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DEPARTMENT OF COMPUTER
SCIENCE AND ENGINEERING

TEACHER'S MESSAGE

I am gratified to know that the Department of Computer Science & Engineering is bringing out the second issue of their technical magazine "WIRED 2.0" of this academic year (2017-2018). This is a productive technical material and subsidiary skill developing tool for the students. The Department of CSE is striving hard towards the goal of providing innovative and quality education with high standard to achieve academic excellence and provides platform for the students to achieve their career goals. I wish the Computer Science & Engineering Association "SYNERGY" a very big success in all their ventures. I also applaud the coordination and efforts behind the team to bring out this issue. I wish them all success.

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EDITOR'S NOTE

It is indeed a great honour to be the Newsletter Editor for the Wired 2.0 and it is an immense pleasure to launch this second edition for 2018. In this issue, we have technical articles written by few students of the computer science department. There also some photographs clicked by the students and paintings done by few in the gallery section. A huge thank you to all the persons who contributed writing the wonderful and inspiring articles, without which there wouldn't have been this newsletter issue. Last but not least, I would like to thak HOD of Computer Science Department, Sonal Ayyapan and the department professors for their everlasting support throughout the creation of this edition.

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OBFUSCATION OF MALICIOUS CODE

Malware is a category of malicious code that includes viruses, worms, and trojan horses etc. They normally utilize popular communication tools to spread, including worms sent through email and instant messages, virus infected files downloaded from peer-to-peer connections etc. They often carry out tasks such as click frauds, stealing passwords, changing the system configuration, using a system as a bot to launch further attacks etc.

To overcome this security, threat many network based and host based intrusion detection systems or antivirus softwares have been created. For detecting malwares many static and dynamic analysis techniques have been developed with each having their own shortcomings. In case of traditional antivirus softwares, they use signature matching approach to detect malwares. Though the signature matching approach is quite fast and effective but it is not reliable.

Now a days with the evolution of metamorphic and polymorphic viruses, signature matching approach is proved to be useless. Virus writers use simple code obfuscation techniques to thwart signature matching. To counter the obfuscation techniques, different approaches have been proposed. For example Bruschi, Martignoni and Monga have proposed the control flow graph matching method. Here the CFG of a program is compared with the CFG of a particular section of a virus. If matching is found then it is proven to be malicious.

With obfuscation techniques, though the structure of code sequence changes but their semantics remains the same. So using the semantic approach can be very helpful in detecting malicious programs. In case of call graph matching approach, system calls issued by a program are monitored and a call graph is generated. This call graph is then matched or its similarity is calculated with the call graph of a malicious program. Though this approach is efficient for malware detection but it has some certain drawbacks. Using independent API call reordering or garbage API call insertion, it can be easily defeated.

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WORD EMBEDDING

A word embedding is a learned representation for text where words that have the same meaning have a similar representation.

It is this approach to representing words and documents that may be considered one of the key breakthroughs of deep learning on challenging natural language processing problems.

This is contrasted to the thousands or millions of dimensions required for sparse word representations, such as a one-hot encoding.

Represented as real-valued vectors in a predefined vector space. Each word is mapped to one vector and the vector values are learned in a way that resembles a neural network, and hence the technique is often lumped into the field of deep learning.

There are many techniques to create Word Embeddings. Some of the popular ones are:
1. Binary Encoding.
2. TF- Encoding.
3. TF-IDF Encoding.
4. Latent Semantic Analysis Encoding.
5. Word2Vec Encoding.

Applications:

Healthcare: Take for example, one of the biggest challenges faced by health-tech today – how to integrate HIMS and EHR? How to feed this integration into the CDS of hospitals? And finally, how to automate the process of generating accurate results from CDS – both diagnostic and prescriptive?

Financial News: An industry that is highly sensitive to news announcements and press releases, modern technology is being trained to delve into understanding the sentiment of financial news even as we speak, to detect and depict market bearings.

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BASIC BLOCKCHAIN CONCEPT IN CRYPTOCURRENCY SYSTEM

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Bitcoins are a crypto-currency and digital payment system that can be used like a usual currency, but don't physically exist like dollar bills. Bitcoins exist only in the cloud, they are used like cash when transferred between people through the web.

The Bitcoin system is peer-to-peer network based and transactions take place between users directly, without an intermediary. These transactions are verified by network nodes and recorded in a public distributed ledger called a Blockchain. Since the system works without a central repository or single administrator, Bitcoin is called the first decentralized digital currency.

Blockchain can be called the spine of the entire crypto-currency system. Blockchain technology not only helps with the users perform transactions using crypto-currencies but also ensures the security and anonymity of the users involved. It is a continuously growing list of records called blocks, which are linked and secured using cryptographic techniques. A Blockchain can serve as "an open and distributed ledger, that can record transactions between two parties in a verifiable and permanent way." This ledger that is shared among everyone in the network is public for all to view.This brings in transparency and trust into the system.

The Blockchain is typically managed by a peer-to-peer network, collectively adhering to a protocol for validating new blocks. Once recorded, the data in any given block cannot be altered retroactively without the alteration of all subsequent blocks and a collusion of the network majority.Transactions once stored in the Blockchain are permanent. They cannot be hacked or manipulated.

Features of Blockchain
- SHA256 Hash Function
- Public Key Cryptography
- Distributed Ledger & Peer to Peer Network
- Proof of Work
- Incentives for Validation

THE FOURTH INDUSTRIAL REVOLUTION OR   INDUSTRY 4.0

The first industrial revolution began in the 1760. This transition included going from hand production methods to machines and the rise of the factory system. The second revolution was mass production of various products like cars using assembly line and use of electricity for the production. On the third phase, computer and automation was introduced to speed up production and sales. Today the industry is moving towards 4th phase of it's evolution, industry 4.0. Industry 4.0 is a name given to the current trend of automation and data exchange in manufacturing technologies. It includes cyber-physical systems, the Internet of things, cloud computing and cognitive computing. Industry 4.0 fosters what has been called a "smart factory". Modern information and communication technologies like cyber-physical system, big data analytics and cloud computing, will help early detection of defects and production failures, thus enabling their prevention and increasing productivity, quality, and agility benefits that have significant competitive value.

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Proponents of the term claim Industry 4.0 will affect many areas, most notably:
- ❖ Services and business models
- ❖ Reliability and continuous productivity
- ❖ IT security: Companies like Symantec, Cisco, and Penta Security have already begun to address the issue of IoT security
- ❖ Machine safety

Challenges in implementation of Industry 4.0:
- ❖ IT security issues, which are greatly aggravated by the inherent need to open up those previously closed production shops
- ❖ Reliability and stability needed for critical machine-to-machine communication (M2M), including very short and stable latency times
- ❖ Need to maintain the integrity of production processes
- ❖ Lack of adequate skill-sets to expedite the march towards fourth industrial revolution
- ❖ Threat of redundancy of the corporate IT department
- ❖ Loss of many jobs to automatic processes and IT-controlled processes, especially for lower educated parts of society
- ❖ Low top management commitment

In the world of rapidly evolving technology and communities, industry 4.0 is definitely going to make an impact. The advancement of machine learning and general intelligence AI is going to accelerate the growth rate of industry 4.0 and hopefully help us make our lives more smooth and products cheaper.

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