Department of
COMPUTER SCIENCE & ENGINEERING

TECH-EXPLORER

Technical Magazine

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ENGINEERING COLLEGE :: NELLORE
(APPROVED BY AICTE, NEW DELHI & PERMANENTLY AFFILIATED TO JNTU, ANANTHAPURAMU)

"The computer was born to solve problems that did not exist before".
- Bill Gates

Vision of the institute

To be one of the nation's premier Institutions for Technical and Management Education and a key contributor for Technological and Socio-economic Development of the Nation.

Mission of the institute

To produce technically competent Engineers and Managers by maintaining high academic standards, world class infrastructure and core instructions.

To enhance innovative skills and multi disciplinary approach of students through well experienced faculty and industry interactions.

To inculcate global perspective and attitude of students to face real world challenges by developing leadership qualities, lifelong learning abilities and ethical values.

Vision of the Department

To be a choice for education in the area of Computer Science and Engineering, serve as a valuable resource for IT industry & society and exhibit creativity, innovation and ethics to cater the global challenges.

Mission of the Department

M1: To educate learners by adapting innovative pedagogies for enhancing their cognitive skills, technical competence and lifelong learning.

M2: To provide training programs and guidance to learners through industry institute partnerships, social awareness programs, internships, competitions and project works to inculcate research skills toaddress the global challenges.

M3: To provide opportunities for students to practice professional, social and ethical responsibilities using IT expertise with a blend of leadership and entrepreneurial skills.

Program Educational Objectives (PEOs)

PEO-1 : Procure employment/progress towards higher degree and practice successfully in the CS/IT profession. (Successful Career Goals).

PEO-2 : Address complex problems by adapting to rapidly changing IT technologies. (Professional Competency).

PEO-3 : Gain respect and trust of others as effective and ethical team member by demonstrating professionalism and functioning effectively in team-oriented and open-ended activities in industry and society. (Leadership, Ethics and Contribution to Society).

(PROGRAM SPECIFIC OUTCOMES) PSOs

Domain Specific Knowledge: Apply the relevant techniques to develop solutions in the domains of algorithms, system software, computer programming, multimedia, web, data and networking.

Software Product Development: Apply the design and deployment principles to deliver a quality software product for the success of business of varying complexity.

(PROGRAM OUTCOMES) POs

1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.

12. LIFE-LONG LEARNING: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

CLOUD COMPUTING SECURITY ISSUES

The recent emergence of cloud computing has drastically altered everyone's perception of infrastructure architectures, software delivery and development models. Projecting as an evolutionary step, following the transition from mainframe computers to client/server deployment models, cloud computing encompasses elements from grid computing, utility computing and autonomic computing into an innovative deployment architecture. This rapid transition towards the clouds has fuelled concerns on a critical issue for the success of information systems, communication and information security. From a security perspective, a number of unchartered risks and challenges have been introduced from this relocation to the clouds, deteriorating much of the effectiveness of traditional protection mechanisms. As a result the aim of this paper is twofold; firstly to evaluate cloud security by identifying unique security requirements and secondly to attempt to present a viable solution that eliminates these potential threats. The proposed solution calls upon cryptography, specifically Public Key Infrastructure operating in concert with SSO and LDAP, to ensure the authentication, integrity and confidentiality of involved data and communications. The solution, presents a horizontal level of service, available to all implicated entities, that realizes a security mesh, within which essential trust is maintained.

Throughout computer science history, numerous attempts have been made to disengage users from computer hardware needs, from time-sharing utilities envisioned in the 1960s, network computers of the 1990s, to the commercial grid systems of more recent years. Cloud computing is an innovative Information System (IS) architecture, visualized as what may be the future of computing, a driving force demanding from its audience to rethink their understanding of operating systems, client–server architectures and browsers. Cloud computing has leveraged users from hardware requirements while reducing overall client side requirements and complexity.

D. Chandrahas
16711A0514
III CSE

AI BEATS ANIMAL TESTING AT FINDING TOXIC CHEMICALS

There are more than 100,000 chemicals in consumer products. For the vast majority, there is very little information about their toxicity. Traditionally, researchers will test chemicals of interest in animals. As an extreme example, a pesticide undergoes about 30 animal tests, costing about $20 million and consuming more than 10,000 mice, rats, rabbits, and dogs over five years. About 20 kilograms of the chemical are needed for this testing; obtaining such a volume can be quite a challenge for a substance not yet on the market.

The Center for Alternatives to Animal Testing (CAAT) at Johns Hopkins University, sought a better way. As so many biologists are doing these days, we turned to intelligent computer programs for help. We showed that artificial intelligence (AI) could mine existing data on chemical toxicity and generate new information. In 2016, we compiled a database of 800,000 toxicological studies on more than 10,000 chemicals registered under the European REACH legislation for industrial chemicals, and used it to feed an advanced predictive algorithm that enabled us to predict the toxicity of any chemical without setting foot in the animal lab.The software takes advantage of the power of big data and transfer learning, a machine learning method that applies information from one task or set of items to another. Similar chemicals have similar properties. Based on that principle, the software builds a map of the chemical universe. Similar chemicals are put close to each other, dissimilar ones more distant. Then, the model can place new chemicals on the map, assess what is known about their neighbors and from that information surmise their potentially harmful health and environmental effects. The more data are fed into the model, the more powerful it becomes.

T.L. Durga
15711A0573
IV CSE

INTELLIGENT APPS

Smartphones have transformed the way we work, play and communicate. And what makes smartphones irresistible is the wonderfully-functional applications that we download in these devices. These apps unlock the full potential of your smart device and make our lives worthwhile as we can manage our personal/professional relations/activities in an effectual, engaging, and interactive way. Intelligent apps (I-apps) are the next generation of apps that make our everyday tasks and experiences remarkably well. Thanks to Intelligent apps, our smartphones recognize speech, help us make confident decisions and enable us to understand unknown languages through translation!

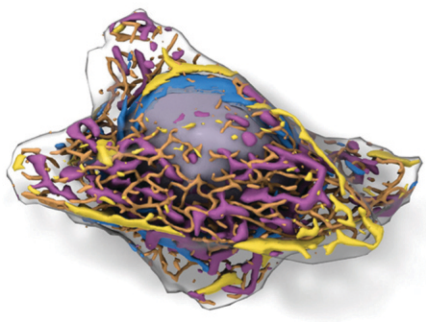
Intelligent apps are pieces of software that leverage different Artificial Intelligence (AI) components such as Machine Learning (ML), Natural Language Processing (NLP), data analytics, deep learning, robotics, general intelligence, expert systems, etc.The AI-powered algorithm helps these apps to take advantage of historical and real-time data to facilitate key user decisions. The smart integration and use of predictive and prescriptive analytics, customer data, and product insights help these apps to engage in continuous learning method, and hence the following benefits.

- Offer predictions and decisions to deliver super-rich and custom-made experiences for users.
- Offer valuable solutions based on users' history of interactions with brands, people and machines.
- Deliver personalized and contextual content to facilitate constant engagement.
- Analyse multiple data sources to deliver valuable insights and help in automating simple routine tasks without specifically waiting for user commands.

In the recent Google I/O, the developers' conference, Sundar Pichai announced its shift from a mobile-first to an AI-first world. He emphasized that Google will be focussing more on AI and Machine Learning. And this shift is applicable not only to Google but brands across all the verticals are also moving vigorously towards AI.

Suma Prathyusha
16711A0538
III CSE

DEEP LEARNING ALGORITHMS IDENTIFY STRUCTURES IN LIVING CELLS



Because of technological limitations, we can only see a few things in the cells at once, Johnson says. So we wanted to figure out ways that we could, at the very least, predict the organization of many more structures from the data that we already have. Specifically, they wanted to develop a method to identify a living cell's components in images taken using brightfield microscopy. This technique is simpler and cheaper than fluorescent microscopy, but has a major disadvantage—it produces images that appear only in shades of gray, making a cell's internal structures difficult to decipher.

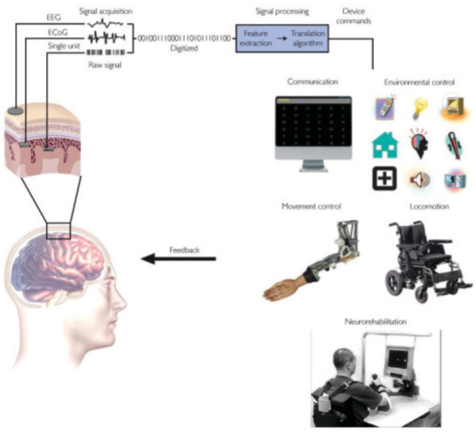
To do this, the team turned to deep learning, an artificial intelligence (AI) approach where algorithms learn to identify patterns in datasets. They trained convolutional neural networks—a deep learning approach typically used to analyze and classify images—to identify similarities between brightfield and fluorescence microscopy images of several cellular components, including the nuclear envelope, cell membrane, and mitochondria.

After comparing many pairs of images, the algorithm was able to predict the location of structures that fluorescent labels would have tagged, but in 3-D brightfield images of live cells (Nat Methods, 15:917–20, 2018). The researchers found that the tool was very accurate: its predicted labels were highly correlated with the actual fluorescent labels for many cellular components, including nucleoli, nuclear envelopes, and microtubules. By applying the technique to a series of brightfield images and merging the outputs, we were able to get this beautiful time-lapse of all these cell parts moving around.

P. Sai Keerthana
16711A0552
III CSE

BRAIN-COMPUTER INTERFACES

Brain-computer interfaces (BCIs) acquire brain signals, analyze them, and translate them into commands that are relayed to output devices that carry out desired actions. BCIs do not use normal neuromuscular output pathways. The main goal of BCI is to replace or restore useful function to people disabled by neuromuscular disorders such as amyotrophic lateral sclerosis, cerebral palsy, stroke, or spinal cord injury. From initial demonstrations of electroencephalography-based spelling and single-neuron-based device control, researchers have gone on to use electroencephalographic, intracortical, electrocorticographic, and other brain signals for increasingly complex control of cursors, robotic arms, prostheses, wheelchairs, and other devices. Brain-computer interfaces may also prove useful for rehabilitation after stroke and for other disorders.



In the future, they might augment the performance of surgeons or other medical professionals. Brain-computer interface technology is the focus of a rapidly growing research and development enterprise that is greatly exciting scientists, engineers, clinicians, and the public in general. Its future achievements will depend on advances in 3 crucial areas. Brain-computer interfaces need signal-acquisition hardware that is convenient, portable, safe, and able to function in all environments. Brain-computer interface systems need to be validated in long-term studies of real-world use by people with severe disabilities, and effective and viable models for their widespread dissemination must be implemented. Finally, the day-to-day and moment-to-moment reliability of BCI performance must be improved so that it approaches the reliability of natural muscle-based function.

P. Sahithya
16711A0550
III CSE

BITCOIN TECHNOLOGY

To cut through some of the confusion surrounding bitcoin, we need to separate it into two components. On the one hand, you have bitcoin-the-token, a snippet of code that represents ownership of a digital concept – sort of like a virtual IOU. On the other hand, you have bitcoin-the-protocol, a distributed network that maintains a ledger of balances of bitcoin-the-token. Both are referred to as bitcoin.

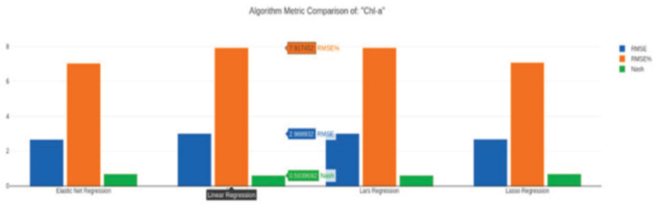
The system enables payments to be sent between users without passing through a central authority, such as a bank or payment gateway. It is created and held electronically. Bitcoins aren't printed, like dollars or euros – they're produced by computers all around the world, using free software. It was the first example of what we today call cryptocurrencies, a growing asset class that shares some characteristics of traditional currencies, with verification based on cryptography.A pseudonymous software developer going by the name of Satoshi Nakamoto proposed bitcoin in 2008, as an electronic payment system based on mathematical proof. The idea was to produce a means of exchange, independent of any central authority, that could be transferred electronically in a secure, verifiable and immutable way.

In what ways is it different from traditional currencies? Bitcoin can be used to pay for things electronically, if both parties are willing. In that sense, it's like conventional dollars, euros, or yen, which are also traded digitally.But it differs from fiat digital currencies in several important ways.

E. Hari Chandana
17715A0502
III CSE

POLLY: A TOOL FOR RAPID DATA INTEGRATION IN SUPPORT OF AGRICULTURAL RESEARCH

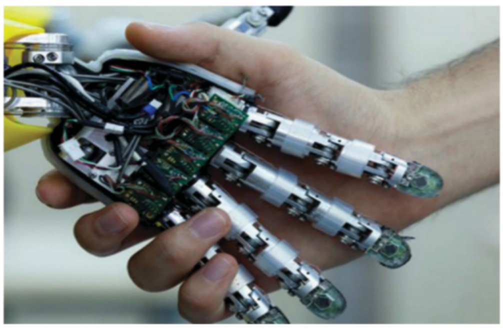
Data analysis and modeling is a complex and demanding task. While a variety of software and tools exist to cope with this problem and tame big data operations, most of these tools are either not free, and when they are, they require large amount of configuration and steep learning curve. Moreover, they provide limited functionalities. In this paper we propose Polly, an online data analysis and modeling open-source tool that is intuitive to use and can be used with minimal or no configuration. Users can use Polly to rapidly integrate, analyze their data, prototype and test their novel methodologies. Polly can be used also as an educational tool. Users can use Polly to upload or connect to their structured data sources, load the required data into our system and perform various data processing tasks. Examples of such operations include data cleaning, data pre-processing, attribute encoding, regression and classification analysis.



The increasing demand for agricultural products in the context of climate change and population growth is propelling the need for smart farming solutions. Smart farming has been shown to increase the quantity and quality of agricultural productivity. Big data and related web and IoT technologies such as machine learning are playing an essential role and enabling many opportunities for smart farming. Recent advances in UAV (Unmanned Aerial Vehicle) and imaging sensors, as well as autopilots, and GPS systems, have enabled collection of large volumes of data with high spatial, spectral, and temporal resolution from agricultural fields, allowing fast and accurate estimation of biophysical and biochemical plant traits (e.g., chlorophyll content, height, biomass, and photosynthesis) that are important indicators of plant stress and health, and prediction of crop yieldand supporting platforms and systems, smart farming is able to provide significant predictive insights in farming management and sustainable agriculture, risk management and decision-making, and also benefit crop productivity and food security concerns.

L. Sowmya
16711A0537, III CSE

UNSUPERVISED HUMAN ACTIVITY ANALYSIS FOR INTELLIGENT MOBILE ROBOTS



The success of intelligent mobile robots operating and collaborating with humans in daily living environments depends on their ability to generalise and learn human movements, and obtain a shared understanding of an observed scene. In this paper we aim to understand human activities being performed in real-world environments from long-term observation from an autonomous mobile robot. For our purposes, a human activity is defined to be a changing spatial configuration of a person's body interacting with key objects that provide some functionality within an environment. To alleviate the perceptual limitations of a mobile robot, restricted by its obscured and incomplete sensory modalities, potentially noisy visual observations are mapped into an abstract qualitative space in order to generalise patterns invariant to exact quantitative positions within the real world. A number of qualitative spatial-temporal representations are used to capture different aspects of the relations between the human subject and their environment. Analogously to information retrieval on text corpora, a generative probabilistic technique is used to recover latent, semantically-meaningful concepts in the encoded observations in an unsupervised manner. The small number of concepts discovered are considered as human activity classes, granting the robot a low-dimensional understanding of visually observed complex scenes. Finally, variational inference is used to facilitate incremental and continuous updating of such concepts that allows the mobile robot to efficiently learn and update its models of human activity over time resulting in efficient life-long learning.

CH. Bhargavi
16711A0510
III CSE

IMPORTANT WEBSITES

- OLDOC.COM Free Online Dictionary of Computing
- Net Lingo A dictionary of Internet terms.
- Tech Web An encyclopedia of Internet terms.
- webopedia.com An online dictionary and search engine for computer and related technology terms.
- Virtual Museum of Computing (VMoc) includes an eclectic collection of World Wide Web (WWW) hyperlinks connected with the history of computing and on-line computer-based exhibits available both locally and around the world.
- Software History Center
- Cover Pages: online resource for markup language technologies.
- IEEE History Center: Preserving, Researching, and Promoting the Legacy of Electrical Engineering and Computing.
- Computer History Museum is the world's largest and most significant history museum for preserving and presenting the computing revolution and its impact on the human experience. Federal Government Resources
- Final Report of the National Commission on New Technology Uses of Copyrighted Works
- NASA Careers Information on careers with the National Security Agency.
- CSRI (Computer Science Research Institute) brings university faculty and students to Sandia National Laboratories for focused collaborative research on DOE computer and computational science problems. The CSRI is organized under the DOE Stockpile Computing Program. CSRI provides a mechanism by which university researchers learn about problems in computer and computational science at DOE Laboratories.
- NIST (National Institute of Standards and Technology) Provides links to resources which were chosen to enhance and support the research needs of NIST scientific and administrative personnel. NIST's Computer Science areas of research include: computer security, software testing, information access, networking, and convergent information systems.
- Official website of the National Center for Computational Sciences.
- Science.gov A-Z listing of Computer Science topics from the National Government website.

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