Nick Reardon

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Professor Catherine Williams

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COVID Projections for Macomb, Michigan

At first it was fear, panic, and mania not only in the United States but also around the entire world. This has since subsided but not necessarily due to safety. As you will see throughout this document I will lay out the hard facts and the numbers to corroborate the idea that we should not be complicit just because 2 years have gone by from the start of the pandemic. This is still a real tragedy, the pandemic hasn’t gone anywhere and, yes, although we do have the vaccines to help keep us safe and/or out of the hospital, we are seeing the numbers surge once again. This paper examines a 30 day trend of data specifically for my hometown: Macomb, Michigan.

The political atmosphere here is very tense. Most people tout Trump as their desired official while the Biden supporters quietly stand by and vote. It’s very sad that this pandemic has been politicized because it is making it normal for us to isolate ourselves and, in turn, do so permanently from our friends and even our families (I’m speaking from experience). I know many people who have severed all ties with their closest family members because of either a political divide, a religious divide, or just plain arguing. We’re not safe, but luckily I, and my most loved ones, are fully vaccinated with the booster shot as well.

I can’t say for sure that I’ve been exposed to the coronavirus but I do know for sure that I have never contracted it. COVID has decimated our country, and the world, and has left us all exhausted in its wake, a wake that still carries on. COVID does not only pose an existential threat to us and the broader humanity, it also poses consequences that you will be dealing with for your entire life (the “long-haulers” as is being said now). COVID, on it’s own, at first will cause you to have a fever, it will make you cough, you’ll feel short of breath, you’ll be fatigued, you’ll get the chills (sometimes with uncontrollable shaking), body aches, headache’s, a sore throat, congestion, loss of taste, loss of smell, nausea or vomiting, and diarrhea and these are just what to expect upon getting infected.[1] These symptoms have been enough to kill over **5.9 million** people world-wide and has potentially left over **493 Million** with the chance of having long-haul side effects.[2]

Another thing about COVID is that you can catch it, recover from it, and then catch it all over again… repeatedly. And with each reoccurring infection the odds of long-covid increase dramatically as well as the potential for significant neurological and autoimmune disease.[3] Among these symptoms you have the potential to expect, after getting reinfected, migraines, vascular issues, heart disease, fatigue, lower oxygen levels (depending on damage to the lungs), cognitive decline, IQ decline, brain fog, inflammation (basically everywhere), strokes, pulmonary embolisms, and cardiac injury.[4] This list is not exhaustive either, these are just a few examples of what to expect.

Knowing this, it is sad to see so many people just ignoring this disease like it doesn’t even exist (and some people do seriously believe that it’s a hoax thanks to our Republicans)! We should look at this disease and the effects it can have on us, vaccinated or not, with our eyes wide open. This is not something that we can just say “ok, we’re fine now” and have the pandemic be over. So, using the tools that I have with regards to data science, I’ve decided to explore the data for a 30-day period and forecast what to expect in the near future.[5] Here are some of my findings…

Forgive me if this comes off as selfish but I wanted to focus only on my own state as well as my own county, Macomb, in particular. Here in Michigan we have seen a growing rate of death over the past 30 days. At the beginning we were losing around 380 people daily, now it is ramping up and we are losing around 410 people a day due to COVID. In my county alone there have been approximately 3,830 deaths since the beginning of the pandemic. One thing that we may think is worse than death is if people get infected and actually live. Life is a great thing, right? Well, what if you’re permanently disabled? What if you have the threat of having a heart attack at any moment now after being infected? How will you be able to live a nice, fulfilling life without the anxiety of knowing that you can die at any moment now after being infected and feeling that lack of health and energy that you will feel after getting infected? It’s like the flip of a switch. You’re okay, you get infected, and now you’re not okay. Rinse. Repeat. It really is that easy.

As of the 25th of February 2022, there have been cumulatively about 225,000 cases here in Macomb alone. That’s 225,000 people who now must live with the potential of having long-term symptoms, potentially shortening their life, and that is if they had the ability to recover. 1 out of 50 people who catch COVID here in Macomb will die while the rest are ill-fated and have to live with the long-haul possibilities of harm, and it is **very likely** that you will have long-haul symptoms. On top of that, this is a novel virus, we do not know how exactly it will affect people 5 years from now because we simply do not have that data yet. All we can do as of now is report on the statistics and make projections.

Luckily, we are at a point in this pandemic where we do not need to worry about the hospitals reaching their critical capacity, but that’s not to say that it won’t happen again. Look, I’m an optimist here; I think that the worst has passed, but I do not think that this is the end. Most people seem to be acting as if it is. We’re lifting mask mandates and telling our civilians that everything is ok. Well, mostly ok. I do not believe that people assume that it won’t happen to them and that’s probably why I still see people wearing masks. Those who contract it, for whatever reason, each have the unique possibility to cause it to mutate. Once COVID mutates, we have a new variant and now we have a new, potentially worse, form of COVID that we have to protect ourselves from.

I, personally, think that we need to focus now more than ever on crushing this disease. We need the infection rates to go way down, but the data is saying the exact opposite. Here is a graph of the deaths here in Macomb Michigan day by day.

Chart, line chart, histogram

Description automatically generated

This is interesting because it looks like the data is intermittent. After looking at the data we can see that there are some days where no one dies, followed by days where a fair portion of people die, followed by very few deaths, and then an immediate upsurge of deaths, which is then followed by nothing and another significant spike. This is the pattern that I see in this data and this data is recent. This pandemic is not over and I’m not sure if it ever will be. I think that, at best, we’re going to have to treat COVID as if it were the Flu. We’re going to have to get repeatedly vaccinated to help prevent us from getting infected or, if we do get infected, reduce the symptoms to the point of where very few of us will need to be hospitalized.

This may sound pessimistic, but it is not absurd. This country has been divided due to two main reasons: Trump and COVID. Trump alone divided our families, and we are still paying the price for that. Now, his attitude and his supporters still resonate in our decisions that we make every day. If you don’t want to wear a mask you are thought of as a “Trumper” and that’s derogatory. If you do wear a mask, that means that you are anti-Trump, which is not good to the opposition. There are two sets of people, Trumpers and Anti-Trumpers, and the way to show your solidarity with Trump is by removing your mask. This is just one example of how this pandemic has been politicized.

Unfortunately, we all must deal with the results of people not wearing a mask and that is mutations. We have seen 2 major mutations since the original outbreak, Delta and Omicron, with new variants to look out for, the new one being BA.2 (a currently unnamed variant of Omicron), and we have had to respond accordingly. First it was the main vaccine, and the “agreement” was to have the follow-up vaccine approximately one month later. Well, things change. Now that the variants are coming, we need to fight the war against them and come up with more vaccines to keep us all protected. That means that we must keep getting poked until eventually nothing new comes around. The quickest way to prevent variants is through wearing a mask! The people who respect their duties to protect themselves and their families who wear their masks and sanitize everything they can to help prevent this from getting further out of hand are being undermined by the opposition. It is due to this opposition that we are seeing the new variants. This is a fight that we have yet to win, if the ability to win even exists, and we need to stay vigilant to protect ourselves, our neighbors, our friends, and our families from the danger that this disease can bring.

I decided to try forecasting COVID death rates using deep learning. I used a library called GluonTS and a model called DeepAR. Amazon originally developed this algorithm and it was supposed to out-perform most, if not all, of the other algorithms. The runner up algorithm is Facebook Prophet. These algorithms have the choice to have seasonality and holidays integrated with them which, in my experience, has proven to be quite useful. For the sake of this effort I decided not to use seasonality.

I split the data for my county into a training set of the length 25 and a test set with a length of 5. I trained DeepAR for 25 epochs and got a great loss. However, this is what the program’s output was using DeepAR.

Chart

Description automatically generated

This is in opposition to the real data, which looks like the following.

Chart, line chart

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Obviously there is an issue with this forecast. The lower end will predict a negative death rate, and that’s obviously not possible. That being said, if you look at the maximum values it does start to appear that it may be a good algorithm. It still doesn’t catch the intermittent nature of the data but it does get pretty close to the rolling average. I also decided to check the predictions of SARIMAX[6], which provided worse results and I ultimately removed it from my code for presentation purposes. Either way, my conclusion is that I would probably need more data to train on.

Using unique identifiers also increases the accuracy of your deep learning models (in this case, DeepAR). By doing that you can compare trends across not only one county, but the entire nation as well. In any case, while this effort may be done in vain, there was a lot to learn about deep learning and how it can not only be applied for regression and classification but for forecasting as well.

References:

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