really upsetting. The root cause for this is global warming. Global warming begins when sunlight reaches the Earth. The clouds, atmospheric particles, reflective ground surfaces and surface of oceans then sends back about 30 %of sunlight back into the space, whilst the remaining is absorbed by oceans, air and land. This consequently heats up the surface of the planet and atmosphere, making life feasible. As the Earth warms up, this solar energy is radiated by thermal radiation and infrared rays, propagating directly out to space thereby cooling the Earth. However, some of the outgoing radiation is re-absorbed by carbon dioxide, water vapours, ozone, methane and other gases in the atmosphere and is radiated back to the surface of Earth. These gases are commonly known as greenhouse gases due to their heat-trapping capacity. It must be noted that this re-absorption process is actually good as the Earth's average surface temperature would be very cold if there was no existence of greenhouse gases. The dilemma began when the concentration of greenhouse gases in the atmosphere was artificially increased by humankind at an alarming rate since the past two centuries. As of 2004, over 8 billion tons of carbon dioxide was pumped thermal radiation is further hindered by increased levels of greenhouse gases resulting in a phenomenon known as human enhanced global warming effect. Recent observations regarding global warming have substantiated the theory that it is indeed a human enhanced greenhouse effect that is causing the planet to heat up. The planet has experienced the largest increase in surface temperature over the last 100 years. Between 1906 and 2006, the Earth's average surface temperature augmented between 0.6 to 0.9 degrees Celsius. According to Intergovernmental Panel on Climate Change (IPCC), carbon dioxide and methane levels have increased by 35 % and 148 % since the industrial revolution of 1750 [10].

With 1.1% of the world's population, Egypt accounts for only 0.5% of global emissions; an average of 2.3 tons of CO2per person, Egypt is ranked 29 in terms of global polluters, Energy, electricity, and transportation are the leading sectors contributing to GHG emissions in Egypt, Egypt contributes 31% of the CO2 emissions from North Africa, and 13% of the CO2 emissions from the whole of the African continent. With climate change it is still unknown what the impacts upon the Nile River flow will be. There are studies that suggest that with the increase in global temperatures there will be increased evaporation in the Nile River and thus less water supply and ultimately water scarcity. Other studies suggest that with the increased evaporation in Egypt, will result in increased precipitation in the Ethiopian highlands (more upstream from Egypt) which will lead to increased runoff in the Nile River flows downstream in Egypt. This may ultimately cause floods as the Aswan Dam at Lake Nasser in Egypt may not be able to cope with this increased runoff. The ultimate problem is that these two scenarios requires completely opposite adaptation strategies; one entails floods and increased runoff, the other is water scarcity and possible drought [11].

2. A Review on Efforts done for public health

2.1 ML in healthcare for imaging and diagnosis

With machine learning advancing at an astounding speed, machine learning is an active application in diagnosis of human diseases. As machine learning operates on algorithms, healthcare specialists are aiming to leverage this technology in their field by actively developing algorithms and providing information to machines that can help them in imaging and analyze human bodies for abnormalities. By using smart machines machine on a human body, the machines can quickly scan through the body and can click images to detect diseases early on [12].

2.2 ML in healthcare for data collection and follow-ups

As big data has several applications and gathers information from every possible source, leveraging the same to improve human life can be helpful for doctors to provide people with enhanced services. When ML can accommodate sufficient information about a user, doctors can personalize the treatment options. This personalization of services is possible with the help of machines providing insights about risks of a particular patient being susceptible to a specific disease. With accurate information and actionable insights, machines can also suggest users and doctors about remedies and precautionary measures with depending on a patient's response to medications [12].

2.3 ML in healthcare for radiology and radiotherapy

ML has proved its worth and capabilities to detect cancer in the past and is one of the most viable options for leading healthcare pioneers to identify any abnormalities. With such performance, ML is proving to be another strong option for radiology and radiotherapy. Doctors can use this technology to scan through the possibilities of a patient's response to a specific input of radiations through their body. ML can also help doctors and surgeons in deciding what and how intense a radiation would be required depending on how well the patient responds to specific amounts of emissions [12].

2.4 ML in healthcare for drug discovery and experiments

Scientists strive to find ways of how they can discover newer ways to certain deadly diseases. With rigorous attempts at improving healthcare, they search for different drugs that can behave as advanced medicines and perform experiments that are focused solely on how these medications can help. Machine learning algorithms help scientists by providing them information about how to improve drug performance and behavior of the same on a test subject. The behavioral details that noted from a test subject and a dummy drug can be noted and ML algorithms can be used to determine how those medications perform on a human being [12].

2.5 ML in healthcare for surgeries

Current technological innovations continuously strive to improve the healthcare situation for patients and doctors. When machines focus on improving the performance of operations, they can help doctors by using surgical robots. These surgical robots prove to be of great help to doctors as they provide doctors with high definition imagery and extended flexibility to reach out in areas that are crucial for a doctor. Machine learning has several other applications in numerous fields that try to improve human life. As healthcare pioneers are working to improve the current scenario of their industry consistently, they can now search for ways in which their organization can leverage this technology and how they can benefit from the same [12].

3. Proposed Solution

3.1 Solution Overview

I will focus on detection the activity and the product that had negative effect on the human, as we know the government don't force people for healthy actions or don't track them in the quarantine but here is the problem a lot of people don't take quarantine seriously which cause to spread the disease (corona as example) more quickly.

First of all we need to use all camera in the city for the solution what the model do is following:

1. Look for any wrong activity like (being too close during quarantine, no mask, etc.) or any Signs of disease (cough, high temperature, etc.)
2. The model will properly tell the police and hospital if needed

The model's task is simple but difficult at the same time as it needs to process video and extract the activity then decide it wrong or not in real time

3.2. Data collection and preprocessing

We can collect data from different cameras around the city, using old videos, social media and we can create our own video for that purpose. But we will need large data set for the model for each action we need to detect the real challenge will be to find and classify all the needed videos.

Maybe we can use trends for collect data as Facebook did at #10yearschallenge they collected a lot of classified data in so short time.

We need to validate the data, handle the different video quality and handle different country will result to different actions which will must be handled.

3.3. Model Training

For video classification we will turn it into frames so we can give it to our model.

First of all we need to detect human so the most important thing at first is to detect human from any video correctly then try to discover which can be done at the same time if there are only one model or separately (model for detect human and another for process the frames and decide if there are wrong actions).

As we know the CNN will work great for images and maybe we use Unet for human detection as it is well known as good solution for segmentation problems

The real challenge will be detect actions not human but I think it will not be impossible.

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