She III Newsletter

Department of Computer Science & Engineering

Volume 2

Issue 2

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Vision

- Vision and Mission of the Institute
- To be one of the premier Institutes of Engineering and Management education in the country.

Mission

- To provide Engineering and Management education that meets the needs of human resources in the country.
- To develop leadership qualities, team spirit and concern for environment in students.

Vision

Vision and Mission of the Department

• To be a premier department for education in Computer Science and Engineering in the state of Karnataka, moulding students into professional engineers.

Mission

- To provide teaching/ learning facilities in Computer Science and Engineering better than prescribed by University for easy adaptation to industry and higher learning.
- Provide a platform for self learning to meet the challenges of changing technology and inculcate team spirit and leadership qualities to succeed in professional career.
- Comprehend the societal needs and environmental concerns in the field of Computer Science.





from the Department of Computer Science and Engineering, is dedicated to Dr. Andrew Yan-Tak Ng, Cofounder and Chairman of Coursera, an online learning center.

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- ✓ Open Software for speech
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- Students Achievement
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Editor's Message

Welcome to The Shell, a twice-yearly magazine covering the happenings and life of the Department of Computer Science and Engineering at BNMIT. The most distinctive feature about our department is the scholarly culture imbibed in the students. The faculties also have immense opportunities to broaden their research horizon that makes them better scholars.

I hope you enjoy every stop on this tour of the department through The Shell. I thank all the team members for their active participation. This has helped in the timely release of the newsletter.

We will see you again in the next semester with a new issue.

Anagha A. VIII CSE 'A'

Department Profile

The Department of Computer Science & Engineering at BNMIT is renowned for imparting state of the art education and carrying out cutting edge research. In addition to the strong UG Program, two PG Programs and research facilities for M.Sc (Engg.) and Ph.D courses are also offered. The Department has an equipped R&D centre and ongoing sponsored projects from VTU, DST-IISC and company incubated facilities.

The Department is associated with professional bodies viz. IEEE (USA), ACM (USA), Computer Society of India (CSI), Institution of Engineers & Indian Society for Technical Education. Major areas of specialization of the faculty include Image Processing, Computer Vision, Pattern Recognition, Computer Networks, Network Security, Embedded Systems, Compiler Design, Wireless Sensor Networks and Data Mining.

The department organizes national and international conferences regularly. Guest lectures are arranged every semester for the benefits of students. Students are placed in leading IT companies. Students are also pursuing higher studies in reputed Universities around the globe.



Shri. Narayan Rao R. Maanay, receiving Best Education Award of The Hindu Newspaper from Honourable Higher Education Minister of Karnataka Sri. Basavaraj Rayareddi in the presence of Dr. M.P. Poonia, Vice-Chairman, AICTE and Dr. M.S. Shamasundar, Advisor, NAAC at Bangalore on 26.03.2017.

BNM Institute of Technology is one among 16 engineering colleges in Karnataka to be ranked 100 - 150 by National Institute Ranking Framework (NIRF), Ministry of Human Resource Development, New Delhi, for the year 2017. University Topper



Shubratha C Sharma 7th Rank

Olga Skorokhodova: An inspiration scientist



Olga Ivanovna Skorokhodova was a Soviet scientist, therapist, teacher and writer. She lost her vision and hearing due to meningitis, and worked in the Institute for the Handicapped for the USSR Academy of Pedagogical Sciences as the world's only deaf-blind researcher. Skorokhodova created a number of scientific works concerning the development of education and teaching for the deaf and blind children.

Born in 1911 in Bilozerka, Kherson Oblast (currently Ukraine) in a poor peasant family, Olga began to lose her hearing when she was five years old due to meningitis. In 1922, after her mother's death, she was sent to a school for the blind in Odessa. In 1925, almost completely mute, Olga came to the School-Clinic for Deaf and Blind children in Kharkiv, founded by Professor Ivan. A. Sokolyansky. Under his care, Olga recovered speech, and she began to keep notes on self-observation.

In 1948, Skorokhodova became a fellow researcher at the Institute for the Handicapped and the Academy of Educational Sciences of the USSR. There, Olga worked until the end of her life. She died on 7th May 1982.

In 1947, she published her book "How I perceive the world", which aroused great interest among the people. This literary work was awarded the K. D. Ushynsky prize. In 1954, the book was supplemented with a second part, published under the title "How I perceive and represent the world". In 1972, a third part was published under the title "How I perceive, imagine and understand the surrounding world".

Vaishnavi Ravi VI CSE 'B'

Open source software for speech and time-series processing

The Graphical Models Toolkit (GMTK) has a number of features that support a wide array of statistical models suitable for speech recognition and other time series data. GMTK may be used to produce a complete automatic speech recognition system (ASR) for both small-and large-vocabulary domains. The graphs themselves may represent everything from N-gram language models down to Gaussian components, and the probabilistic inference mechanism supports first-pass decoding in these cases.

In general, there are two representational extremes one may employ when using GMTK for an ASR system. On the one hand, a graph may explicitly represent all the underlying variables and control mechanisms (such as sequencing) that are required in an ASR system. We call this approach an "explicit representation" where variables can exist for such purposes as word identification, numerical word position, phone or phoneme identity, the occurrence of a phoneme transition, and so on. In this case, the structure of the graph explicitly represents the interesting hidden structure underlying an ASR system.

On the other hand, one can instead place most or all of this control information into a single hidden Markov chain, and use a single integer state to encode all contextual information and control the allowable sequencing. We call this approach an "implicit" representation. As an example of these two extremes, consider the word "yamaha" with pronunciation Iy aa m aa hh aa!. The phoneme laa! occurs three times, each in different contexts, first preceding an ImI, then preceding an 1hhI, and finally preceding a word boundary. In an ASR system, it must somewhere be specified that the same phoneme laa! may be followed only by one of ImI,/hi, or a word boundary depending on the context -laa!, for example, may not be followed by a word boundary if it is the first laa! of the word. In the explicit GM approach, the graph and associated conditional probabilities unambiguously represent these constraints. In an implicit approach, all of the contextual information is encoded into an expanded single-variable hidden state space, where multiple HMM states correspond to the same phoneme laa! but in different contexts. The explicit approach is useful when modeling the detailed and intricate structures of ASR. It is our belief, moreover, that such an approach will yield improved results when combined with a discriminative structure, because it directly exposes events such as word-endings and phone transitions for use as switching parents The implicit approach is further useful in tempering computational and/or memory requirements. In any case, GMTK supports both extremes and everything in between - a user of GMTK is therefore free to experiment with quite a diverse and intricate set of graphs. It is the task of the toolkit to derive an efficient inference procedure for each such system.

A standard DBN is typically specified by listing a collection of variables along with a set of intraand inter-dependencies, which are used to unroll the network over time. GMTK generalizes this ability via dynamic GM templates. The template defines a collection of (speech) frames and a chunk specified. Each frame declares an arbitrary set of random variables and includes attributes such as parents, type (discrete, continuous), parameters to use (e.g. discrete probability tables or Gaussian mixtures) and parameter sharing. At the end of a template is a chunk specifier (two integers, N : M) which divides the template into a prologue (the first N -1 frames), a repeating chunk, and an epilogue (the last T -M frames, where T is the frame-length of the template). The middle chunk of frames is "unrolled" until the dynamic network enough a specific. OMTK uses a simple textual language (OMTKL) to define GM templates. A template chunk may consist of several frames, where each frame contains a different set of variables. Using this feature, one can easily specify multi-rate OM networks where variables occur over time at rates which are fractionally but otherwise arbitrarily related to each other.

> Yasha Ravindra VI CSE 'B'

Deep learning

Deep Learning is a new area of **Machine Learning** research, which has been introduced with the objective of moving **Machine Learning** closer to one of its original goals: Artificial Intelligence. Deep learning is also known as deep structured learning, hierarchical learning or deep machine learning. It is a class of machine learning algorithms that:

• Use a cascade of many layers of nonlinear processing units for feature extraction and transformation. Each successive layer uses the output from the previous layer as input. The algorithms may be supervised or unsupervised and applications include pattern analysis



(unsupervised) and classification (supervised).

- Are based on the (unsupervised) learning of multiple levels of features or representations of the data. Higher level features are derived from lower level features to form a hierarchical representation.
- Are a part of the broader machine learning field of learning representations of data. Learn multiple levels of representations that correspond to different levels of abstraction; the levels form a hierarchy of concepts.

In a simple case, there might be two sets of neurons: one set that receives an input signal and one that sends an output signal. When the input layer receives an input it passes on a modified version of the input to the next layer. In a deep network, there are many layers between the input and the output, allowing the algorithm to use multiple processing layers, composed of multiple linear and non-linear transformations.

Supervised Learning: It is the machine learning task of inferring a function from *labeled*

training data. The training data consist of a set of training examples. In supervised learning, each example is a *pair* consisting of an input object (typically a vector) and a desired output value (also called the *supervisory signal*). A supervised learning algorithm analyses the training data and produces an inferred function, which can be used for mapping new examples. An optimal scenario will allow for the algorithm to correctly determine the class labels for unseen instances. This requires the learning algorithm to generalize from the training data to unseen situations in a "reasonable" way.

Unsupervised Learning: It is the machine learning task of inferring a function to describe hidden structure from "unlabelled" data. Since the examples given to the learner are unlabelled, there is no evaluation of the accuracy of the structure that is output by the relevant algorithm which is one way of distinguishing unsupervised learning from supervised learning and reinforcement learning.

A central case of unsupervised learning is the problem of density estimation in statistics, though unsupervised learning encompasses many other problems (and solutions) involving summarizing and explaining key features of the data.



Deep learning algorithms are based on distributed representations. The underlying assumption behind distributed representations is that observed data are generated by the interactions of factors organized in layers. Deep learning adds the assumption that these layers of factors correspond to levels of abstraction or composition. Varying numbers of layers and layer sizes can be used to provide different amounts of abstraction.

Deep learning exploits this idea of hierarchical explanatory factors where higher level, more abstract concepts are learned from the lower level ones. These architectures are often constructed with a greedy layer-bylayer method. Deep learning helps to disentangle these abstractions and pick out which features are useful for learning.

For supervised learning tasks, deep learning methods obviate feature engineering, by translating the data into compact intermediate representations similar to principal components, and derive layered structures which remove redundancy in representation.

Many deep learning algorithms are applied to unsupervised learning tasks. This is an important benefit because unlabelled data are usually more abundant than labeled data. Examples of deep structures that can be trained in an unsupervised manner are neural history compressors and deep belief networks.

Deep learning is often presented as a step towards realising strong AI and thus many organizations have become interested in its use for particular applications. In December 2013, Facebook hired Yann LeCun to head its new artificial intelligence (AI) lab that was to have operations in California, London, and New York. The AI lab will develop deep learning techniques to help Facebook do tasks such as automatically tagging uploaded pictures with the names of the people in them. Late in 2014, Facebook also hired Vladimir Vapnik, a main developer of the Vapnik–Chervonenkis theory of statistical learning, and co-inventor of the support vector machine method.

In 2014, Google also bought DeepMind Technologies, a British start-up that developed a system capable of learning how to play Atari video games using only raw pixels as data input. In 2015 they demonstrated AlphaGo system which achieved one of the long-standing "grand challenges" of AI by learning the game of Go well enough to beat a human professional Go player.

In 2015, Blippar demonstrated a new mobile augmented reality application that makes use of deep learning to recognize objects in real time.

> Roshan Pandey VI CSE 'B'

MEAN Stack

MEAN Stack is the current trending technology for web development. MEAN Stack is primarily used for the development of single page web application which uses JavaScript maximum and renders the content to the users in no time.

Single page web application means the whole application is developed as a single page. On the page JavaScript and html5 is used to update the contents of the page dynamically as required. The routes provided at the backend displays some particular content on the page depending upon the route.

An overview of web application:

If we talk about current stage of software development and areas of computation Web Apps are playing a vital role in our day to day life. Today web pages and websites are being heavily used everywhere. Before some product is launched or some company is newly opened their websites are made live for users to know about them beforehand. Today the world has become global due to the heavy use of the websites. It seems as if web has become a guide for everything.

There are two main phases of a web development, which are:

Front End: Front end means the page of the application which is viewed by the user on the desktop or the laptop or any other device. Front end are used to display the contents to the user update the content of the web pages depending upon user input and dynamically change the content. Front end serves only a container for rendering the content to the user. There is no computation or processing done in Front end. Front end only serves as an area or a place to show some content to the user.

Back End: Back end, as the name suggests operates at the back part of the webpage. Essentially the difference between Front End and Back End is that the codes for the Front End can be viewed by the user, but the code for the Back End cannot be viewed by the user. All the processing and computation involved is done in the Back End. Also the business logics for some company or organization lie in the Back End. Back End acts as a server which communicates with the remote servers and displays the result to the user.

Over-view of old method of web app development:

Initially web apps were developed through plain html and some scripting language. Slowly .css came into existence to beautify the web pages. JavaScript was being used to dynamically update the contents of the web page. But most of the work was done at the Back End. Mainly PHP (a back end language) was used. PHP is difficult to maintain for large applications. There are also security issues in PHP. PHP is an interpreted language. It requires an interpreter to work. The PHP syntax is not followed well by the developers. Slowly people felt the need of new technology.

New methods of developing web app: Primarily the languages used for the Front End has been same namely HTML, CSS, Java Script. These markup and scripting

languages are something which are inevitable. The change of languages for web development comes into matter only when talking about Back End. Initially PHP was used intensively as Back End for web development which used apache server or more compatible WAMP(for Windows), LAMP(for Linux), MAMP(for Macintosh) server which has built in PHP server.

MEAN Stack:

MEAN Stack is combination of four languages.

- M MongoDB (used as a database)
- *E* Express (used as a framework for creating server for node.js)
- *A* AngularJs (front end framework extending HTML)
- *N*-node.js (back end language)

MEAN Stack is a combination of four languages as described above. Initially it feels difficult to learn all the four languages and then start to code and see the output. But once all the four languages are known to you, you will enjoy the coding for the web apps. We will see all the four languages briefly:

AngulaJS – It is a framework for the front end web page development. It extends the original HTML markup tags and provides with an extremely beautiful elements. It applies most of the common validation that one does for which one has to write a lot of code. It is fully structured and well maintained. The elements are perfectly stable on major devices say it may be laptop, mobile, desktop, tab, etc.

Express – It is framework developed primarily for creating a server for node.js apps. It has minimal code for developing node.js server. It acts as a middleware for the HTTP requests that we will be performing in our web apps.

It provides the routing tables which are used for the routing of page and changing the content of the page dynamically. One can learn basic express from here: *https://www.tutorialspoint.com/nodejs/nodejs_express_f* ramework.htm

Node.js – Node js a platform built on chrome's JavaScript. It is event- driven. The events that originate through some click or some value change can be monitored and accordingly a call to the server can be performed or some other action can be taken.

Node js has non-blocking I/O model. Non-blocking I/O means one can perform input/output operations before the previous input/output operation has been finished. In this way asynchronous call is made and we need not wait for the request to finish sending a new I/O request. This feature of the node js makes it very stable, light-weight and efficient. Node js can handle large chunk of data efficiently. It is suitable for large applications.

MongoDB – MongoDB is essentially a database. It is a free open-source database program. The major difference between SQL and MongoDB is SQL has structured data but MongoDB uses unstructured data. MongoDB makes use of JSON data, which is used heavily for transferring data through request from client-side and sending back the response from server-side. MongoDB has no tables, rather it has collection which stores data in JSON formats.

The main reason for the apps developed from MEAN Stack being fast is because it uses JavaScript heavily and major front-end codes are available to the browser. One can easily see all the JavaScript. However, that is fine since the codes that are visible only reveal the elements styling and all beautifying stuffs. The business logics and the computation lies to the server side which is hidden from the users.

One of the main advantages of using MEAN is that web apps can viewed on all the major devices. In addition, the node.js can be used to interact with the system resources. So one can build IOT and web apps side-by-side using node js.

Using the HTML markup language, CSS and angular js one can also build mobile apps. Ionic is an example, which is an open source SDK. It is cross platform for hybrid mobile app development. It is built using Apache and angular js. One can use normal web languages like HTML, CSS and build mobile apps. The only drawback is it takes more memory than the apps developed by android.

The HTML markup language, CSS and node js can be used to build system application, for example electron. It allows building a system application using HTML, CSS and node.js. So, in a nutshell, today learning MEAN Stack is worth it. We can develop web apps, mobile apps and system apps using same language.

Rajeev Ranjan

VI CSE 'B'

Light Fidelity [Li-Fi]

Light Fidelity (Li-Fi) is a bidirectional, high-speed and fully networked wireless communication technology similar to Wi-Fi.

The term was coined by "Harald Haas" and is a form of "visible light communication" and a subset of "Optical Wireless Communication (OWC)" and could be a complement to RF communication (Wi-Fi or cellular networks) or even a replacement in contexts of data broadcasting.

It is wire and UV visible light communication or infrared and near UV instead of radio frequency spectrum, parts of optical wireless communications technology, which carries much more information and has been proposed as a solution to the RF bandwidth limitations.

This OWC (Optical Wireless Communication) technology uses light from light emitting diodes (LEDs) as a medium to deliver networked, mobile, high speed communication in a similar manner to Wi-Fi. Li-Fi has the advantage of being useful in electromagnetic sensitive areas such as in aircraft cabin, hospitals and nuclear power plants without causing electromagnetic interference.

Like Wi-Fi, Li-Fi is wireless and uses similar 802.11 protocols; but it uses visible light communication (instead of radio frequency waves), which has much wider bandwidth.

Applications

In contrast to radio frequency waves used by Wi-Fi, lights cannot penetrate through walls and doors. As long as transparent materials like windows are covered, access to a Li-Fi channel is limited to devices inside the room. Most remotely underwater operated vehicles (ROVs) use cables to transmit command, but the length of cables then limits the area ROVs can detect. However, as light wave could travel through water, Li-Fi could be implemented on vehicles to receive and send back signals. Many treatments now involve multiple individuals, Li-Fi system could be a better system to transmit communication about the information of patients. Besides providing a higher speed, light waves also have little effect on medical instruments and human bodies.

Vehicles could communicate with one another via front and back lights to increase road safety. Street lamps and traffic signals could also provide information about current road situations.

There are many companies around the world developing this technology:

- PureLiFi, is a start-up company based in UK. They are developing Li-Fi technology in collaboration with the French company Lucibel.
- VLNComm is a start-up company in U.S. It has been funded by the US Department of Energy and National Science Foundation.
- OLEDComm is a French company working on LiFi. It provides products for indoor positioning.
- LightPointe, known for point-to-point gigabit Ethernet Free Space Optics and Hybrid Optical-Radio Bridges are developing this technology through Firefly Wireless Networks.
- * i2cat, located in Barcelona, Spain, is developing location based services.
- ByteLight, which has been quired by the LED manufacturer Acuity Brands.

Qualcomm, GE, Panasonic, Philips, Samsung, OSRAM are among the larger corporations who are entertaining this technology.

Thus, the Li-Fi has got wide use in various fields.

Shreyas K R VI CSE 'B'

QUIZ

- 1. Speech, EEG and ECG signals are the examples of information-bearing signals that evolve as functions of a single independent variable _____.
- 2. Digital programmable system allows ______ in reconfiguring the DSP operations by just changing the program. As the digital signal is in the form of 1's and 0's, it is more _____ and it can be in magnetic tapes.
- 3. Which property does y(t)=x(1-t) exhibit?
- 4. If a signal x(t) is processed through a system to obtain the signal $(x(t)^2)$, then the system is said to be
- 5. The input analog signal is converted into digital using A/D converter and passed through and then converted back to analog using D/A converter.
- 6. In the digital processing of the radar signal, the information extracted from the radar signal, such as the position of the aircraft and its speed, may simply be printed on a paper. So, there is no need of which converter in this case?
- 7. Which of the following wave is known as "amplitude modulated wave" of x(t)?

a)C.x(t) (where C is a constant) b)x(t)+y(t) c)x(t).y(t) d)dx(t)/dt

- 8. Which is the physical device which performs the operation on the signal and modifies the input signal?
- 9. What is the nature of execution for voiced speech?

a)Near periodic vibration of vocal folds. b) Random noise. c) Single impulse. d) No excitation.

10. The autocorrelation of stationary signal is a 2d plot because _____

	5. Digital Signal Processor	10. Spectrum of signal does not vary with time.
	4. Non-linear	e noitqO.e
	 Time shifting and reflecting properties 	8. System
	2. Flexibility, accurate, stored	o notido. 7
:Y9W2RA	emiT .I	6. D/A Converter

2017-Students Achievements Internship

Ketan Anand of 6th semester completed Internship of Digital Marketing at MCaffeine between 12th Feb-20th March.

Technical

- 1. Yasha Ravindra of 6th semester participated in Statewide Engineering IT quiz organized by the Board of IT Education Standards (BITES) and Tata Consultancy Services.
- 2. Pradhan B Suresh of 4th semester won the 1st place in IPL Auction conducted at BMSCE UTSAV.
- 3. Macha Pujitha of 6th semester participated in paper presentation event on 8th March 2017 during 3days national technical fest "ANOKHA-2K17 organized by RRCE, Benagaluru on 8th, 9th and 10th March 2017.
- 4. IEEE -BNMIT student branch organised a college level Science and Technology Quiz on 3rd May 2017 in association with Q-Quotient BNMIT. Our department students have won both first and second places. Student details are as follows.
 - \odot Varun Kashyap and Skanda Meda of 2^{nd} semester won 1^{st} prize
 - \odot G Sumukha and Mohammed Azam of 6th semester won 2nd prize.

Cultural

- 1. Sneha M S of 8^{th} semester has secured 1^{st} place in the POTPOURRI event in Tatava at BNMIT.
- 2. Rahul Niranjan of 4th semester secured 2nd place in ONE ACT PLAY in 17th VTU youth festival YUVA KALANJALI held at Sir MVIT, Bengaluru from 16th -19th March 2017.
- 3. Deepak V Kashpay of 6^{th} semester won the BNM Idol 2017.
- 4. Agrajit Bhowmik of 8th semester won second prize in the Chuck Glider in Tatva at BNMIT.

Sports

- 1. Vaibhav has secured 2^{nd} place in the Treasure Hunt event held on 3^{rd} - 4^{th} March 2017 at BNMIT.
- 2. Japesh M of 6th semester has won 1st prize in carrom singles conducted at Vivekananda Vidyarthi Nilaya-cultural and Sports Extravaganza.

Department Activity



- 1. Mr. Aniruddha S. G, Co Founder and Trainer of design code testig academy, conducted the workshop on Ruby on Rails to help the students to deploy web application like "College Fest Management" which could manage various events by displaying menus, enrolment, registration and accessing the database using various methods efficiently. Students experienced Practical deployment of a live web application. The students created an application for "Gender identification" with many attributes and functions. The workshop was completely hands on with many live applications and many case studies.
- 2. Mr. Sajay Kumar Bhagat from Jyoti Embedded Labs, conducted a workshop on ARM-7 Embedded systems. The workshop provided hands on various hardware and software concepts and building of practical working application. It also provided basics of Embedded Systems, CPU architecture, features, and key differentiating factors between different ARM families, Keil/Philips Flash utilities, Digital I/O, I/O Port programming, understanding the MUXing scheme of ARM7, Interfacing LED and the practical deployment of the LED On/OFF control through Blue tooth, 7 Segment display through mobile phones.





3. Mr. Parth Sharma, founding member and CEO of Knightsrobocorp, conducted a workshop on ROS (Robot Operating System and its application) for the students of ODU and was awarded the certificate of appreciation by the Old Dominion university for taking a hands-on session on Robotics Engineering and Research.

Knightsrobocorp is a start-up firm which focuses on the technical training of engineering students and providing hands-on experience by teaching various tools required as per industrial standards. Mr. Parth Sharma was also an active member of AIESEC an international Student-run organisation that provides platforms for students to find and finish their internships abroad and also served as an Exchange Intern for AIESEC Italia.

4. UTTISHTA 2017 was a youth convention held at BNMIT on February 18, 2017 for celebrating the occasion of 154th birth anniversary of Swami Vivekananda and 150th birth anniversary of Sister Nivedita by team Uttishta. The main event had two key speakers, one being Sri Chakravarthi Sulibele, a renowned Kannada orator and columnist, who spoke about the importance of developing scientific thinking as engineers and how to be the actual "youth". Another speaker was Capt. Naveen Nagappa, a soldier who fought in Kargil war alongside Capt. Vikram Batra. His life story was so inspiring and touching that it caught the entire auditorium in tears.

Editorial Team

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