RISK ANALYSIS OF DIABETES AND COVID-19 DEATH RATE WITH MAJOR DISEASE COMPLICATIONS USING MACHINE LEARNING

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Abstract:

During the recent global urgency, scientists, clinicians, and healthcare experts around the globe keep on searching for a new technology to support in tackling the Covid-19 pandemic. The evidence of Machine Learning and Artificial Intelligence application on the previous epidemic encourage researchers by giving a new angle to fight against the novel Coronavirus outbreak. Making risk-free surroundings will be priority of every person's mind so that life can be conductivejust as before. Diabetes is an around the world predominant infection that can cause obvious micro vascular confusions like diabetic retinopathy macular edema in the natural eye retina, Cardiovascular, TB, Nephrology, Parkinson disease. In modern medical science, images are basic instrument for exact information of patients. Meanwhile assessment of contemporary clinical symbolisms stays complex. This disease data can predominant in various ways to cause of death rate factors. We collected different types ofdisease with comorbidity of diabetes along with other disease dearth rate dataset is collected from Kaggle and PubMed source. Using machine learning and Deep learning concept we are classify the images of chest x-rays and CT scan images of eyes, Lungs, which can effect of various disease symptoms along effect of organs also. Here majorly focused on Coronavirus, Diabetes Mellitus, TB, Kidney disease images ete.. UsingArtificial Neural Network and KNN can classify the images and LR and Random forest algorithms createdplots of images how fast its grown up and getting accuracy of various disease risk factors like 72-85% Diabetes to Retinopathy, 75-85% TB, Diabetes to Nephrology 75-92%, Covid-19 to TB is 80-95% and Covid-19 to Alzheimer's 80-90%, Covid-19 to Diabetes 80-95%. This factor of accuracy is calculated basedon WHO record and radiologist's suggestion.

Keywords: Machine Learning, Deep learning, image classification, linear regression, diabetes, Covid.

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1. Introduction

This paper mainly focuses on risk factor of comorbidity concept that has to may diabetic patient caught withany secondary disease with severity so now a day most of them aware about how so far disease can get with and without age group relationship. Here we are followed by some major disease with data frame work usingmachine learning technique and artificial network concept how a disease defects the one priority to anotherpriority to goes for increasing of dearth rate causes. Here implemented data frame work based on age factor dearth risk analysis of major diseases. Novel coronavirus covid-19 pandemic time many of the patients are suffered with similarity of body infection like cough, fever, lung disease, Diabetes Mellitus**,** Tuberculosis (TB)type of disease patients have more chance for dearth risk factor increase. Some of the disease will takemajor help of diagnosis or radiology help to predict the state of disease like Chest X-ray and CT scan image will help for medical diagnosis of how much body organs are damaged with the disease. Challenging factors of various disease will help for radiology to predict the diseases like CT and MRI images cases. For Covid-19dearth rate we are classified based on CT scan and database also classified using Artificial neural network and K-NN along with linear regression model is used for data base classification. And accuracy is 66% shown asper the covid-19 database on April 4, 2021, active covid-19 cases and dearth rate per week evaluation and day to day accuracy also defected based on database using KNN and Random forest algorithm.

We collected data to various diseases how much dearth rate defect nearly a year as we can see that Diabetes Mellitus 2.5Millions of people suffered there is no age limit to effect with is disease at same stage to go forvarious disease dearth rate can see that Cardiovascular 2.6Millions, Retinopathy 1.25Millions, Alzheimer'sis not just a memory loss of disease it can effect more and American people are yearly grown up project value is $355billion of medical care and medical bill generated and worldwide dearth rate is 1.15Millions of patients per year and as of now 50Billons of patients are died, TB 1.5Millions, Parkinson 1.0Million, Nephropathy 4.5Millions and Diabetes 3.5Millions of patients are died per year and this data is collected from google internet from various disease sources link.

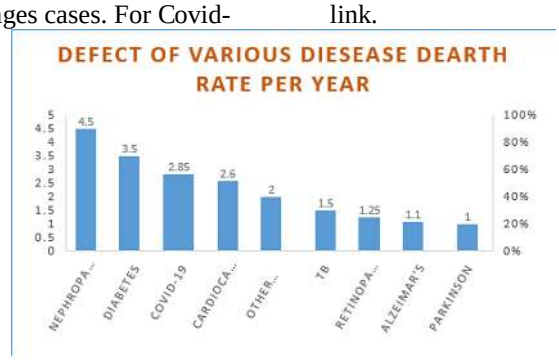

Figure 1: Defects of various disease dearth rate per year.

2. Data Collection and Discussion

Diabetes Mellitus is one of the most dangerous disease every knows that how now a day it effects on the different type of diseases effects on this most of the dearth rate cases may happens due to the comorbidity reason human body doesn't have that much humanity power to control and defect with the virus. Virus how itmay cause inhuman body at the same time it can damage any organ at any age if may have they comorbidity.

This paper proposed that diabetes with comorbidity attacks with dearth rate Cardiovascular disease, Retinopathy, Nephropathy, TB, Asthma, Alzheimer's, Parkinson, epilepsy, covid-19 etc..

Cardiovascular disease: CVD risk factor may depends on the age consideration and this investigationfollows the dearth rate cases. This data is collected from pubMed. Epilepsy was no longer associated with cardiovascular risk after adjusting for health behaviors at the same time diabetes mellitus is longer disease todefect the CVD. The age factor can be consider >50 years, <50 to 60 years and >60 years and 60< to years data we collected for dearth rate for CVD to other diseases[1].

Some of the survey has compared cases of cardiovascular measuring in people with and without diabetes along with some other prior studies they compared risk of CVD[2, 3]. Heart disease, hypertension and strokewill more effect on diabetes mellitus people they regional with proper food meditation in case it differ anything changes in food cause its more dangerous to people [4].

Skin auto fluorescence (SAF) is a non-obtrusive marker of tissue aggregation of cutting edge glycation end products (AGE). As of late, we exhibited in everybody that raised SAF levels anticipate the advancement oftype 2 diabetes (T2D), cardiovascular illness (CVD) and mortality.

Retinopathy: Diabetic Retinopathy (DR), caused by small vessel disease, is the main cause of blindness in persons with diabetes. The purpose has to investigated risk factors of Retinopathy with diabetes and without diabetes. Based on types of Diabetes it gives the risk evaluation in different mode[4]. Here major effect of T2DM is more risk to lose the eye infection along to loss their vessel effect. It is suggested that patients should control their HbA1c and LDL-c and quit gnawing betel nut to prevent DR. This thought applies especially to female patients[5].

There are multiple side effects cause diabetic with retinopathy in that major problem is blindness at the working stage of ages only due to the worsening global epidemic diabetic the incident of morbidity caused bythe disease. Based on the duration of the diabetic the major patients diagnosed before the age 30 years withthat 50% of DR in after 10 years of age and nightie% of DR after 30 years[6]. The poor metabolic control with less important but relevant to development progression of DR and increased HbA1c associated with riskfactor[7].

Alzheimer's:

Diabetes is viewed as a danger factor for vascular dementia. This kind of dementia happens because of cerebrum harm that is regularly brought about by decreased or hindered blood stream to your mind. Numerous individuals with diabetes have cerebrum changes that are signs of both Alzheimer's infection andvascular dementia[8].

Asthma:

Asthma is inflaming disease of the airways to the lungs. Asthma make breath is difficult to lungs and can make some physical activity challenges. Based on age factor it affects very different manner to manage the disease. According to the Centers for Disease Control and Prevention (CDC) nearly 25millions of people are suffering with this disease[1]. When compared to this disease comorbidities view Covid-19

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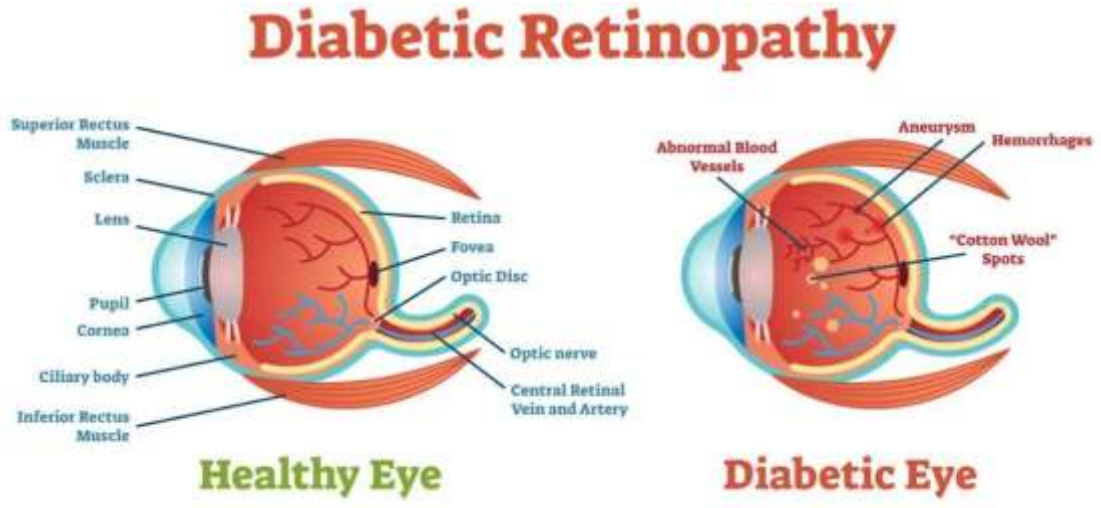

Figure 2: Eye collapse with diabetes

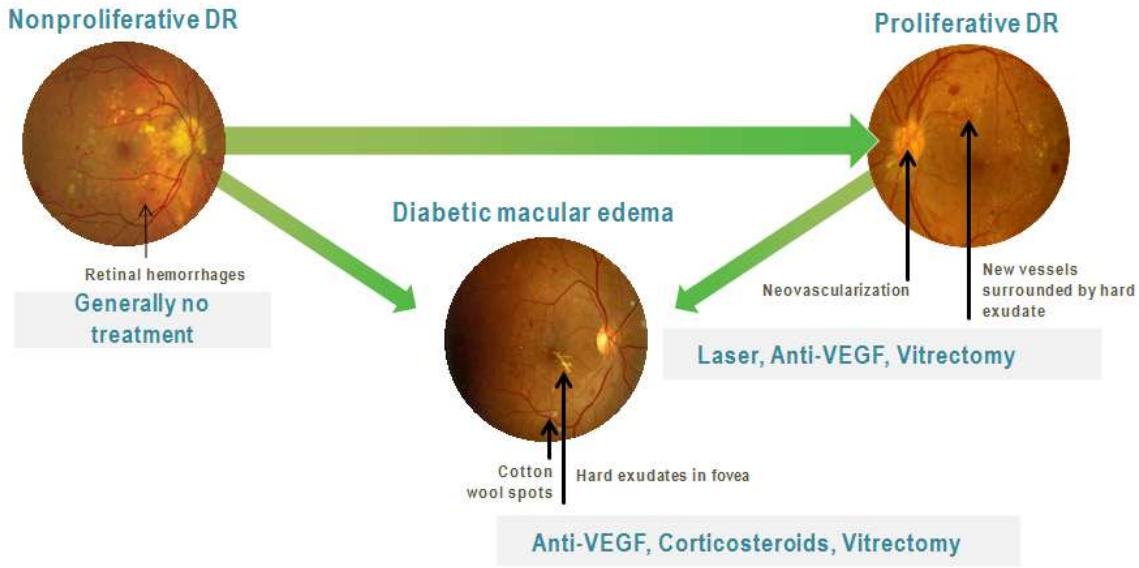

Figure 3: Eye retina infected with diabetes types

patient have more dearth rate who are defect with Asthma disease reason a person who is effected with Asthma also forma air in respiratory system at the same time symptom of the disease will follows the similar cause only viewthing[9].

Covid-19 and Asthma semantically can follows coughing, especially at night time its more in asthma patientbut Covid-19 patient entire[10] can block the respiratory system along with tightness in chest and shortnessof breath, difficulty to talk etc

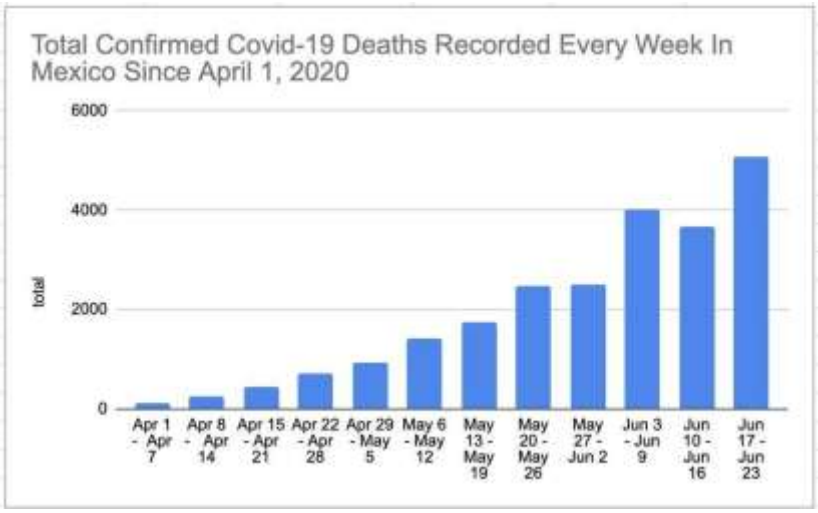

Figure 4: facts of spreading asthma with covid-19

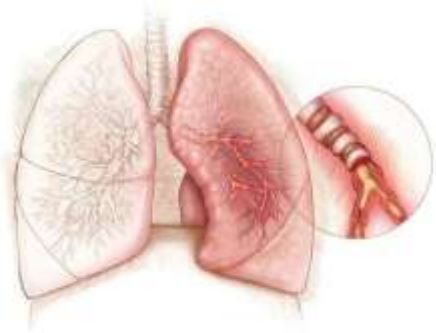

Figure 5: Covid-19 and Asthma blocking respiratory system.

Tuberculosis (TB):

Tuberculosis is an infectious disease usually caused by Mycobacterium tuberculosis (MTB) bacteria. Tuberculosis generally affects the lungs, but can also affect other parts of the body. Total nearly 1.5Millionpeople are died with TB. TB is one of the top 10 cause of disease in dearth rate increase. TB is present in allcountries and age groups. But TB is curable and preventable some case if patient may caught with covid-19 itgoes to death rate increase because the symptoms of TB will lead the same Covid-19 symptoms but small variation only. Tuberculosis mostly affects adults in their most productive years. However, all age groups areat risk. Over 95% of cases and deaths are in developing countries.

People who are infected with HIV are 18 times more likely to develop active TB (see TB and HIV section below). The risk of active TB is also greater in persons suffering from other conditions that impair the immune system. People with under nutrition are 3 times more at risk. Globally in 2019, there were 2.2 million new TB cases in 2018 that were attributable to under nutrition [11].

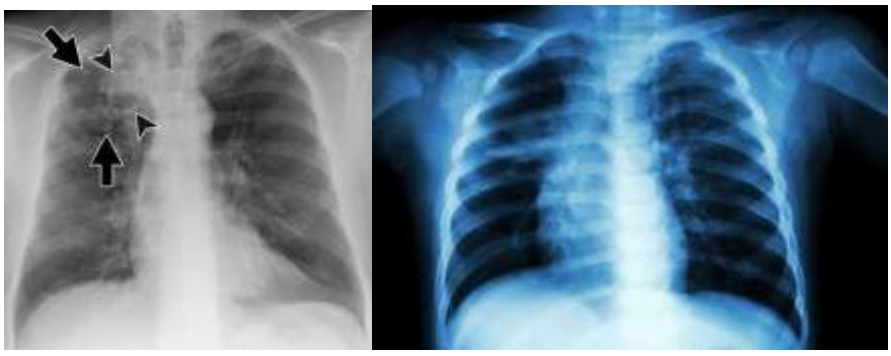

Figure 6: pulmonary tuberculosis defects to other disease

Nephropathy:

Nephrology and Kidney Care for Diabetics: Diabetes makes huge pressure and harm the kidneys. Diabetes patients are regularly really disabled and at high danger for kidney disappointment if not on dialysis. This further confuses the administration of their diabetes and builds mortality hazard. In any case, new therapies, drugs, and clinical experiences are supporting clinical experts in their battle against kidney sickness and its relationship to diabetes[12].Diabetic nephropathy is a genuine kidney-related intricacy of type 1 diabetes and type 2 diabetes. It isadditionally called diabetic kidney infection. About 25% of individuals with diabetes ultimately createkidney infection [15-16]

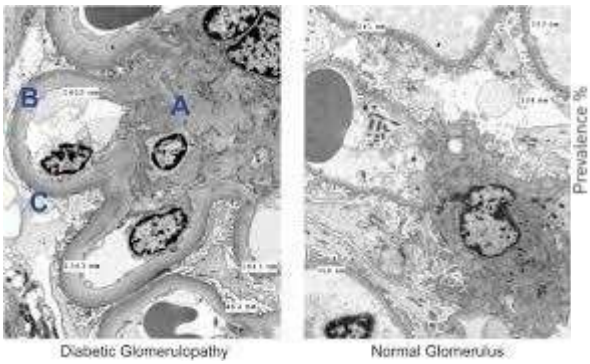

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Figure 7: variation of dialysis

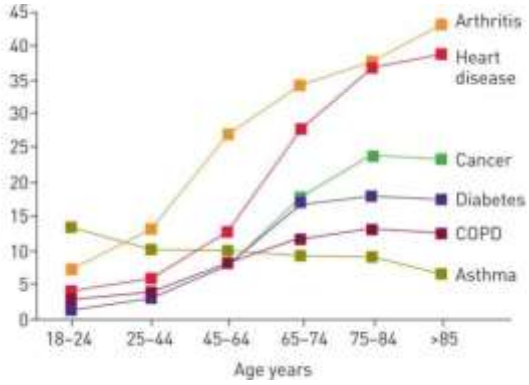
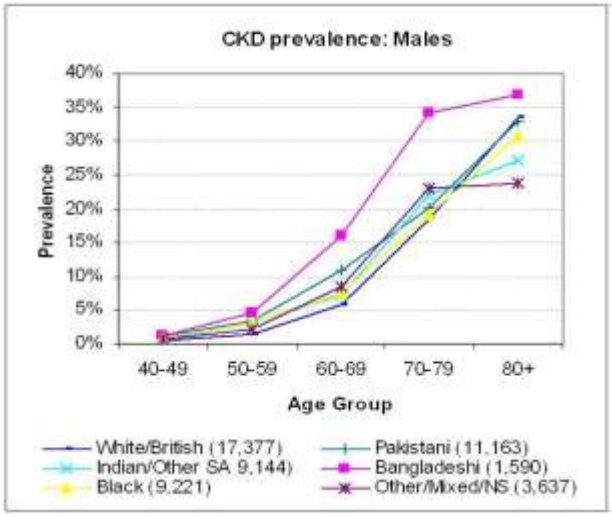


Figure 8: risk factor for diabetic to kidney failure



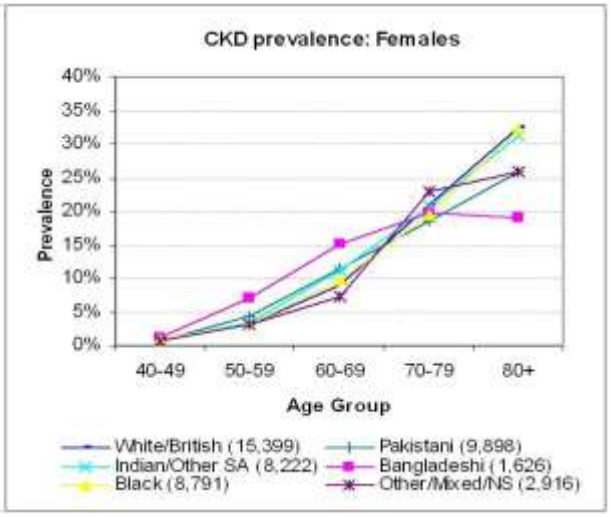


Figure 9: risk analysis based on age factor CKD prevalence

Parkinson:
Parkinson's sickness (PD) is the second most basic neurodegenerative illness, influencing around 3% of the populace aged >55 years and above the age. Epidemiological examinations accomplice milk use with an extended peril of Parkinson's contamination (PD) and type 2 Diabetes Mellitus (T2D). PD is a α-synuclein Patchy related with mitochondrial brokenness, oxidative pressing factor, inadequate lysosomal opportunity of α-syncline (α-sync) and assortment of misfolded α-syn. In T2D, α-sync propels co-assortment with islet amyloid polypeptide in pancreatic β-cells. Global database is saying that PD is raising age along with some comparison of geographical prevalence with sex[16].

Novel Coronavirus Covid-19:
Risk factor with COVID as per the who knowledge April 4, 2021 data exploration of dearth rate in all overworld along with country wise data analysis. We generated the dearth rate risk factor using ANN and CNN, KNN will help the plots of nearest of highest rate of country which is in top position. UsingRandom and LR find the regression of each country and accuracy of bar graph.

Table 1: As per WHO database of active and dearth rate cases up to April 4, 2021

	Name	WHO Region	Cases - cumulative total	Cases - cumulative total per 100000 population	Cases - newly reported in last 7 days	Cases - newly reported in last 7 days per 100000 population	Cases - newly reported in last 24 hours	Deaths - cumulative total	Deaths - cumulative total per 100000 population	Deaths - newly reported in last 7 days	Deaths - newly reported in last 7 days per 100000 population	Deaths - newly reported in last 24 hours	Transmission Classification
0	Global	NaN	129902402	1664.06908	4074809	52.196347	662690	2831815	36.275971	71152	0.911468	11306	NaN
1	United States of America	Americas	30238692	9135.48000	450173	136.000000	79135	547584	165.520000	6161	1.860000	1066	Community transmission
2	Brazil	Americas	12839844	6040.59000	519675	244.460000	91097	325284	153.030000	21822	10.270000	3769	Community transmission
3	India	South-East Asia	12392260	897.99000	483350	35.030000	89129	164110	11.890000	2870	0.210000	714	Clusters of cases
4	France	Europe	4665709	7147.94000	272334	417.220000	45352	95690	146.600000	1962	3.010000	324	Community transmission
5	Russian Federation	Europe	4572077	3132.97000	61333	42.030000	9021	100017	68.540000	2613	1.790000	384	Clusters of cases
6	The United Kingdom	Europe	4353672	6413.21000	28353	41.770000	3402	126816	186.810000	301	0.440000	52	Community transmission
7	Italy	Europe	3629000	6002.13000	140381	232.180000	21917	110328	182.480000	3072	5.080000	481	Clusters of cases
8	Turkey	Europe	3400296	4031.70000	251202	297.850000	42306	31892	37.810000	1120	1.330000	179	Community transmission
9	Spain	Europe	3291394	7039.70000	16087	34.410000	0	75541	161.570000	131	0.280000	0	Community transmission

Table 2: COVID-19 Data from various Country max death rate of April 4, 2021.

Out[8]:

	Cases - cumulative total	Cases - cumulative total per 100000 population	Cases - newly reported in last 7 days	Cases - newly reported in last 7 days per 100000 population	Cases - newly reported in last 24 hours	Deaths - cumulative total	Deaths - cumulative total per 100000 population	Deaths - newly reported in last 7 days	Deaths - newly reported in last 7 days per 100000 population	Deaths - newly reported in last 24 hours
count	2.370000e+02	236.000000	2.370000e+02	236.000000	237.000000	2.370000e+02	236.000000	237.000000	236.000000	237.000000
mean	1.096223e+06	2686.250293	3.438489e+04	103.340662	5592.320675	2.389717e+04	44.092864	600.438819	1.298269	95.409283
std	8.728898e+06	3233.390181	2.707853e+05	181.625821	44230.091700	1.891961e+05	59.951886	4855.161686	2.612597	778.452015
min	0.000000e+00	0.000000	0.000000e+00	0.000000	0.000000	0.000000e+00	0.000000	0.000000	0.000000	-1.000000
25%	2.907000e+03	144.982500	4.000000e+01	1.720000	0.000000	2.900000e+01	1.572500	0.000000	0.000000	0.000000
50%	2.903100e+04	1348.445000	7.720000e+02	20.195000	46.000000	4.440000e+02	14.870000	10.000000	0.165000	0.000000
75%	2.371870e+05	4740.335000	6.719000e+03	134.912500	793.000000	3.860000e+03	70.472500	83.000000	1.360000	9.000000
max	1.299024e+08	15679.800000	4.074609e+06	1355.590000	662690.000000	2.831815e+06	279.010000	71152.000000	18.140000	11306.000000

Figure 10: box plot of newly reported last 7days data

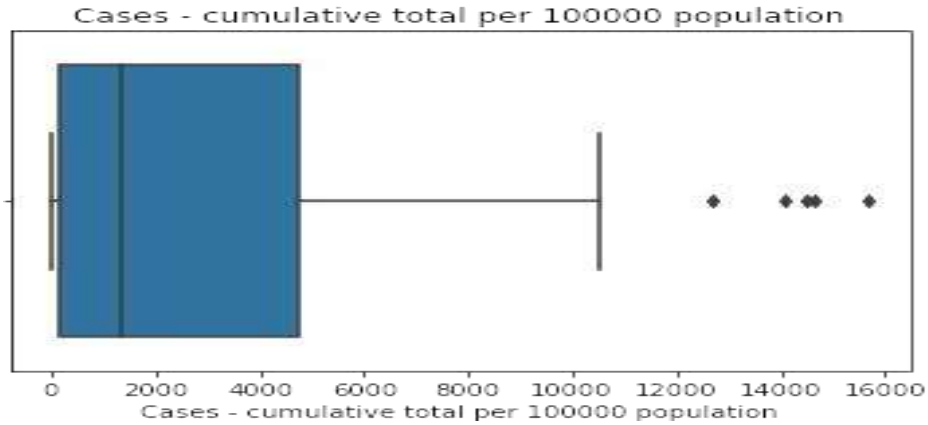


Figure 11: box plot of cumulative total 100000 papulations data

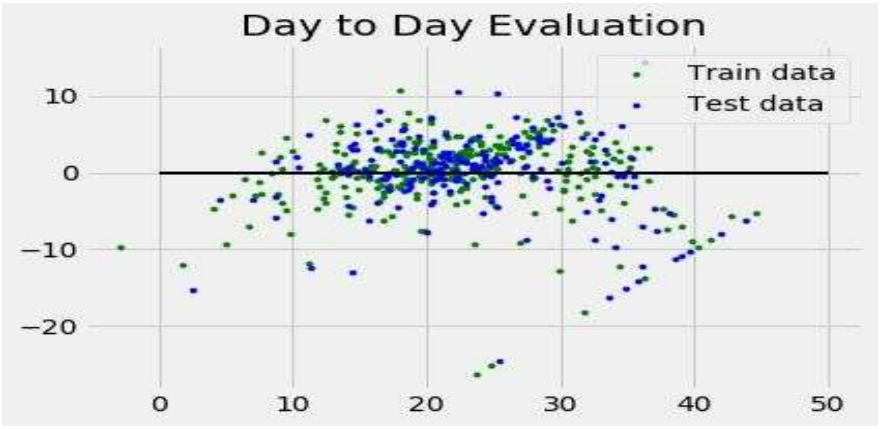


Figure 12: Logistic Regression of trained data dearth papulation

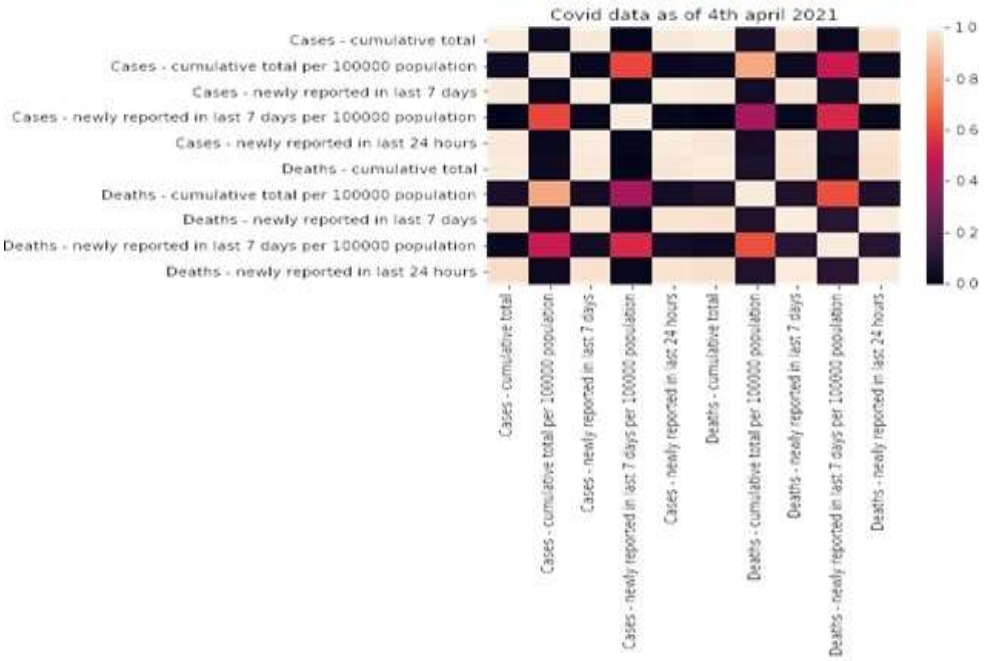


Figure 13: plots of Covid-19 as of April, 2021

3. Conclusion

The study of Machine learning approaches for identification of patients affected by various diseases with help of CT scan MRI images and Database help for quickly identify the patients need necessary action on various symptoms similarity. These paper has focused on the various diseases how will effect of organs andits symptoms with that death rate and risk factors of major diseases. Diabetes Mellitus and novel extreme Acute Respiratory Syndrome Corona Virus 2 virus (SARS—CoV-2) with this two disease any another disease may affect individual or primary to secondary attack of disease how fast dearth rate increase and Covid-19 as of April 4, 2021 how much data is caused by the dearth along with risk. Feature scope of this paper can predict the Covid-19 on comorbidity of any major effect disease with similarity symptoms disease will effect on fast collapse of organs.

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