In this issue

Automating Remote Sensing

To detect buildings

From the late 1980s, there have been many attempts to automatically detect buildings in images captured by remote sensing satellites. The approach is useful for many purposes: to make more accurate maps, to detect damages, to estimate population, and to monitor land-use and land-cover changes. Besides, the technique will be immensely valuable for military intelligence.

As the image resolutions from satellites improved, the research area became more vibrant. The plethora of machine learning algorithms that were developed in this century further enriched the field. Yet, there are unresolved issues that limit the use of satellite images for the purposes envisaged.

A Review Article in this issue examines the techniques, methods and algorithms used so far for detecting and delineating buildings from their surroundings in remote sensing satellite images. The advantages and disadvantages of each method are explained. The article also points out future directions for researchers.

The eyes in the sky that humans have put into orbit are slowly learning to discriminate between manmade objects and natural ones. Humans, who can already discriminate one from the other, need to now turn their eyes to **page 1252** for more on the topic.

Wind and Solar Energy Production

Sensitive to climate change?

Renewable energy production in India now accounts for more than 23% of the total energy produced. While hydroelectric power generation is not expected to vary drastically with climate change, solar and wind energies are very sensitive to changes in weather and climate. Calculations on the return of investments in solar and wind energy may need to take climate change scenarios into account.

So, researchers from IITM Pune evaluated the projected changes in wind and solar energy potential over the Indian landmass, using climate models. The assumptions behind the climate models vary and their prediction accuracies also differ. So the researchers also took into consideration their ensemble outputs. Taking into account the data available from the last 55 years, they projected possible changes for the next 55 years.

Solar and wind energy outputs vary from season to season. So the researchers examined seasonal variations.

Large-scale wind and solar energy installations today are localised. The researchers examined the energy potential of six wind and six solar farms in different parts of India.

To peep into the proverbial, but scientific, crystal ball and to be better prepared for the future of solar and wind energy in India, turn to **page 1268** and read the Research Article.

Blasting in Limestone Quarry

Evaluating ground vibrations

Millions of years ago, in the tertiary period of the Eocene, there lived marine organisms, whose skeletal remains were later buried under volcanic eruptions and sedimentation. These remain today as the Nimbahera limestone formation to the southeast part of Rajasthan and are much valued by the cement and construction industries. Drilling and blasting to reach deep deposits in open pit mining can be a nuisance to local populations. And the ground vibrations can even damage structures in nearby areas. So there is a need to be able to predict ground vibrations.

But ground vibrations depend on many factors. The problem could perhaps be tackled by using multivariate linear regression. It could also be addressed using machine learning using artificial neural networks. Which will perform better?

Researchers in mining engineering at IIT-BHU started measuring ground vibrations using seismographs at designated distances from the blasts in a mine there. The data gathered were used to test the performance of the two approaches.

Besides establishing the superiority of artificial neural networks for the task, the researchers have some groundbreaking results to report. Read the Research Article on **page 1279** in this issue.

Diseases of Fruit Trees

Diagnosis from images

Recently, there have been many reports on automatic detection and diagnosis of plant diseases from images – a technology that needs to be further developed to serve farming communities. A Research Article in this issue focuses on disease detection in five major fruits of India – mango, guava, grape, orange and apple.

Researchers from the Amity University, Noida collected images of fruits and leaves from available datasets and applied a combination of thirteen convolutional neural networks to train their model. The accuracy, they say, is better than the earlier pre-trained models. And the accuracy can be increased even more by increasing the datasets of images.

Now what remains to be done is to develop a mobile app that fruit farmers can use to send images to the database to get quick automated diagnosis and treatment protocols.

Those interested in harvesting the fruits of this research need to quickly turn to **page 1315** in this issue to read the Research Article.

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