Manakula Vinayagar Institute of Technology, Kalitheerthalkuppam, Puducherry-17

ELECTROMAG

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2017 – 18

MEDICAL IMAGE ANALYSIS

DO IT YOURSELF

RIDDLES

AND MORE

MAGAZINE BY DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1: Employability: Our Graduates shall be suitably employed in allied industries/services with professional competency and knowledge of modern tools.

PEO2: Higher Education: Our Graduates shall be capable to pursue higher studies/research in the field of engineering and management.

PEO3: Entrepreneurship: Our Graduates shall be prepared for a successful career by meeting ever increasing demands required by Electronics and communication profession and enable them to become an entrepreneur.

PEO4: Ethical: Our Graduates cultivate professional and ethical attitudes with effective communication skills, team work and multidisciplinary approach related to engineering issues.

PROGRAMME OUTCOMES

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: 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.

PO3: 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.

PO4: 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.

PO5: 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.

PO6: 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.

PO7: 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.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: 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.

PO11: 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 multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOS)

PSO1: Products Development: Use modern tools to design subsystems for simple applications in Embedded Systems and VLSI.

PSO2: Design Thinking: Apply engineering concepts to find solutions in the fields of Communications, Signal/Image Processing.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

About the Department

The Department was established in the year 2008 focusing to develop the skills of modern youth in the field of Electronics and Communication Engineering. Adequate emphasis is given to electronic design using modern teaching methodologies. Emphasis is also given to the development of soft and hard skills. Ulmost care is taken in the perspective of imparting more practical knowledge to the student's community in the field of Electronics and Communication.

Vision

The department aspires to produce dexterous professionals, competent Researchers and entrepreneurial leaders for the benevolence of the society.

Mission

Higher Order Thinking: To invoke higher order thinking among the students by means of comprehensive teaching and learning process.

Competency: To provide training on cutting-edge technologies to improve the competency of the students.

Continuous learning: To promote innovation through providing state of-art facilities and active industry institute interaction.

Entrepreneurship: To facilitate the students to improve their leadership and entrepreneurship skills with ethical values.

DEEP LEARNING FOR HEALTHCARE APPLICATIONS

BY DR.D.SARASWATHI, ASSOCIATE PROFESSOR/ECE

The days are gone when health care databases were small. Due to the tremendous advancement in image acquisition devices, the increase in throughput and the installation of bio-medical data collection devices have led to an unprecedented amount of data. This data is high dimension (CT, MRI, etc.), rich in variables and collected from many (often incompatible) data platforms. It makes medical data challenging and of great interest for analysis, especially images. This rapid growth in medical images requires extensive and tedious effort from medical experts—work that is subjective, prone to human error and that may have large variations from expert to expert. An alternative solution is to use machine learning techniques to automate the process of diagnosis; however, traditional machine learning methods are not sufficient to deal with such complex problems. A high-performance computing with machine learning promises the capacity to access big medical image data for accurate and efficient diagnosis. Deep learning will not only help to select and extract features, but also construct new ones; furthermore, it not only diagnoses a disease, but also measures the predictive target and provides actionable prediction models to aid physicians to develop effective treatment plans Machine learning (ML) and artificial intelligence (AI) have progressed rapidly in recent years. ML and AI techniques have played an important role in the medical field, supporting such activities as medical image processing, computer-aided diagnosis, image interpretation, image fusion, image registration, image segmentation, image-guided therapy, image retrieval and analysis. ML techniques extract information from the images and present information efficiently in an effectively form. ML and AI facilitate and assist doctors in diagnosing and predicting the risk of diseases accurately and more rapidly, allowing them to be detected earlier.

These techniques enhance the abilities of doctors and researchers to understand how to analyze the generic variations which will lead to disease. These techniques comprise conventional algorithms without learning such as support vector machines (SVMs), neural networks (NNs), k-nearest neighbor (KNN).

And deep learning algorithms such as convolutional neural networks (CNNs), recurrent neural networks (RNNs), long short-term memory (LSTM), extreme learning models (ELMs) and generative adversarial networks (GANs). The SVM, NN, KNN and similar algorithms are limited in terms of processing images in their raw form. Fig.1 shows the sample convolutional neural network architecture.
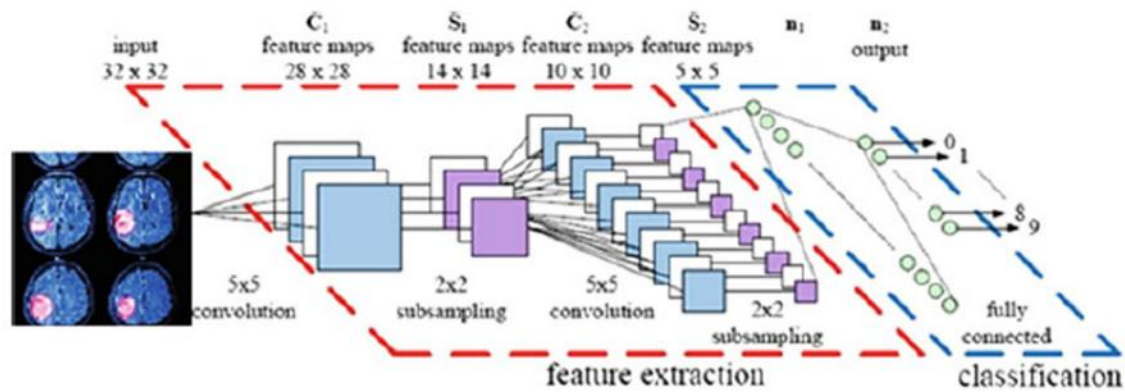

Fig.1 Convolutional neural network architecture

Many big research organizations are working on deep learning-based solutions that encourage the application of deep learning on medical images. Looking to the brighter side of machine learning, humans will soon be replaced in most medical applications, especially diagnosis. However, there are several challenges reducing the expansion of deep learning. One of the major barriers is the unavailability of annotated datasets. Thus, it remains to be seen whether enough training data is obtained, without which the performance of deep learning algorithms will be affected.

Recent developments on other applications have shown that the bigger the data, the better the result; however, how much big data could be used in health care. So far, deep learning-based applications have provided positive feedback. However, due to the sensitivity of health care data and a variety of challenges, one should look at more sophisticated deep learning methods that can deal with complex health care data efficiently. So, the conclusion is that there are unlimited opportunities for the improvement of the health care system through the use of deep learning-based systems.

LEARN MORE ABOUT DEEP LEARNING FOR HEALTHCARE APPLICATIONS
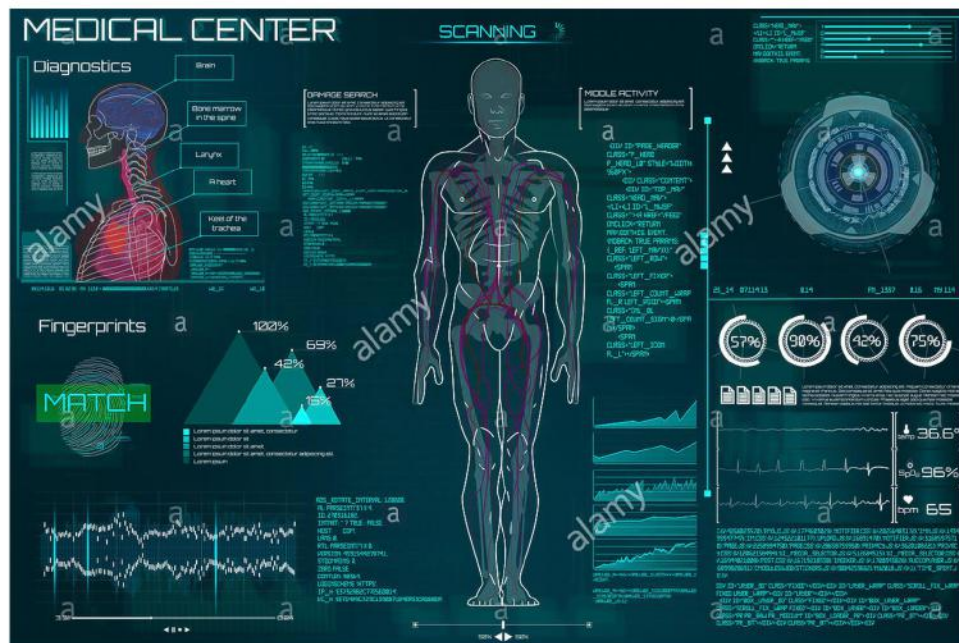
DATA SCIENCE

By S.Prasanna, IV year

MEDICAL IMAGE ANALYSIS

Medicine and healthcare is a revolutionary and promising industry for implementing the data science solutions. Data analytics is moving the medical science to a whole new level, from computerizing medical records to drug discovery and genetic disease exploration. And this is just the beginning. Healthcare and data science are often linked through finances as the industry attempts to reduce its expenses with the help of large amounts of data. Data science and medicine are rapidly developing, and it is important that they advance together.

The healthcare sector receives great benefits from the data science application in medical imaging. There is a lot of research in this area, and one of the major studies is Big Data Analytics in Healthcare . According to the study, popular imaging techniques include magnetic resonance imaging (MRI), X-ray, computed tomography, mammography, and so on. Numerous methods are used to tackle the difference in modality, resolution, and dimension of these images. The data science predictive analytics methods learn from historical data and make accurate predictions about the outcomes. They process the patient data, make sense of clinical notes, find the correlations, associations of symptoms, familiar antecedents, habits, diseases, and then make predictions. The impacts of certain biomedical factors such as genome structure or clinical variables are taken into the account to predict the evolution of certain diseases.The main benefit is the improvement of the quality of life for patients and the quality of working conditions for doctors.

DATA SCIENCE IN AGRICULTURAL FIELD

Agriculture is the backbone of the Indian economy, but the industry currently needs more support than any other. India is a country of over a billion people in population, out of which, over 70% of the population lives in the rural areas. With 40% of the country's workforce, agriculture is a major industry and an influencer of the Indian economy. Despite this, its contribution to the $ 2.3 trillion economy is just a meager 16% of the entire GDP. Agriculture is one sector responsible for feeding every individual, but the people involved in it are the last to be taken care of. After failing institutions, time has indeed come for technology to take over the change. With newer problems cropping up every day in the most inevitable indigenous sectors, it is high time we resort to emerging technologies for solutions.

The revolutionary technology that goes by the name Big Data has already made waves in other Indian industries from IT to healthcare. And now, investors and market players are planning to leverage the potential of Big Data for the benefit of agriculture in India. Apart from major companies, it is the vision of several youth of the country that has attracted the use of Big Data for farming.

Facilities like satellite-based filed monitoring, embedded sensors on crops and fields, predictions on wind direction, fertilizer requirement notifications, pest infestations, GPS-enabled tractors, water cycles, and more are acting as points of rich data sources that could be used for better agriculture practices. Besides, Big Data and analytics now also enable monitoring and supervision for growth rate and nutrient requirements on a plant-by-plant basis. Moreover, analytics is enabling farmers to make data-based decisions like which crops to plant for their next harvest. The rich information on soil health, water availability, and predictions on rainfall and precipitation make this data source .

RIDDLES

1. There is a dog on one side of a lake and a woman on the other. The woman calls the dog over and when he gets there he is not wet at all. How is this possible?

2. How do trees get onto the internet?

3. When I'm first said, I'm quite mysterious, but when I'm explained, I'm nothing serious. What am I?

4. The person who made it never used it and the person who used it never saw it, what is it?

5. I have hands I can move but I cannot clap, what am I?

6. When do you start when it's red but stop when it's green?

7. What is at the end of every rainbow?

8. I am odd number, remove one letter and I become even, what number am I?

9. I am weightless but can be seen. Put me in a bucket and I'll make it lighter. What am I?

10. What kind of table is good for you to eat?

11. A plane crashes directly on the border of the US and Canada. Where do they bury the survivors?

12. I have a ring, but no hands. I used to be plugged into the wall but now I follow you every where. What am I?

13. I am black when clean and white when dirty. What am I?

14. What runs around a house but does not move?

1. The lake is frozen. 2. They log on. 3. A Riddle! 4. A Casket. 5. A Clock. 6. When you are eating a watermelon. 7. The letter "W". 8. Seven, take out the "S" and it will become even. 9. A Hole. 10. Vegetable. 11. You don't bury survivors. 12. A Telephone. 13. I am a chalkboard. 14. A Fence.

MULTIMETER TEST LEADS
FROM SCRATCH

If you are an electronics hobbyist and need to measure low currents and low voltages, you can buy any inexpensive multimeter. However, test leads of such meters are fragile. That's what led me to make my own multimeter test leads from readily available material. These test leads cost you almost nothing as the required material, except wires, must be already available with most of you. Note that these test leads work fine for low voltages only.

Material required
1. **Two empty ball pen tubes**
2. **Wires**
3. **Refill**
4. **Aluminium foil**
5. **Two steel pins**
6. **Insulation tape**
7. **Soldering iron (used to connect wires to steel pins)**

The process:
Plug design. Cut two 2cm long pieces from the ballpen refill so that these can be inserted into ports of the multimeter. These refill pieces act as plugs. As the refill is made of a plastic material, cover refill pieces with aluminium foil to provide conduction. Using insulation tape, affix one end of black and red wires to the refills, respectively; these wires represent common (ground or negative) and positive probes.
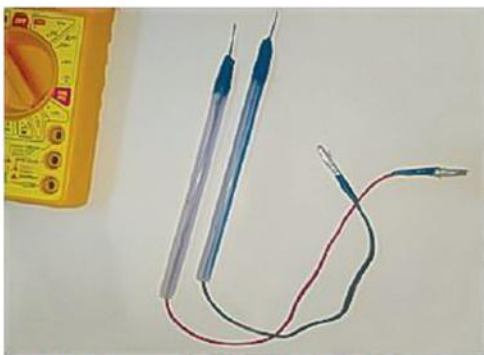

Fig. 1: Test leads made from readily available materials

Fig. 3: Cut two 2cm lengths from the refill

Fig. 4: Wrap the refill pieces in aluminium foil

Probe and tip design.
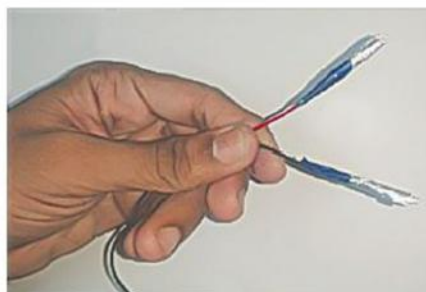Use empty pen tubes as probes, and steel pins as tips. Insert other ends of wires through the pen tubes and connect to steel pins with the help of a soldering iron. Affix the ends with the help of insulation tape.

Testing.
Test the leads to ensure that these work. Now you are good to go!

Fig. 2: Material required

Fig. 5: Affix red and black wires to the foil-wrapped refill pieces

Talent Works

Art by Dr.S.Padmapriya, Asst. Prof.

Wall art by Berlin Perdisha,
IV year

Art by Rajaasri,
IV year

Glimpse of the year

FACULTY DEVELOPMENT PROGRAM on NI Graphical
System design platform for Industrial IOT applicatios

"MITRONCE 2K18" – On the occasion of MITILENCE
A National level technical symposium held on FEB'18

LEARNATHON of INDIA contest held on FEB'18
1st Place won by DARSHAK KUMAR and 3rd place won by JASSWANTH
of our department

Inaugration of IEEE Student branch on 2017

Pongal celebration

INFRAMIND'18 contest conducted by TCS and the winners GOKULNATH and MUGILAN of 3rd year are honoured with cash prize by TCS delegates

Toppers of our department students are honoured by TCS delegates in FRUITION event

Difficulties in your life does not come to destroy you, but to help you realise your hidden potential and power. Let the difficulties know that you are too difficult.

-Dr. A. P. J. Abdul Kalam
Missile Man of India
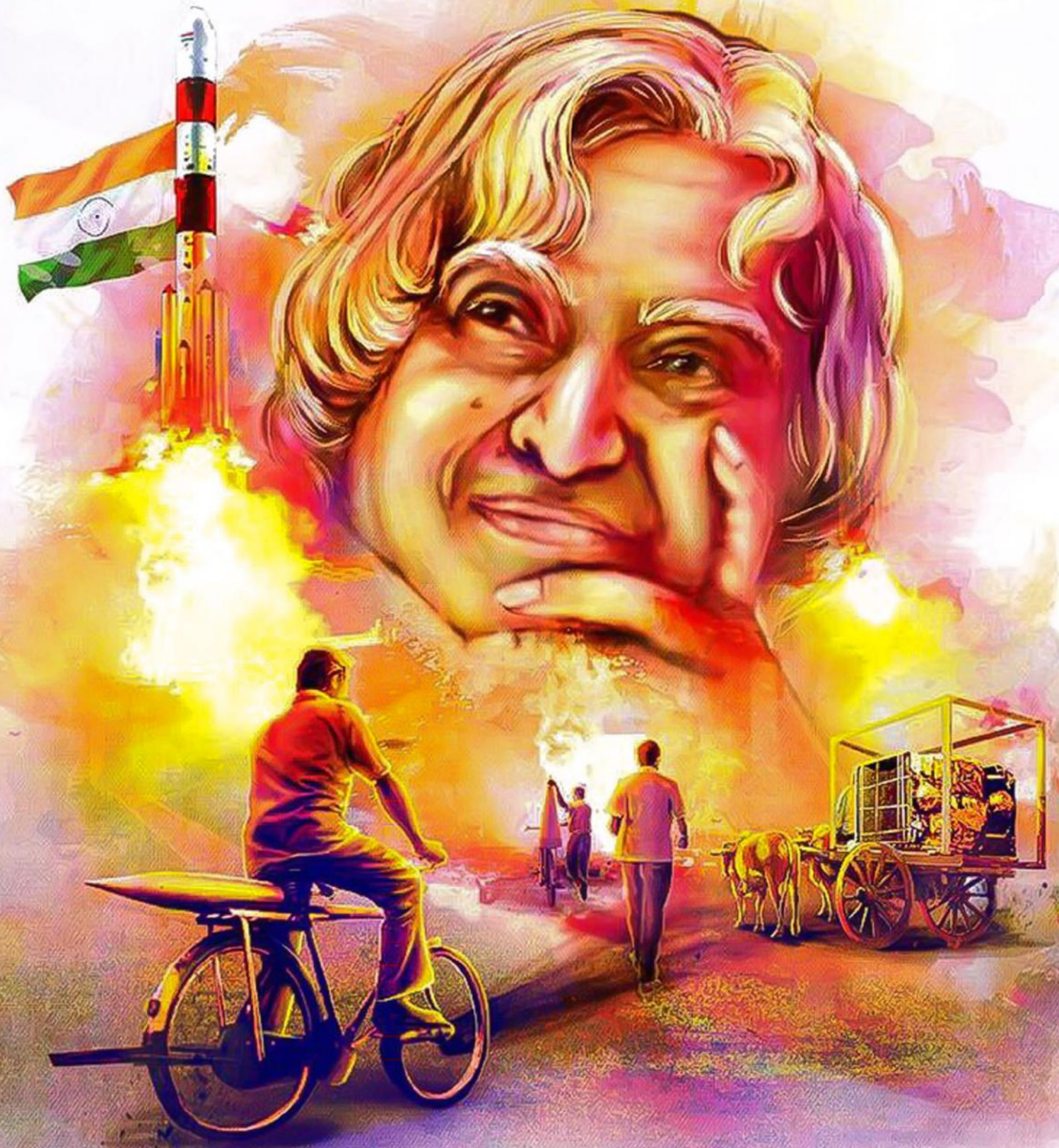
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Scientists dream about doing great things.
Engineers do them.