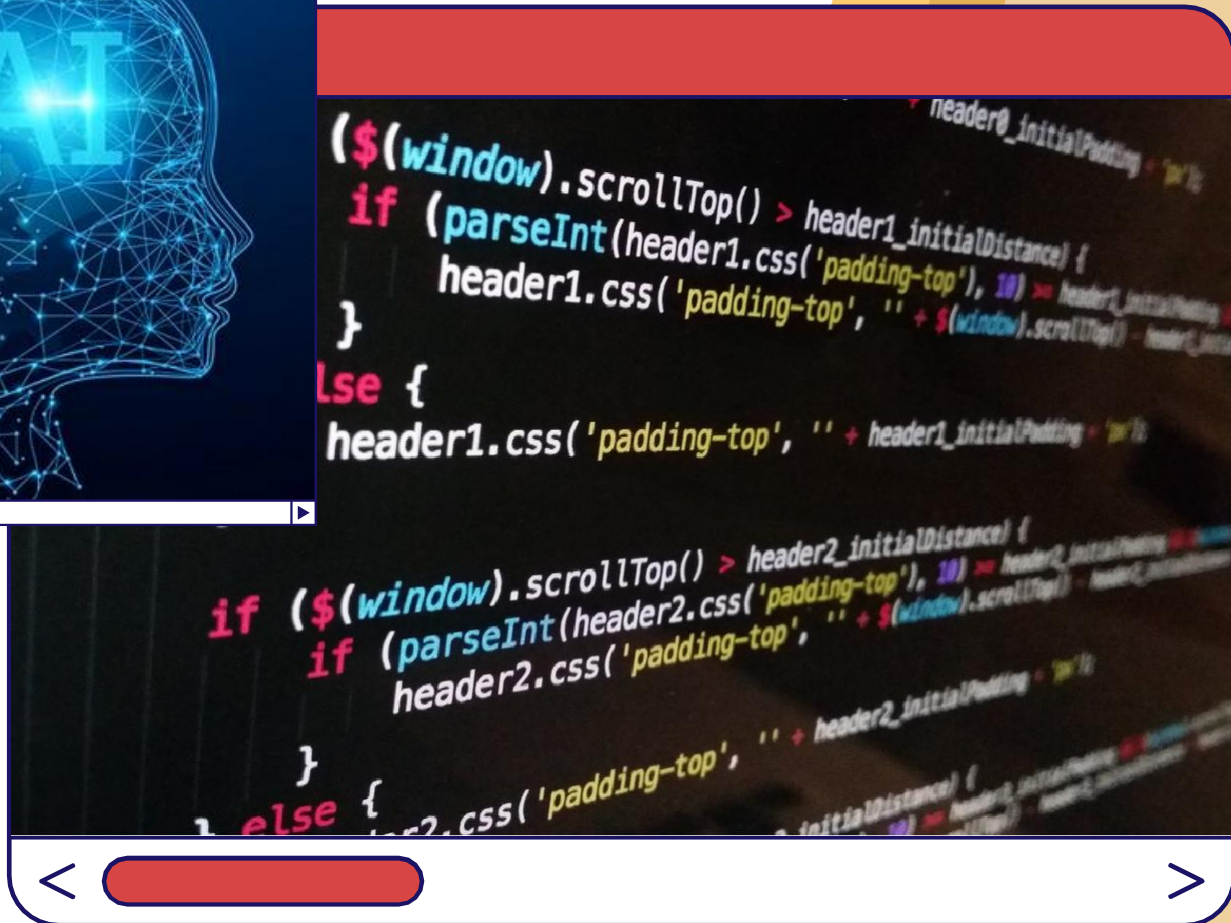


Symbi-Sains

**TECH-MAGAZINE OF
DEPT OF CSE, SIT**



APRIL 2022 ISSUE

The EDITORIAL

As the youth of today, we are the leaders of tomorrow, and in this rapidly changing world, we must learn to advance with technology. Symbi-Sains is more than just a magazine; it is the amalgamation of the knowledge of all the students and faculties trying to pave the future into a better world using technology.

“ The **future** is literally in our hands to mold as we like. But we cannot wait until **tomorrow**. ”



Pooja Kamat
Faculty Head



Pooja Bagane
Faculty Head



Pranav Nale
Student Head

VISION and MISSION

The Vision

To evolve as a center of excellence in Computer Science and Engineering to produce skilled and proficient global professionals to build the society.

The Mission

- To provide the conducive environment for establishing students in the global platform of research and innovation
- To educate students on cutting edge technologies with problem-solving capabilities, leadership and team workskills
- To inculcate the professional values with lifelong learning through curricular and co-curricular activities and create globally-aware disciplined citizens.
- To commence various initiatives for motivating students to work for the betterment of society.

Program Educational Objectives

- PEO1: Apply their skills with research orientation and establish themselves globally.
- PEO2: Apply problem solving and emerging technology skills for designing solutions.
- PEO3: Apply technical and leadership skills to be a successful entrepreneur.

MESSAGE FROM THE DIRECTOR



Welcome to the Department of Computer Science Engineering, where you'll join a diverse community engaged in hands-on learning and cutting-edge research on your route to a successful career in business, government, or academia. Through creative instruction from our professors and involvement in hands-on projects and laboratories, our undergraduate and postgraduate students get an excellent educational experience. Being a member of one of our student competition teams allows you to acquire not just engineering and interpersonal abilities but also lifelong friendships. Working on industry-sponsored capstone projects and internships in businesses fosters professional ties that lead to post-graduation success. Our faculty members are engaged in high-impact research funded by government and academic bodies in a variety of areas, including Artificial Intelligence and Machine Learning, Deep Learning, Cyber Security, Blockchain, and Datascience. Through excellence in teaching, research, and service, we create an inclusive and dynamic experience. Welcome, I look forward to working with you. If you have any comments, questions, or ideas, please email me at director@sitpune.edu.in.

Dr. Ketan Kotecha

Professor, Computer Science & Engineering

Director, Symbiosis Institute of Technology

*Head, Symbiosis Centre for Applied Artificial Intelligence
(SCAAI)*

MESSAGE FROM THE HOD



Welcome to the Department of Computer Science and Engineering (CSE) at Symbiosis Institute of Technology, Pune. Computer science Engineering is a fascinating, challenging, and dynamic discipline that is now generally acknowledged as a vital source of tools and strategies for improvements in virtually every field of human effort. The Department of CSE started its journey in 2008 by offering undergraduate and postgraduate programs. Currently, the Department has a total of 29 skilled full-time faculty members with many of them being PhD degree holders. The Department's facilities include cutting-edge classrooms and programming laboratories, each with the most up-to-date machines and equipment. Department of CSE at SIT is intensively research-oriented and student-centered. Our mission and vision statements express some of our department's guiding concepts and objectives. You will be exposed to high-quality inspiring teaching and learning as a student in the Department. You'll get the chance to work on real-world issues presented by the industry, learn from IT & international experts/researchers. Students can enhance their experiences and grow personally by participating in and organizing extracurricular activities such as the technical events, hackathons, poster presentations, conferences, student clubs and other activities that promote the development of a variety of both discipline-specific and lifelong transferable skills such as enterprise, collaboration, and leadership. We are quite proud of our graduates and their achievements; they are highly competent IT professionals who are pursuing successful professions in a variety of settings in a competitive and global market.

If you have any comments, questions, or ideas, please email me at headcsit@sitpune.edu.in.

Dr. Deepali Vora

Head and Associate Professor, Computer Science & Engineering, Symbiosis Institute of Technology

Dynamic Programming

"Dude! Can you count this money?" Assuming the money given consists completely of 100-rupee notes, let's say it summed up to 1900. Now, I have given you a one hundred rupee note. How much is it now, in total? 2000? Did you count all the money again or just added one hundred to the existing sum? My assumption is you would have added one! How did you do this? You have memorized the earlier sum right!? Yes, this that you must memorize for Dynamic Programming! Not 2000, but "the memorizing" concept. Let's see how and why!

Formal Definition:

Dynamic Programming is a technique of obtaining an optimal solution to a problem by breaking down it into further subproblems. It utilizes the fact that the optimal solutions for the subproblems eventually end up giving an optimal solution for the bigger problem. [**Read More...**](#)

Tharun B

Final Year Student, CSE, Symbiosis Institute of Technology

What is the **B**lockchain?

Before we answer the question, let us ask you something. What are Bitcoins?

If you don't know the answer, read on, since understanding the blockchain is only possible with an example.

BITCOIN -

Bitcoin is a decentralized cryptocurrency, which is exchanged over a peer-to-peer network. When people speak about "bitcoin", they mean the network which supports bitcoin, or the cryptocurrency exchanged on the bitcoin network. It is a cryptocurrency because it uses cryptographic techniques to prevent fraud and counterfeiting. The bitcoin network is said to be a decentralized one because:

- No single person/organization controls the production or exchange of bitcoins.
- The bitcoin network is a peer-to-peer network.
- The database/ledger storing the records is present in each node on the network.

[Read More...](#)

Suraj Naranatt

Final Year Student, CSE, Symbiosis Institute of Technology

Beauty of being a Kid during Online Education

Today I would like to share my personal experience. My 3rd-grade son's online school is going on for the past 1.5 years and being a teacher myself, I can resonate with the challenges his teachers face in conducting online lectures. Preparing online content and delivering it effectively, keeping in mind the students' attention span, making the session interactive by asking questions and conducting online activities! Yes, it is totally challenging for both school and college teachers, especially when their parents are probably overlooking. But one major difference which I observed in both the cases is that schoolteachers have to take efforts to keep other kids mute from answering when a particular kid is asked a question as all are eager to answer! Whereas in college, teachers have to take efforts in making students answer and participate in interactions! I wondered and realized that it is probably a part of human behaviour that as we grow up, we prefer to keep quiet and not answer with the fear of being mocked at for either giving a wrong answer or trying to act smart in front of the teacher. As kids, we never bothered if we were judged, and that is certainly the beauty of this tender age. How I wish we get to re-live those years in this fast-paced world...

Pooja Kamat

Assistant Professor, CSE, Symbiosis Institute of Technology

Art Corner



Rupali Gangarde

*Assistant Professor, CSE, Symbiosis
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Art Corner



Seema Patil

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FACULTY PUBLICATIONS

Heliyon

Volume 7, Issue 6, June 2021, e07211



Research article

COVID-19 pulmonary consolidations detection in chest X-ray using progressive resizing and transfer learning techniques

Anant Bhatt ^a, Amit Ganatra ^b, Ketan Kotecha ^a

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Abstract

A viral outbreak with a lower respiratory tract febrile illness causes pulmonary syndrome named COVID-19. Pulmonary consolidations developed in the lungs of the patients are imperative factors during prognosis and diagnosis. Existing Deep Learning techniques demonstrate promising results in analyzing X-ray images when employed with Transfer Learning. However, Transfer Learning has its inherent limitations, which can be prevaricated by employing the Progressive Resizing technique. The Progressive Resizing technique reuses old computations while learning new ones in Convolution Neural Networks (CNN), enabling it to incorporate prior knowledge of the feature hierarchy. The proposed classification model can classify pulmonary consolidation into normal, pneumonia, and SARS-CoV-2 classes by analyzing X-rays images. The method exhibits substantial enhancement in classification results when the Transfer Learning technique is applied in consultation with the Progressive Resizing technique on EfficientNet CNN. The customized VGG-19 model attained benchmark scores in all evaluation criteria over the baseline VGG-19 model. GradCam based feature interpretation, coupled with X-ray visual analysis, facilitates improved assimilation of the scores. The model highlights its strength to assist medical experts in the COVID-19 identification during the prognosis and subsequently for diagnosis. Clinical implications exist in peripheral and remotely located health centers with the paucity of trained human resources to interpret radiological investigations' findings.



Dr. Ketan Kotecha
Director
SIT



Dr. Ambika Pawar
Asso Prof. CSE
SIT



Data Protection and Privacy in Healthcare

Research and Innovations

EDITED BY

Ahmed Elngar, Ambika Pawar, and Prathamesh Churi

FACULTY PUBLICATIONS

Online Extremism Detection: A Systematic Literature Review With Emphasis on Datasets, Classification Techniques, Validation Methods, and Tools

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ABSTRACT Social media platforms are popular for expressing personal views, emotions and beliefs. Social media platforms are influential for propagating extremist ideologies for group-building, fund-raising, and recruitment. To monitor and control the outreach of extremists on social media, detection of extremism in social media is necessary. The existing extremism detection literature on social media is limited by specific ideology, subjective validation methods, and binary or tertiary classification. A comprehensive and comparative survey of datasets, classification techniques, validation methods with online extremism detection tool is essential. The systematic literature review methodology (PRISMA) was used. Sixty-four studies on extremism research were collected, including 31 from SCOPUS, Web of Science (WoS), ACM, IEEE, and 33 thesis, technical and analytical reports using Snowballing technique. The survey highlights the role of social media in propagating online radicalization and the need for extremism detection on social media platforms. The review concludes lack of publicly available, class-balanced, and unbiased datasets for better detection and classification of social-media extremism. Lack of validation techniques to evaluate correctness and quality of custom data sets without human interventions, was found. The information retrieval unveiled that contemporary research work is prejudiced towards ISIS ideology. We investigated that deep learning based automated extremism detection techniques outperform other techniques. The review opens the research opportunities for developing an online, publicly available automated tool for extremism data collection and detection. The survey results in conceptualization of architecture for construction of multi-ideology



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<https://www.emerald.com/insight/1750-6220.htm>

Unleashing analytics to reduce electricity consumption using incremental clustering algorithm

Analytics to
reduce
electricity
consumption

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Abstract

Purpose – To reduce the electricity consumption in our homes, a first step is to make the user aware of it. Reading a meter once in a month is not enough, instead, it requires real-time meter reading. Smart electricity meter (SEM) is capable of providing a quick and exact meter reading in real-time at regular time intervals. SEM generates a considerable amount of household electricity consumption data in an incremental manner. However, such data has embedded load patterns and hidden information to extract and learn consumer behavior. The extracted load patterns from data clustering should be updated because consumer behaviors may be changed over time. The purpose of this study is to update the new clustering results based on the old data rather than to re-cluster all of the data from scratch.

Design/methodology/approach – This paper proposes an incremental clustering with nearest factor (KNF) algorithm to update load patterns without overall daily load curve clustering.

Findings – Extensive experiments are implemented on real-world SEM data of Irish Social Science Data Archive (Ireland) data set. The results are evaluated by both accuracy measures and clustering validity indices, which indicate that proposed method is useful for using the enormous amount of smart meter data to understand customers' electricity consumption behaviors.

Originality/value – KNF can provide an efficient response for electricity consumption patterns analysis to end consumers via SEMs.

Keywords Pattern recognition, Smart meter, Electricity data analytics, Incremental clustering algorithm, Incremental clustering with nearest factor algorithm, Smart electricity meter

Paper type Research paper

1. Introduction

The smart grid (SG) is the next generation of the electrical grid able to deliver electricity in a smart controlled way from points of generation to consumers (Siano, 2016). SG allows two-way communication between the utility and its customers, and the sensing along the transmission lines makes the grid smart. The consumer of SG can modify their purchasing patterns and behavior according to the received information, incentives and disincentives (Li et al., 2010). The advantages of SG are that it enables detailed tracking of energy

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FACULTY PUBLICATIONS

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Building Footprint Extraction from High Resolution Aerial Images Using Generative Adversarial Network (GAN) Architecture

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Dr. Shilpa Gite
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ABSTRACT Building extraction with high accuracy using semantic segmentation from high-resolution remotely sensed imagery has a wide range of applications like urban planning, updating of geospatial database, and disaster management. However, automatic building extraction with non-noisy segmentation map and obtaining accurate boundary information is a big challenge for most of the popular deep learning methods due to the existence of some barriers like cars, vegetation cover and shadow of trees in the high-resolution remote sensing imagery. Thus, we introduce an end-to-end convolutional neural network called Generative Adversarial Network (GAN) in this study to tackle these issues. In the generative model, we utilized SegNet model with Bi-directional Convolutional LSTM (BConvLSTM) to generate the segmentation map from Massachusetts building dataset containing high-resolution aerial imagery. BConvLSTM combines encoded features (containing of more local information) and decoded features (containing of more semantic information) to improve the performance of the model even with the presence of complex backgrounds and barriers. The adversarial training method enforces long-range spatial label vicinity to tackle with the issue of covering building objects with the existing occlusions such as trees, cars and shadows and achieve high-quality building segmentation outcomes under the complex scenes. The quantitative results obtained by the proposed technique with an average F1 score of 96.81% show that the



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Deep learning based respiratory sound analysis for detection of chronic obstructive pulmonary disease

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ABSTRACT

In recent times, technologies such as machine learning and deep learning have played a vital role in providing assistive solutions to a medical domain's challenges. They also improve predictive accuracy for early and timely disease detection using medical imaging and audio analysis. Due to the scarcity of trained human resources, medical practitioners are welcoming such technology assistance as it provides a helping hand to them in coping with more patients. Apart from critical health diseases such as cancer and diabetes, the impact of respiratory diseases is also gradually on the rise and is becoming life-threatening for society. The early diagnosis and immediate treatment are crucial in respiratory diseases, and hence the audio of the respiratory sounds is proving very beneficial along with chest X-rays. The presented research work aims to apply Convolutional Neural Network based deep learning methodologies to assist medical experts by providing a detailed and rigorous analysis of the medical respiratory audio data for Chronic Obstructive Pulmonary detection. In the conducted experiments, we have used a Librosa machine learning library features such as MFCC, Mel-Spectrogram, Chroma, Chroma (Constant-Q) and Chroma CENS. The presented system could also interpret the severity of the disease identified, such as mild, moderate, or acute. The investigation results validate the success of the proposed deep learning approach. The system classification accuracy has been enhanced to an ICBHI score of 93%. Furthermore, in the conducted experiments, we have applied K-fold Cross-Validation with ten splits to optimize the performance of the presented deep learning approach.

Subjects Artificial Intelligence, Data Mining and Machine Learning, Natural Language and Speech
Keywords Deep learning, CNN based classification, Medical-assistive technology, Respiratory sound analysis, Machine learning

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Additional information and

FACULTY PUBLICATIONS



Ambient acoustic event assistive framework for identification, detection, and recognition of unknown acoustic events of a residence

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ARTICLE INFO

Keywords:
Smart home acoustics acoustic sensor network
House monitoring Residential assistance
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LSTM-CNN

ABSTRACT

In recent times, Ambient Assisted Living has emerged as Smart Living. Smart living is a subset of ambient intelligence, which uses the latest technologies, intellectual processes, and ambient intelligent methodologies to enable house residents to live independently with a virtual companion 24×7 . Typically, these residents are highly engrossed in the daily routine activities that they tend to ignore certain acoustic events attributing them to the white noise caused due to tap water leakage, flush water leakage, the acoustics of door opening/closing, cupboard opening/closing, curtain opening/closing, television, shower, radio, chair and many more. These unattended events lead to a waste of critical energy resources such as electricity, water, and gas and may cause accidents in some cases. For the conducted experiments, a customized dataset termed as "unknown-2000" and ESC-50 has been used, which has more than 2000 audio sound classification samples. The customized dataset is used for the conducted experiments, consisting of various length acoustic events ranging from 2 s to 10 s. In the proposed review, we have identified, analyzed, and evaluated resident acoustic events using Librosa machine learning libraries, texture analysis using LBP methodology, LSTM-CNN, SVM, KNN, LSTM, Bi-LSTM, and Decision Tree-based classification approaches. Furthermore, in the proposed approach, based on the conducted rigorous and detailed analysis, we are also envisioning the prospective ways to enhance smart living concepts by proposing a novel Acoustic Event Detection and Classification System. The investigation results validate the success of the proposed approach. The obtained results indicate that the customized version of the LSTM-CNN based classification approach used in the conducted experiment has outperformed all the other customized classification approaches, such as SVM, KNN-based classification, C4.5 decision tree-based classification, LSTM, and Bi-LSTM based classification. The LSTM-CNN based classification model has achieved an average value of approximately 0.77 and a standard deviation of 0.2295. Furthermore, the obtained experimental results show that the proposed approach has produced a good performance in various noisy conditions such as SNR0, SNR3, SNR6, SNR9, SNR12, and SNR15. The system classification accuracy has been enhanced to 77% for various acoustic events of a residence. In the end, a detailed comparison of LBP and without LBP approaches has been carried out, which proves that the combination of LBP and LSTM-CNN classification approach provides better results than without the LBP classification approach. The proposed Ambient Acoustic Event Assistive Framework is a cost-effective alternative due to the use of low-cost microphone sensors in the conducted experiments.

1. Introduction

Cyber-physical systems aim to provide 24×7 connectivity between cyber and physical objects using the latest technologies such as the internet of things, wireless sensor networks, big data, and artificial intelligence. IoT plays a crucial role in establishing interconnectivity

between smart sensing devices, real-world objects, and virtual objects [1–4]. The current era is of IoT and intelligent assistive technologies. The latest ambient intelligence technologies have established the concept of Ambient Assisted Living (AAL). The presented ambient acoustic assistive framework's primary motivation is the issues older people face worldwide. In most countries, older populations are

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Bearing Fault Detection Using Comparative Analysis of Random Forest, ANN, and Autoencoder Methods

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Conference paper
First Online: 29 June 2021

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Prof. Pooja Kamat
Assistant
Professor, CSE

Abstract

The manufacturing industry is currently witnessing a huge revolution in terms of the Industry 4.0 paradigm, which aims to automate most of the manufacturing processes from condition monitoring of the machinery to optimizing production efficiency with automated robots and digital twins. One such valuable contribution of the Industry 4.0 paradigm is the concept of predictive maintenance (PdM), which aims to explore the contributions of artificial intelligence to get meaningful insights into the health of the machinery to enable timely maintenance. As majority of these machineries consist of bearings, bearing fault detection using artificial intelligence has been a popular choice for researchers. This paper provides a systematic literature survey of the existing research works in bearing fault detection. Further in this paper, we have done comparative analysis of bearing fault detection using the techniques of random forest classification, artificial neural network, and autoencoder on the benchmarked dataset provided by CWRU. The deep learning model of autoencoders provides the highest accuracy of 91% over the algorithms of artificial neural network and random forest.

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To feature your work in next issue -
To work with us -*

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