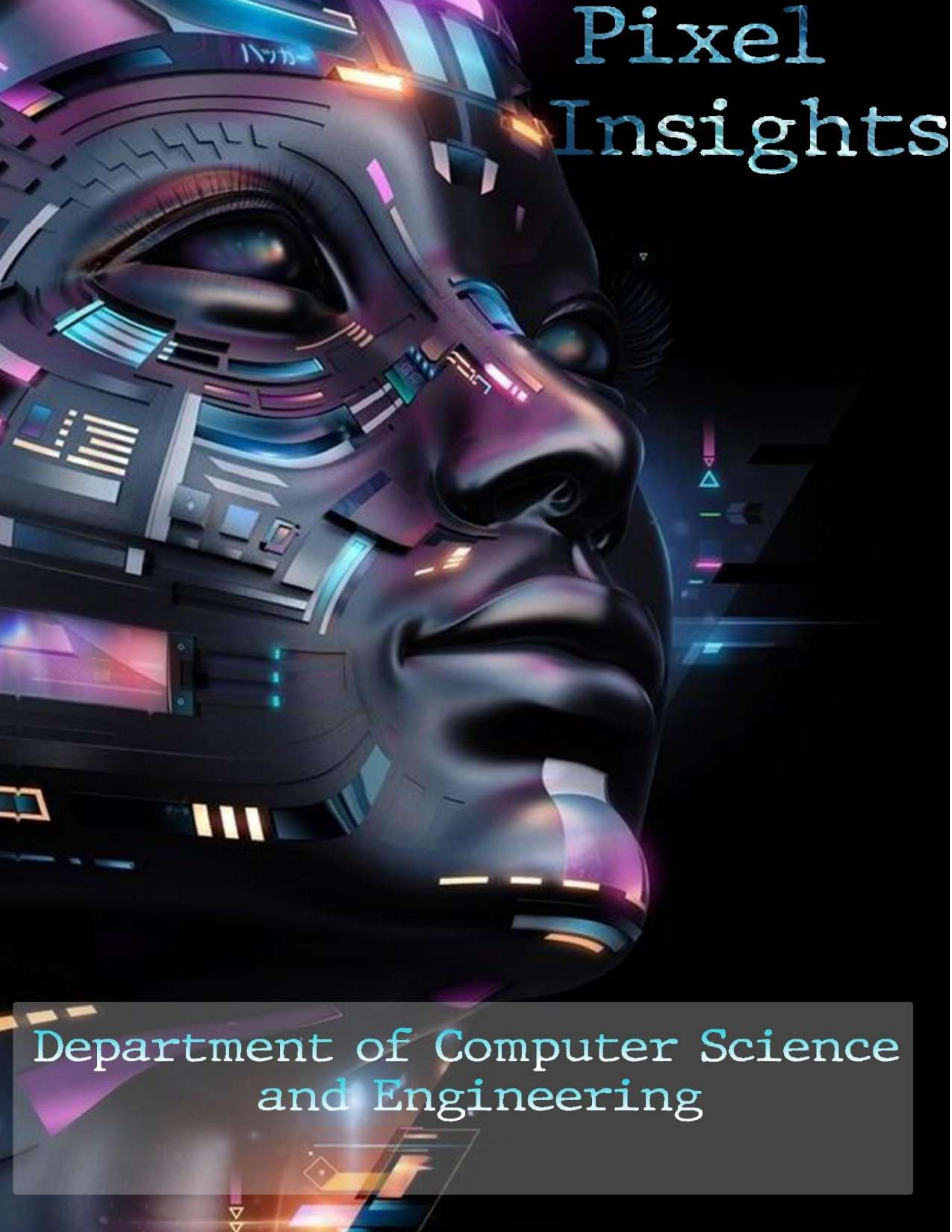
Pixel Insights



Department of Computer Science and Engineering

Message from HOD

The Department of Computer Science and Engineering is dedicated to creating a favorable environment for students and faculty through its extra-curricular activities.

This phase started with a faculty development program focused on potential research opportunities in Computer Science and Biology, followed by student development activities such as alumni connections and a study-interact program with students from Japan.

The department organized activities that aimed to enhance software skills, introduce new programming concepts, and provide opportunities for alumni connections. This program was met with great enthusiasm and ended with high praise.

The student-interact exchange program offered students a chance to experience international cooperation and exchange, as well as to deepen their understanding of both Japan and India through education. During this phase, students also had the chance to learn about Arduino, software management, and resume writing. Additionally, the department has seen an increase in copyright registrations, patent filings, and publications in academic journals and conferences.

The department will continue to work towards enhancing its extra-curricular programs through collaborations and a diverse range of activities.

Dr. Geetha Kiran A
Prof. & HoD, CSE

MACHINE LEARNING IN TRANSPORTATION DATA ANALYTICS

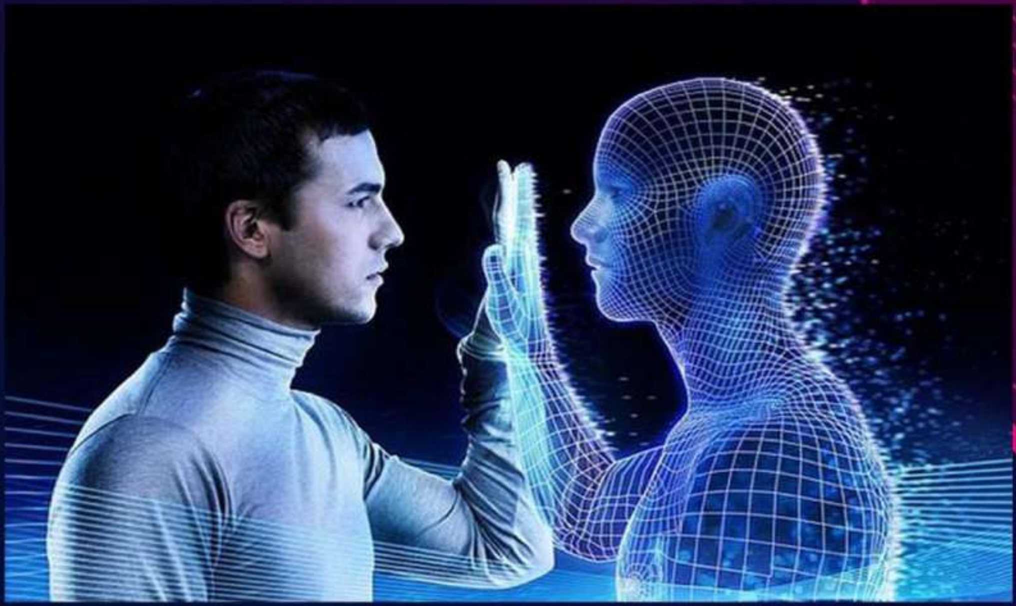
Machine Learning is a collection of methods that enable computers to automate data-driven model building and programming through a systematic discovery of statistically significant patterns in the available data. While machine learning methods are gaining popularity, the first attempt to develop a machine that mimics the behaviour of a living creature was conducted by Thomas Ross in 1930s. In, 1959 Arthur Samuel defined machine learning as a “Field of study that gives computers the ability to learn without being explicitly programmed”. While the demonstration by Thomas Ross, then a student at the University of Washington and his professor Stevenson Smith, included a Robot Rat that can find a way through artificial maze, the study presented by Arthur Samuel included methods to program a computer “to behave in a way which, if done by human beings or animals, would be described as involving the process of learning.” With the evolution of computing and communication technologies, it became possible to utilize these machine learning algorithms to identify increasingly complex and hidden patterns in the data. Furthermore, it is now possible to develop models that can automatically adapt to bigger and complex data sets and help decision makers to estimate impacts of multiple plausible scenarios in a real time.

The transportation system is evolving from a technology-driven independent system to a data-driven integrated system of systems. For example, researchers are focusing on im-proving existing Intelligent Transportation Systems (ITS) applications and developing new ITS applications that rely on quality and size of the data . With the increased availability of data, it is now possible to identify patterns such as flow of traffic in real time and behaviour of an individual driver in various traffic flow conditions to significantly improve efficiency of existing transportation system operations and predict future trends. For example, providing real-time decision support for incident management can help emergency responders in saving lives as well as reducing incident recovery time. Various algorithms for self-driving cars are another example of machine learning that already begins to significantly affect the transportation system. In this case, the car (a machine) collects data through various sensors and takes driving decisions to provide safe and efficient travel experience to passengers. In both cases, machine learning methods search through several data sets and utilize complex algorithms to identify patterns, take decisions, and/or predict future trends. Machine learning includes several methods and algorithms, some of them were developed before the term “machine learning” was defined and even today researchers are improving existing methods and developing innovative and efficient methods.

Subramanya T N

2nd Year, CSE

DIGITAL TWIN



A digital twin is a digital representation of a physical object or system. The technology behind digital twins has expanded to include large items such as buildings, factories and even cities, and some have said people and processes can have digital twins, expanding the concept even further. The idea first arose at NASA: full-scale mockups of early space capsules, used on the ground to mirror and diagnose problems in orbit, eventually gave way to fully digital simulations. But the term really took off after Gartner named digital twins as one of its top 10 strategic technology trends for 2017 saying that within three to five years, “billions of things will be represented by digital twins, a dynamic software model of a physical thing or system". A year later, Gartner once again named digital twins as a top trend, saying that “with an estimated 21 billion connected sensors and endpoints by 2020, digital twins will exist for billions of things in the near future." In essence, a digital twin is a computer program that takes real-world data about a physical object or system as inputs and pro-duces as outputs predications or simulations of how that physical object or system will be affected by those inputs.

How does a digital twin work?

A digital twin begins its life being built by specialists, often experts in data science or applied mathematics. These developers research the physics that underlie the physical object or system being mimicked and use that data to develop a mathematical model that simulates the real-world original in digital space.The twin is constructed so that it can receive input from sensors gathering data from a real-world counterpart. This allows the twin to simulate the physical object in real time, in the process offering insights into performance and potential problems. The twin could also be designed based on a prototype of its physi-cal counterpart, in which case the twin can provide feedback as the product is refined; a twin could even serve as a prototype itself before any physical version is built.

The process is outlined in some detail in this post from Eniram, a company that creates digital twins of the massive container ships that carry much of world commerce – an extremely complex kind of digital twin application. However, a digital twin can be as com-plicated or as simple as you like, and the amount of data you use to build and update it will determine how precisely you're simulating a physical object. For instance, this article outlines how to build a simple digital twin of a car, taking just a few input variables to compute mileage.

Digital-twin Applications

◆Manufacturing is the area where rollouts of digital twins are probably the furthest along, with factories already using digital twins to simulate their processes.

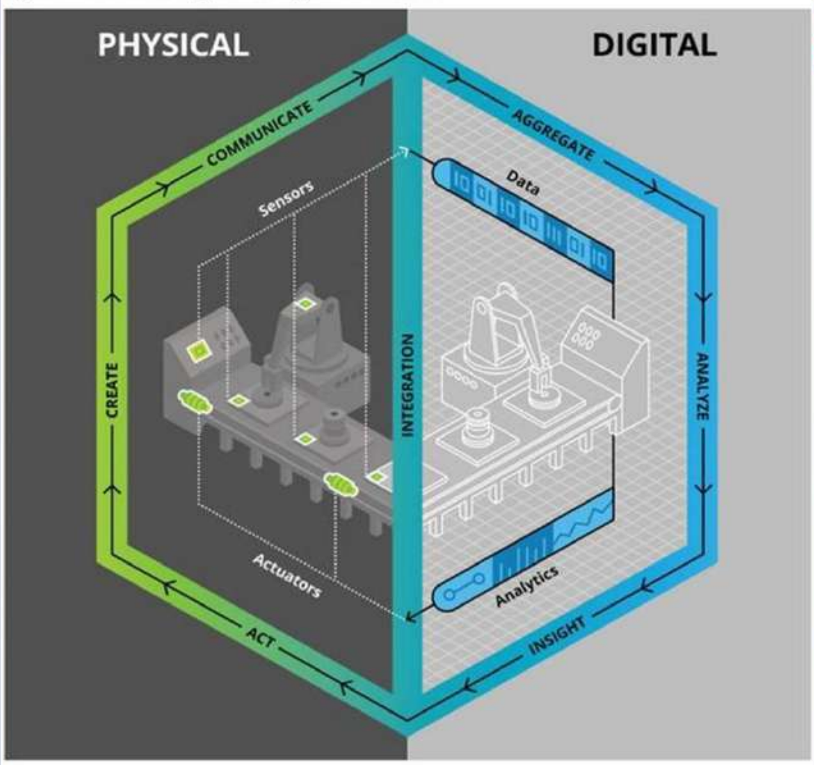
◆Automotive digital twins are made possible because cars are already fitted with telemetry sensors, but refining the technology will become more important as more autonomous vehicles hit the road.

♦Healthcare is the sector that produces the digital twins of people we mentioned above. Band-aid sized sensors send health information back to a digital twin used to monitor and predict a patient's well-being.

Digital twins and IoT

Clearly, the explosions of IoT sen-sors are part of what makes digital twins possible. And as IoT devices are refined, digital-twin scenarios can include smaller and less complex objects, giving additional benefits to companies.

Figure 1. Manufacturing process digital twin model



Source: Deloitte University Press.

Deloitte University Press | dupress.deloitte.com

Digital twins can be used to predict different outcomes based on variable data. This is similar to the run-the-simulation scenario often seen in science-fiction films, where a possible scenario is proven within the digital environment. With additional software and data analytics, digital twins can often optimize an IoT deployment for maximum efficiency, as well as help designers figure out where things should go or how they operate before they are physically deployed.

The more that a digital twin can dupli-cate the physical object, the more likely that efficiencies and other benefits can be found. For instance, in manufacturing, where the more highly instrumented devices are, the more accurately digital twins might simulate how the devices have performed over time, which could help in predicting future performance and possible failure.

BENEFITS OF DIGITAL TWIN

Digital twins offer a real-time look at what's happening with physical assets, which can radically alleviate maintenance burdens. Chevron is rolling out digital twin tech for its oil fields and refineries and expects to save millions of dollars in maintenance costs. And Siemens as part of its pitch says that using digital twins to model and prototype objects that have not been manufactured yet can reduce product defects and shorten time to market.

But keep in mind that that Gartner warns that digital twins aren't always called for, and can unnecessarily increase complexity. “[Digital twins] could be technology overkill for a particular business problem. There are also concerns about cost, security, privacy, and integration.”

International Conferences

◆H Hanebel Alva, Dr. Chandrika J, " Interdisciplinary approach to Palliative Care: A sur-vey of tools and an affordable technique", 2nd International Conference on Recent In-novative Trends in Computer Science and Applications, 25th & 26th October 2019.

◆Dr. Chandrika J, " Voice Based Email System for visually Impaired people" 3rd Interna-tional Conference on Data Engineering and Communication Systems, 19th & 20th December 2019.

◆Dr. Chandrika J, " Machine Learning Based Approach for Assessment of crop field" 3rd International Conference on Data Engineering and Communication Systems, 19th & 20th December 2019.

Placements

Company Name	No. of students placed
Accenture	29
TCS	05
Global Logic	01
Simeio solutions	01
Hexaware Technologies	01
Mercedes Benz	04
Cognizant	02
Infosys	07
Tata Elxs	01