Deep Learning Techniques To Predict Severity Of Cardiac Arrest In Diabetic Patients

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Abstract: The incidence of cardiac arrest and sudden cardiac death is increasing across the country. Meanwhile, diabetes is at twice the risk. The incidence of cardiac arrest and sudden cardiac death is on the rise across the country, and even young adults who lead healthy lifestyles are sometimes suffering from hidden heart problems with no symptoms. Sedentary lifestyle and problems like stress are dangerous for heart health and COVID-19 plays a major role in weakening hearts. People with diabetes have twice the risk of cardiac arrest or stroke compared to people who do not suffer from the metabolic disorder. In this paper, Deep Learning Techniques has discussed to Predict Severity of Cardiac Arrest in Diabetic Patients. When diabetes takes its toll, heart health deteriorates, and one becomes susceptible to sudden cardiac events. Over time, high blood sugar can damage blood vessels and heart nerves. Diabetics also often have other complications with the disease, such as high blood pressure, which can further affect heart function. So, if you have diabetes and your blood sugar levels are often out of control, your heart is likely to be affected and it is important that you make the right lifestyle changes. Eating healthy, being active and reducing stress can help people with diabetes not only maintain healthy blood sugar levels but also maintain optimal heart health.

Index Terms - **Cardiac Arrest, Deep Leaning, Diabetes, Blood Pressure, Cardiac Death**

I. INTRODUCTION

In today's modern age, due to the rush and hustle and bustle of work, lifestyle, stress, family problems, stress, modern diet etc.,even a healthy person without any disease has an increasing incidence of heart attack [1]. Moreover, heart problems can occur without any symptoms, especially in young people. People with diabetes have twice the risk of having a heart attack or stroke. As aperson's diabetes worsens, so does their heart health [2]. This makes them more prone to sudden heart attacks. In addition, high blood sugar can damage blood vessels and heart nerves. Therefore, it is best for people with diabetes to keep their blood sugar levels under control for the most part [3-4]. Also, you need to make some changes in your lifestyle. Eating healthy foods, being active and avoiding stress can help maintain heart health in addition to maintaining blood sugar levels [5]. Diabetic patients, especially the elderly, are prone to metabolic and hepatic impairment due to the use of drugs [6]. Experts say that these deficienciescan eventually lead to heart attacks. Cardiac arrest monitor for diabetic patients including insertion surgery takes two hours to complete. Before the procedure, the doctor will clean the chest with a disinfecting agent [7]. Then, he will numb the site of the incisions with the help of local anesthesia. During surgery, the doctor will insert (one or more) insulated wires into a large vein nearor below your collarbone and guide it to the implantation site with the help of X-ray imaging [8-9]. Then the doctor will fix the endof each wire (with the other end secured to the pulse generator) in the correct position on your heart [10]. After the surgery, they will likely stay in the inpatient unit for a day or two. The doctor will tune/program the cardiac arrest monitor for diabetic patients including according to the pacing needs. Do not go home alone [11]. Call a family member, friend, or driver for the same. The doctor can monitor the cardiac arrest monitor for diabetic patients including remotely. The doctor may ask them to avoid lifting heavy objects or doing strenuous exercise for a month or so [12]. If it experiences pain or discomfort, contact the doctor. He or she may recommend taking over-the-counter medications such as ibuprofen or acetaminophen. The cardiac arrest monitor for diabeticpatients including battery can last between 5 and 15 years. Make sure to visit the doctor every 3 to 6 months [13]. Although the chances of the cardiac arrest monitor for diabetic patients including stopping working due to electrical interruption(s) are low, it isbetter to be careful and take the necessary precautions [14]. Using a cell phone while having a cardiac arrest monitor for diabetic patients including is safe. However, keep it at least 15 centimeters or 6 inches away from the device. Also, ensure it does not put the phone in the shirt pocket [15-16].

Studies show that more young people today are more likely to have heart attacks and hospital admissions due to pre-diabetes. Pre-diabetes means that one's blood sugar levels are higher than normal [17]. That means they may have type 2 diabetes if their blood sugar is between 100 and 125 mg/dL [18]. Prediabetes is common and increases the risk of developing type 2 diabetes. The study found that young adults with pre-diabetes were 1.7 times more likely to be hospitalized for a heart attack. Therefore, if pre- diabetes is not treated, it can significantly affect health and lead to type 2 diabetes [19-20]. It also increases a person's risk of heartdisease. As myocardial infarction is increasing in young people, our study focused on defining risk factors related to this young population. Accordingly, early-stage diabetes is a risk factor for future heart disease risks [21]. The researchers reviewed medical records from 2018 of patients hospitalized for heart attacks among young adults aged 18 to 44 years. Of the more than 7.8 million young adults hospitalized for a heart attack [22]. The analysis found that blood sugar levels were associated with pre-diabetes in more than 31,000 people. Accordingly, the risk of heart attack for those with pre-diabetes was 2.15 percent [23]. But it was 0.3 percent for young adults with normal blood sugar levels. Adults with pre-diabetes are more likely to have high cholesterol and obesity than those without pre-diabetes [24].

"Despite having a higher risk of heart attack, young people with pre-diabetes don't have serious heart problems or other heart-related complications like stroke,"[25]. Pre-diabetes and type 2 diabetes are precursors to other serious health problems, but they can be remedied, especially with a healthy diet [26]. These can include eating less, stopping smoking, reducing stress, being physically active, and losing weight. Changing culture and eating habits have increased the risk of heart attack and death among young people in their 20s [27].

II. LITERATURE REVIEW

Hold the phone on the opposite side of the implant while talking. Passing through security checks through a metal detector at a shopping mall or airport will not interfere with the device. However, it may beep due to the cardiac arrest monitor for diabetic patients including metallic components. One of the best things it can do to avoid potential complications is to carry an identification card that indicates it is wearing cardiac arrest monitor for diabetic patients [28]. Be sure to check with all doctors about the cardiac arrest monitor for diabetic patients, including the dentist. Specific medical treatments and diagnostic procedures such as MRI, radiation, electrocautery, and CT scans may interfere with the device. It is essential to stay at least 2 feet away from high voltage transformers, welding equipment, etc [29]. An accrediting body in the US has given the green signal for two leadless cardiac arrest monitors for diabetic patients including devices that go directly into the heart. Since these cardiac arrest monitor for diabetic patients do not have electrodes, they help in faster recovery and reduce some health risks [30]. Although these devices are safe and effective, their long-term effects have yet to be studied. These chambers work together with the heart's electrical system to allow it to beat properly. The average resting heart rate is between 60 and 100 beats per minute [31]. The heart's electrical system controls the heart rate and starts at the sinus node (your natural cardiac arrest monitor for diabetic patients), propagating electrical impulses downward. It causes coordinated contractions in the heart muscles, which leads to blood pumping [32].

Diabetes is the uncontrollable level of sugar in the blood. It is generally divided into two categories, Type 1 and Type 2. But researchers in Sweden and Finland believe the situation is more complicated for those taking medication for diabetes. Experts say the current study informs the future of diabetes treatment but say that changes in current treatments are unlikely to happen immediately [33]. Diabetes, which affects 1 in 11 adults worldwide, increases the risk of heart attack, stroke, vision loss, kidney failure, and amputation. Type 1 diabetes is an immune system related disease. It affects around 10 per cent of people with the condition in Britain. It attacks the insulin-secreting beta cells in the body. Therefore, the hormone that controls blood sugar levels is not secreted. Type 2 diabetes is a disease caused by poor diet. Fat in the body interferes with the action of insulin. This type of diabetes is largely based on the traditional type 1 diabetes. It affects young adults who appear healthy. This type of diabetes causes the inability to produce insulin [34]. Diabetics with severe insulin deficiency initially looked similar to group 1. They were young. They had a healthy weight. There was a problem with insulin secretion. However, they do not have any deficiency in immunity. Diabetics with severe resistance to secreted insulin. They were usually overweight. Insulin is secreted. But their body does not allow the secreted insulin to function properly. This type of diabetes associated with moderate obesity was mainly observed in overweight individuals. But it is much closer to normal than in Group 3. This middle-aged diabetes had some symptoms when the patients were significantly older than other groups [35]. Their disease was mild. Group 2 patients are currently classified as type 2 diabetics due to the lack of immune system resistance.

III. PROPOSED MODEL

A cardiac arrest monitor for diabetic patients including is a small battery-operated device that helps the heartbeat at its natural rhythm. If the patient has an arrhythmia, the doctor will surgically implant it under the skin of the patient's chest. It is a medical condition in which the heart beats irregularly. It can be prolonged (more common) or swift. There are three types of cardiac arrest monitor for diabetic patients. The primary job of a cardiac arrest monitor for diabetic patients including is to help regulate the heart's function by controlling the heartbeat. Depending on the severity of the condition and treatment needs, the doctor may permanently implant it. The doctor may prescribe a temporary cardiac arrest monitor for diabetic patients including when the heart is beating slowly, such as after a heart attack, drug overdose, or surgery. In cases of heart failure and an irregular (mainly slow) heartbeat, a doctor is more likely to implant a permanent cardiac arrest monitor for diabetic patients including. A cardiac arrest monitor for diabetic patients including follows the process of the heart's natural electrical system. The pulse generator is a small metal unit consisting of a circuit and a battery. A pulse generator creates electrical impulses that control the heart rate. Leads are insulated and flexible wires that the doctor will implant into the heart muscle. Depending on the needs, one to three of these leads may be needed. These leads carry impulses from the generator to the heart (heart) muscle and sense your heart's electrical activity.

However, this study suggests that they may have developed the disease because of a deficiency of beta cells rather than because they were obese. Thus, treatment can be provided close to that given to moderate patients currently defined as Stage 1. Group 2 individuals are at increased risk for vision loss. But those in group 3 face a higher risk of developing kidney disease. Therefore, some of these groups may benefit from improved testing. If it has a cardiac arrest monitor for diabetic patients including, it only works when it needs it. If it has bradycardia (your heartbeat is slower than usual), your cardiac arrest monitor for diabetic patients including sends signals to your heart to maintain the correct pace. New types of speed-generating devices come with sensors. These sensors detect the breathing rate and trigger the cardiac arrest monitor for diabetic patients including to increase the heart rate when needed, especially during exercise. However, the heart may beat abnormally due to certain heart conditions such as age, heart attack, genetic defects, and medication. In such cases, the doctor may prescribe a cardiac arrest monitor for diabetic patients including. The proposed block diagram has shown in the following fig.1
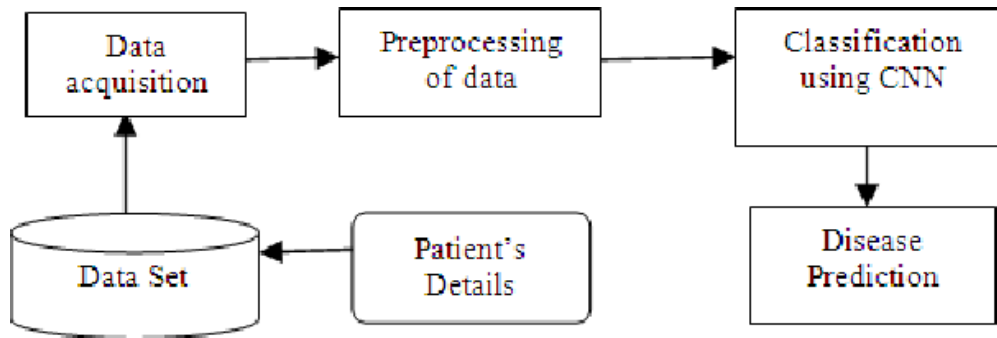
Fig 1: Proposed block diagram

- Pocket Hematoma or Bleeding – Bleeding is common in most people undergoing cardiac arrest monitor for diabetic patients including implant surgery. However, the risk of hematoma (local bleeding outside the blood vessels) is low. If the patient is on anticoagulant therapy, they may still bleed a little, but it is nothing to worry about.

- Haemothorax – This is one of the severe procedural complications of the cardiac arrest monitor for diabetic patients including. However, this is rare.

- Pneumothorax – A pneumothorax or collapsed lung is a complication of having an artificial heart cardiac arrest monitor for diabetic patients including. It occurs during the procedure or within the first two days (48 hours) of surgery.

Deep Vein Thrombosis (DVT) and Phlebitis is the conditions (blood clots in the veins) are more common during cardiac arrest monitor for diabetic patients including insertion. Lead displacement is another complication of having a cardiac arrest monitor for diabetic patients including that can increase discomfort. Additionally, reactivity may be required to prevent lead migration. Cardiac arrest monitor for diabetic patients including failure occurs when the cardiac arrest monitor for diabetic patients including stops working. It can happen for several reasons, from device malfunction to changes in the heart's normal rhythm. Myocardial perforation is rare, myocardial perforation can lead to serious health complications. Shortness of breath and chest pain are some of the common symptoms. Tricuspid regurgitation may occur due to damage to the tricuspid valve during the procedure. Cardiac arrest monitor for diabetic patients including syndrome. If the symptoms worsen after getting a cardiac arrest monitor for diabetic patients including and gradually show signs and symptoms of CHF (heart failure), it is called cardiac arrest monitor for diabetic patients including syndrome. It is primarily caused by a loss of sync between the heart's atria and ventricles (atrioventricular synchrony). There can be many reasons behind an irregular heartbeat. Therefore, the doctor will perform some tests to find out the underlying cause of the condition early. The flow diagram for the proposed prediction has shown in the following fig.2.
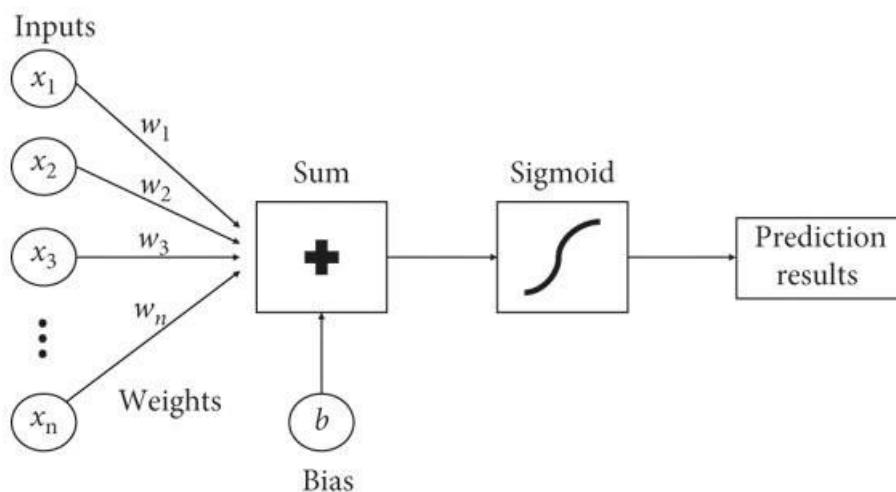

Fig 2: Prediction of the proposed model

- ECG or Electrocardiogram – This is a non-invasive procedure in which the doctor places sensor pads connected to wires in the limbs or chest to measure the heart's electrical impulses.

- Echocardiogram – This is a non-invasive procedure. It uses sound waves to monitor the heart's activity.

- Holter monitoring – This is the counterpart of an electrocardiogram. It helps detect unpredictable irregularities in the heart rhythm. it should wear the tracking device for a day or two and continue with everyday activities. Meanwhile, the device will record all the electrical activity of the heart.

- Stress testing – Only certain heart states are exposed when it exercises.

Cardiac arrest is a sudden loss of heart function. It makes it difficult to pump enough blood to the brain, lungs, and other organs, leading to sudden cardiac arrest and death. Within a few seconds, you lose consciousness and your heart stops beating. Not everyone knows when a heart attack will happen. Symptoms include sudden collapse of the body, cessation of heartbeat and breathing, numbness, chest pain, physical discomfort, weakness, shortness of breath. This includes excessive sweating. So if you experience such a condition, you should consult a doctor immediately. You may need to administer first aid earlier to restore blood flow, Doctors also recommend taking Aspirin tablets. This will help break up some of the blood clots that form in your arteries. Blocks blood flow in an artery during a heart attack. Doctors recommend chewing this pill instead of swallowing it. CPR (Cardiopulmonary Resuscitation) should be performed to maintain blood flow, perhaps if a person with a sudden cardiac arrest is not breathing and has no pulse. To do this, first place your hands on the center of the affected person's chest and give a quick squeeze. Keeping these things in mind can prevent heart attacks. Doctors warn that sleep should be managed properly, as long periods of waking up during the night are said to be the main

cause of heart attacks. Also keep in mind that if you don't follow through you will probably have a heart attack at a young age.

IV. RESULTS AND DISCUSSION

The proposed Predict Severity of Cardiac Arrest (PSCA) has compared with the existing Machine learning prediction (MLP)and deep convolution neural networks (DCNN). Here the matlab r2022b is the tool is used to simulate the results.

4.1 Measuring blood sugar levels:

Studies show that one in four men under the age of 20 suffers from high blood pressure. Statistics show that 75 percent of men nearing 75 have high blood pressure. However, usually, people with high blood pressure have no apparent symptoms. Also, high blood sugar levels can occur without any symptoms. When a person gains much weight, it is necessary to have blood pressure and blood sugar tests done. Moreover, every man should get screened for cholesterol and prostate cancer. The comparison of blood sugar levels has demonstrated in the following table.1

Table 1 Comparison of blood sugar levels

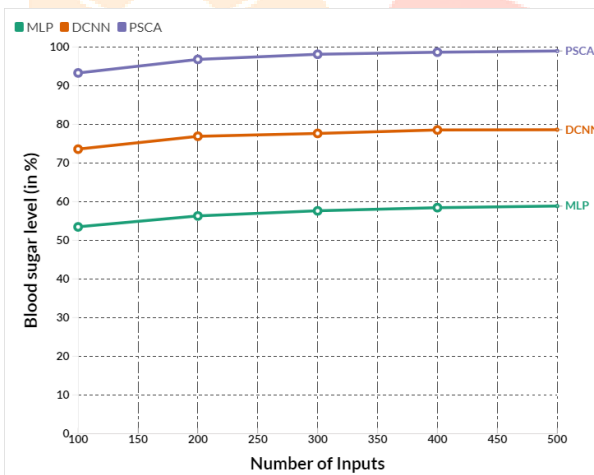| No.of Inputs	Blood sugar level (in %)		
	MLP	DCNN	PSCA
100	53.48	73.59	93.31
200	56.31	76.93	96.82
300	57.63	77.66	98.14
400	58.46	78.55	98.68
500	58.86	78.63	98.98

Fig 3: Comparison of blood sugar levels

The fig 3 shows the comparison of blood sugar levels. In a cut-off point, the proposed PSCA model reached 98.14% of blood sugar level management. In the same point the existing MLP achieved 57.63% and DCNN achieved 77.66% of sugar level management. While compared with the existing models, the proposed model achieved the better results.

4.2 Habitual management

Many men today learn to smoke and drink alcohol at a young age. Smoking damages, the lungs and affects the blood vessels leading to the heart. It also causes blood clots in the body. Similarly, drinking must be stopped. If you cannot stop immediately, try to cut back to at least once a week. The comparison of Habitual management has demonstrated in the following table.2

Table 2 Comparison of Habitual management

No.of Inputs	Habitual management (in %)		
	MLP	DCNN	PSCA
100	46.15	67.36	89.20
200	57.75	68.03	89.68

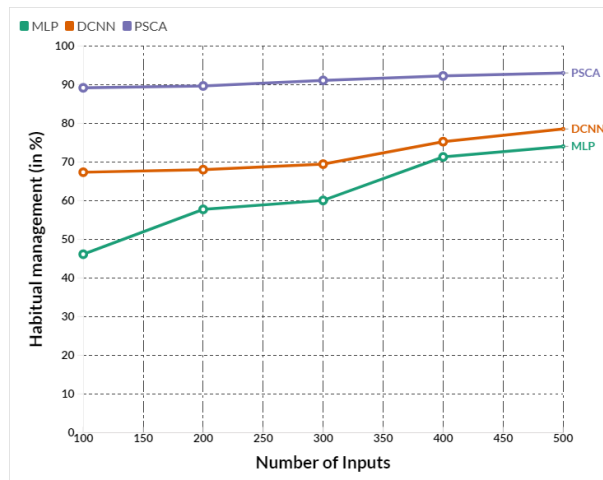| No.of Inputs	Habitual management (in %)		
	MLP	DCNN	PSCA
300	60.07	69.46	91.11
400	71.32	75.27	92.27
500	74.05	78.54	93.04

Fig 4: Comparison of Habitual management

The fig 4 shows the comparison of Habitual management. In a cut-off point, the proposed PSCA model reached 91.11% of Habitual management. In the same point the existing MLP achieved 60.07% and DCNN achieved 69.46% Habitual management. While compared with the existing models, the proposed model achieved the better results.

4.3 Stress management

It is usual for everyone to experience stress. However, prolonged stress can cause changes in blood pressure. It also causes a change in lifestyle and mentality and causes various physical ailments. Studies have shown that men with high-stress levels are more likely to develop heart disease. So if you feel that you are under much stress, it is better to seek the help of a mental health counselor. The comparison of stress management has demonstrated in the following table.3

Table 3 Comparison of Stress management

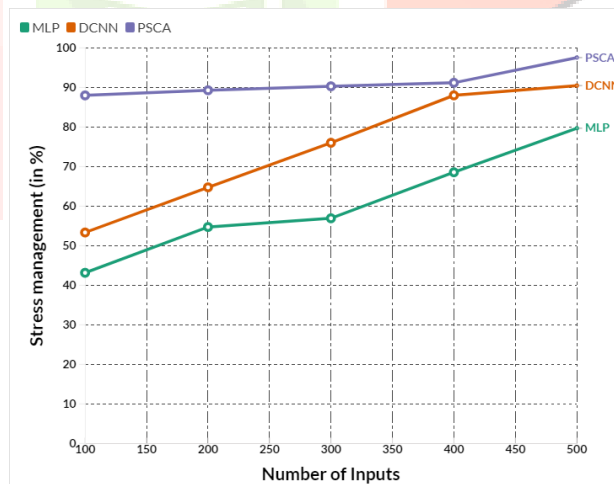| No.of Inputs	Stress management (in %)		
	MLP	DCNN	PSCA
100	43.16	53.35	88.01
200	54.74	64.77	89.30
300	56.94	76.03	90.31
400	68.57	88.02	91.20
500	79.71	90.49	97.57

Fig 5: Comparison of Stress management

The fig 5 shows the comparison of Stress management. In a cut-off point, the proposed PSCA model reached 90.31% of Stress management. In the same point the existing MLP achieved 56.94% and DCNN achieved 76.03% of Stress management. While compared with the existing models, the proposed model achieved the better results.

4.4 Body weight management

Due to changing food habits, chemicals added to them, and changing lifestyles, extra weight has become routine. However, this weight gain is the cause of various ailments in the body. Men should change their eating habits so that their diet is rich in nutrients and proteins. Moreover, instead of eating unhealthy food items that harm the body eat healthy foods like vegetables and fruits. The comparison of Body weight management has demonstrated in the following table.4

Table 4 Comparison of Body weight management

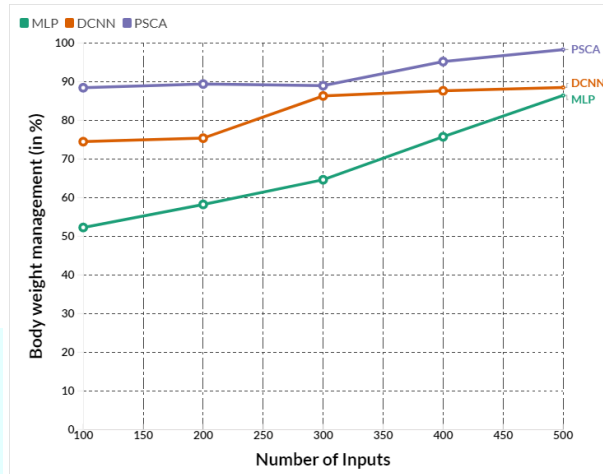| No.of Inputs	Body weight management (in %)		
	MLP	DCNN	PSCA
100	52.29	74.49	88.44
200	58.25	75.40	89.40
300	64.64	86.32	88.97
400	75.75	87.65	95.21
500	86.45	88.52	98.32

Fig 6: Comparison of Body weight management

The fig 6 shows the comparison of Body weight management. In a cut-off point, the proposed PSCA model reached 88.97% of Body weight management. In the same point the existing MLP achieved 64.64% and DCNN achieved 86.32% of Bodyweight management. While compared with the existing models, the proposed model achieved the better results.

4.5 Sleeping management

Our body gets the rest it needs during sleep. Also, sleep helps eliminate the day's tiredness and gather energy for the nextday's work. It does not lose weight when it sleeps well, but weight gain is prevented by excess body fat. Moreover, 7-9 hours of sleep helps people be more energetic. It also protects against diseases like high blood pressure and heart attacks. The comparison of sleeping management has demonstrated in the following table.5

Table 5 Comparison of sleeping management

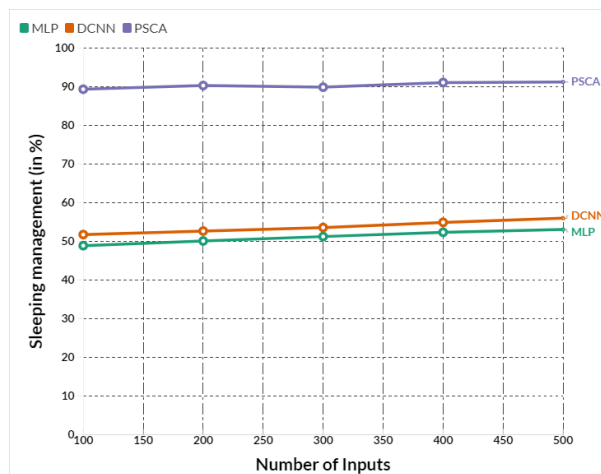| No.of Inputs	Sleeping management (in %)		
	MLP	DCNN	PSCA
100	48.89	51.75	89.35
200	50.10	52.66	90.31
300	51.24	53.58	89.88
400	52.35	54.91	91.08
500	53.05	55.99	91.24

Fig 7: Comparison of sleeping management

The fig 7 shows the comparison of sleeping management. In a cut-off point, the proposed PSCA model reached 89.88% of sleeping management. In the same point the existing MLP achieved 51.24% and DCNN achieved 53.58% sleeping management. While compared with the existing models, the proposed model achieved the better results.

V. CONCLUSION

The number of people suffering from heart disease is increasing worldwide. It is seen daily in the news that especially young men are dying of heart problems like heart attack. For these reasons it has become imperative for everyone to pay more attention tothe welfare of their heart. By following steps like checking blood pressure at regular intervals, checking blood sugar levels, stopping smoking, and eating low-fat foods, the risk of heart disease can be significantly reduced. Most people think that a heart attack is a sudden and unexpected event that stops the heart beating and ends life. But it can be said that there is only half truth in this. Because in more than half of the cases, the symptoms that indicate the danger is happening or happening are manifested in thehours before the event or during the heart attack. Observing these symptoms and acting cautiously can save lives. However, in mostcases, heart attack victims do not know that they are having an attack. The main reason for this is lack of awareness about heart attack symptoms. So it is important for everyone to know the life-threatening heart attack symptoms. Not only will this help save your life, but it will also help save the lives of others as well.

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