



**JAYPEE UNIVERSITY OF
INFORMATION TECHNOLOGY
WAKNAGHAT**



Online Short Term Course

on

**Recent Advances in Computational Intelligence for Signal Processing
(RACISP-2020)**

10th -15th AUGUST, 2020

organized by

**Department of Electronics and Communication Engineering
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT,
SOLAN (H.P), PIN-173234**

ABOUT UNIVERSITY

Jaypee University of Information Technology (JUIT) was set up by Act No. 14 of 2002 vide Extraordinary Gazette notification of Government of Himachal Pradesh dated May 23, 2002 and it is approved by UGC under section 2(f). The University located in serene, calm and dense forestry surroundings of lower Himalayas near to Shimla and it is governed by non-profit charitable trust of **Jaypee Seva Sansthan**. The University is accredited by NAAC, NBA and its NIRF ranking is among top 100 engineering institutes including IIT's, NIT's and Central Universities.

ABOUT DEPARTMENT

Department of Electronics and Communication Engineering is providing high quality, self motivated, creative, ethical engineers and technologist contributing effectively to universal science and contemporary education. Department is accredited by NBA and most of the faculty members in the Department are Ph.D degree holders. ECE Department is well equipped with latest laboratories, name of few are Wireless Sensor Network & IOT, Digital Signal Processing, and Embedded Systems & Robotics. Also, it has the latest software of LABVIEW, MATLAB, and VIVADO. Presently, the Department is offering UG, PG, and Ph.D degree programs in Electronics and Communication Engineering with excellent placement records.

ABOUT THE SHORT TERM COURSE

This short term course is offered as an online/virtual training programme and is aimed to up-grade the knowledge and skills of the students, research scholars, faculties and scientists involved in active research in the area of **Computational Intelligence in Signal Processing**. The goal of the course is to provide a forum to exchange latest research ideas, recent trends and innovations in the field of **Computational Intelligence in Signal Processing**. This course would surely help and offer opportunities to the new researchers, academicians and industry professionals to enhance the knowledge and pursue research in this area.

OBJECTIVE OF THE COURSE

This short term course has been intended to provide knowledge of recent technologies used in signal processing, image processing and machine learning. The objectives of the course are:

1. Constructive understanding and implementation of computational principles of signal and image processing.
2. To address latest applications of signal processing in machine learning.

PROGRAM SCHEDULE

Date	Timing	Speaker	Topic
	11:30AM		INAUGURAL
10-08-2020	11:40AM - 12:30PM	Dr. Nafis U Khan Assistant Professor, JUIT Waknaghat	Fuzzy Inference based Edge Detection in Digital Images
	02:00PM - 03:00PM	Dr. Nishant Jain Assistant Professor, JUIT Waknaghat	Fusion of Biomedical Imaging Modalities
11-08-2020	11:30AM - 12:30PM	Dr. Shruti Jain Associate Professor, JUIT Waknaghat	Futuristic Trends and Challenges in Biomedical Image Processing
	02:00PM - 03:00PM	Dr. Harsh Sohal Assistant Professor, JUIT Waknaghat	Introduction of FPGA based Digital Signal Processing
12-08-2020	11:30AM - 12:30PM	Dr. Sunil Datt Sharma Assistant Professor, JUIT Waknaghat	Digital Signal Processing for Genomics Data Analysis
	02:00PM - 03:00PM	Mr.Pardeep Garg Assistant Professor, JUIT Waknaghat	
13-08-2020	11:30AM - 12:30PM	Dr. Vikas Baghel Assistant Professor, JUIT Waknaghat	Multi-objective Optimization: Fundamentals and Evolutionary Methods
	02:00PM - 03:00PM		
14-08-2020	11:30AM - 12:30PM	Dr. Emjee Puthooran Assistant Professor, JUIT Waknaghat	Machine Learning using Python
	02:00PM - 03:00PM		
15-08-2020	11:30AM - 12:30PM	Dr. Alok Kumar Assistant Professor, JUIT Waknaghat	Role of Thresholding in Spectrum Sensing
	02:00PM - 03:00PM		Open forum and Discussion

PROGRAMME COMMITTEE

CHIEF PATRONS

- Shri Jaiprakash Gaur Ji, Founder Chairman, Jaypee Group
- Shri Manoj Gaur Ji, Executive Chairman Jaypee Group, and Pro-Chancellor, Jaypee University of Information Technology, Waknaghat, H.P.

PATRONS

- Prof. Vinod Kumar, Vice Chancellor, Jaypee University of Information Technology, Waknaghat, H.P.
- Prof. Samir Dev Gupta, Director and Dean Academics, Jaypee University of Information Technology, Waknaghat, H.P.

PROGRAMME CHAIR

- Dr. Rajiv Kumar,
Head of the Department, Electronics and Communication Engineering (ECE),
Jaypee University of Information Technology, Waknaghat, H.P.

COURSE CO-ORDINATORS

- Dr. Nafis Uddin Khan, Assistant Professor
- Dr. Sunil Datt Sharma, Assistant Professor
- Dr. Vikas Baghel, Assistant Professor

WHO CAN ATTEND

Faculty/Research Scholars/Industry Professionals from the field of Electronics & Communication Engineering, Electronics & Instrumentation Engineering, Computer Science Engineering & Information Technology, Electrical Engineering, Biomedical Engineering and Bio-Informatics can attend this course.

BENEFITS OFFERED TO PARTICIPANTS

- No Registration fees
- E-certificate of participation will be provided on the successful completion of the programme

REGISTRATION

- Participants may register through following Google link:
<https://sites.google.com/juitsolan.in/racisp-2020/registration>
- **Last date for the registration is August 09, 2020.**

CONTACT INFORMATION

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Recent Advances in Computational Intelligence for Signal Processing (RACISP-2020)

REPORT

Department of Electronics and Communication Engineering organized one week online short term course on “Recent Advances in Computational Intelligence for Signal Processing (RACISP-2020)”. The program was scheduled from 10th -15th August, 2020. This short term course was coordinated by **Dr. Sunil Datt Sharma** and **Dr. Vikas Baghel**. **Dr. Nafis Uddin Khan** was the convener of the course.

The program was inaugurated by honourable Vice –chancellor (**Prof. Vinod Kumar**) and Dean Research (**Prof. Samir Dev Gupta**). They highlighted the importance of computational techniques in signal processing and motivated the participants. More than 110 faculty members, research scholars from various universities/institutes and industry professionals from different organizations participated in this course.



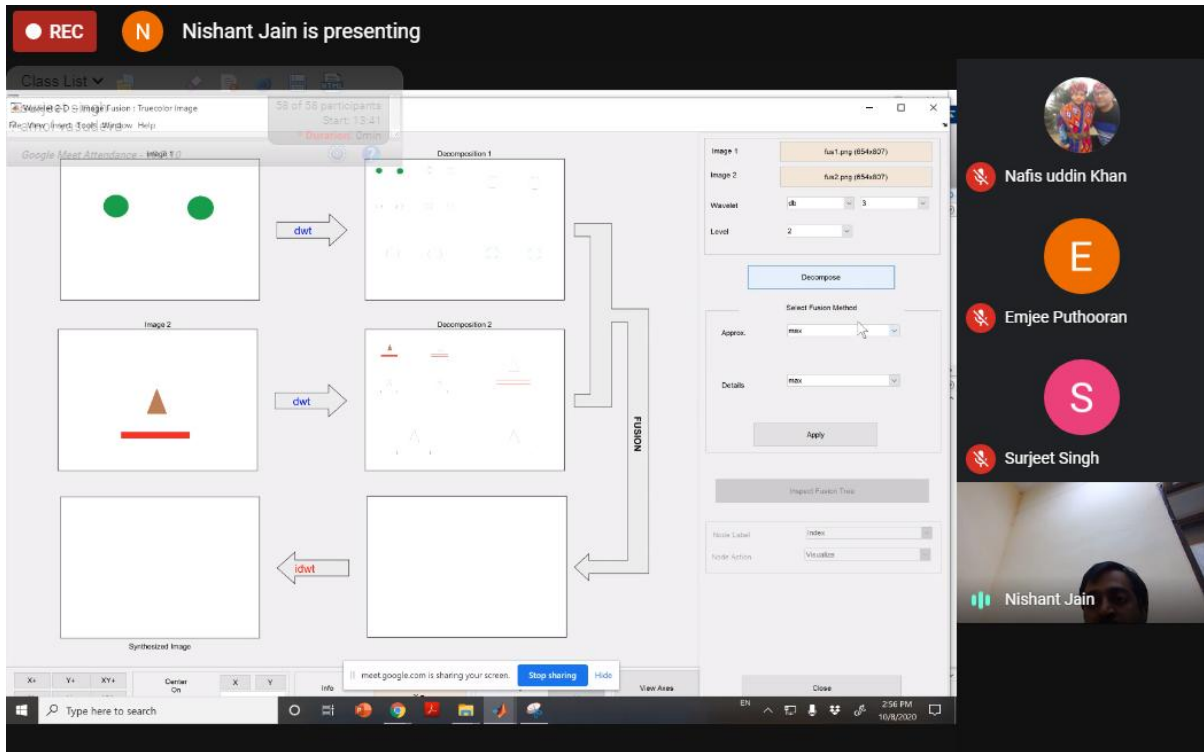


Expert Sessions:

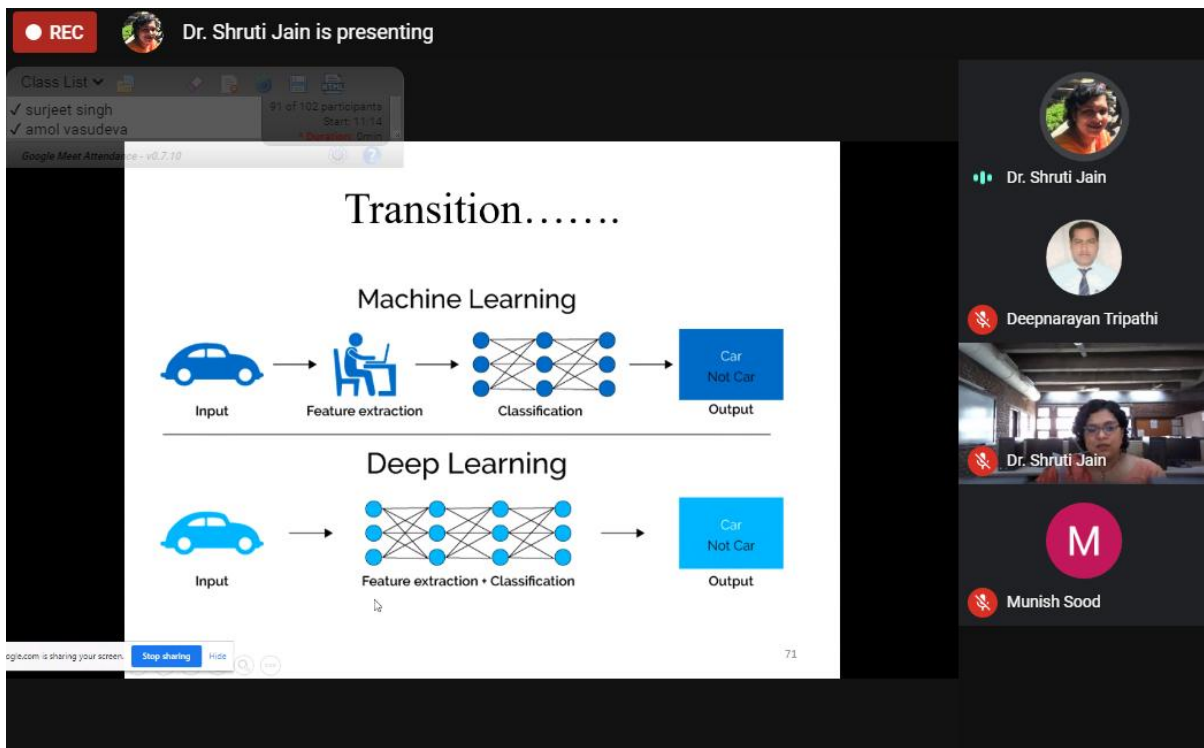
First session was taken by **Dr. Nafis Uddin Khan** and he focussed on Fuzzy inference based edge detection in digital image processing and also highlighted on the open research problems in this area.

A screenshot of a Zoom meeting showing a presentation slide. The top of the slide has a red "REC" button and a profile icon next to the text "Nafis uddin Khan is presenting". The slide content includes a table of contents with items like "Educational and Experience Details", "Introduction", "Publications so far", and "References". The main content area is titled "contd..." and contains a bullet point: "► Sensitive to high gradient impulse noise". Below this, there are three grayscale images of a woman's face (Lena) showing the effect of different parameters: "Noisy image", "k=4, T=100", and "k=10, T=100". The bottom right corner of the slide shows "10 / 66". To the right of the slide, there is a gallery view of three participants: Emjee Puthooran (represented by an orange circle with the letter 'E'), Nafis uddin Khan, Jagpreet Sidhu (represented by a pink circle with the letter 'J'), and sunil datt sharma.

Dr. Nishant Jain discussed about the fusion of biomedical imaging modalities in the second session.



Third Session was conducted by **Dr. Shruti Jain, Associate Professor**, and she highlighted the area of biomedical engineering, time and frequency characterisation of bio signals and bio signal processing. She also motivated the participants to do the research in this area.



Dr. Harsh Sohal discussed the FPGA based digital signal processing and their implementation in fourth session.

How Fast is Enough for DSP?

- It depends!
- **Real time requirements:**
 - Example: data capture speed must match sampling rate. Otherwise, data will be lost.
 - Example: in verbal conversation, delay of response can not exceed 50ms end-to-end.
 - Processing must be done by a specific **deadline**.
 - A constraint on **throughput**.
- Different throughput rates for processing different signals
 - Throughput \propto sampling rate.
 - CD music: 44.1 kHz
 - Speech: 8-22 kHz
 - Video (depends on frame rate, frame size, etc.) range from 100s kHz to MHz.

The slide also shows a grid of participant avatars including Harsh Sohal, M, S, Y, J, V, a, p, D, and others.

Fifth session & Sixth session were taken by Dr. Sunil Datt Sharma with Mr. Pardeep Garg and they discussed about the importance genomics signal processing in coming era and also discussed the open research research directions in this area.

sunil datt sharma is presenting

Class List: pushpendra kumar saimi, sunil datt sharma

Start: 11:24

Google Meet Attendance - v0.7.10

The slide illustrates the process of alternative splicing. It shows a gene with five exons (1-5) and four introns. The RNA is transcribed from the gene. Through alternative splicing, three different RNA molecules are produced, each containing a different combination of exons. These RNAs are then translated into Protein A, Protein B, and Protein C, respectively.

The participant grid includes Kumutha D., sunil datt sharma, Jagpreet Sidhu, and Prince Subhashish Dwivedi.

Session seven was taken by **Dr. Vikas Baghel** and he discussed the fundamentals and evolutionary methods for multi-objective optimization. He also conducted hand-on-session on the same topic in eighth session.

Definitions

Domination :
One solution is said to dominate another if it is **better in all objectives**.

Non-Domination [Pareto points] :
A solution is said to be non-dominated if it is **better than other solutions in at least one objective**.

- ✓ A dominates B (better in both f_1 and f_2)
- ✓ A dominates C (same in f_2 but better in f_1)
- ✓ A does not dominate D (non-dominated points)
- ✓ A and D are in the **"Pareto optimal front"**
- ✓ These non-dominated solutions are called Pareto optimal solutions.
- ✓ This non-dominated (trade-off) curve is said to be **Pareto front**.
- ✓ The concept of optimizing one performance on the cost of other is termed as **Pareto Optimality**.

Jaypee University of Information Technology, Waknaghat

Vikas Baghel

Dr. Emjee Puthooran conducted talk and hands on session machine learning using python in ninth and tenth session respectively.

REC

E

Emjee Puthooran is presenting

Emjee Puthooran

Class List

localhost:8888/notebooks/Desktop/openv-machine-learning-master/notebooks/03.02-Understanding-the-k-NN-Algorithm-Copy1.ipynb

jupyter 03.02-Understanding-the-k-NN-Algorithm-Copy1 Last Checkpoint: an hour ago (autosaved)

File Edit View Insert Cell Kernel Widgets Help

the map, and the second integer as the point's y coordinate. Similarly, let's pick a label for the data point.

```
In [10]: single_label = np.random.randint(0, 2)
single_label
Out[10]: 1
```

Turns out that this data point would have class 0.

Let's wrap this process in a function that takes as input the number of data points to generate (that is, `num_samples`) and the number of features every data point has (that is, `num_features`).

```
In [ ]: def generate_data(num_samples, num_features=2):
    """Randomly generates a number of data points"""
    data_size = (num_samples, num_features)
    train_data = np.random.randint(0, 100, size=data_size)
    labels_size = (num_samples, 1)
    labels = np.random.randint(0, 2, size=labels_size)
    return train_data.astype(np.float32), labels
```

Let's put the function to test and generate an arbitrary number of data points, let's say eleven, whose coordinates are chosen randomly.

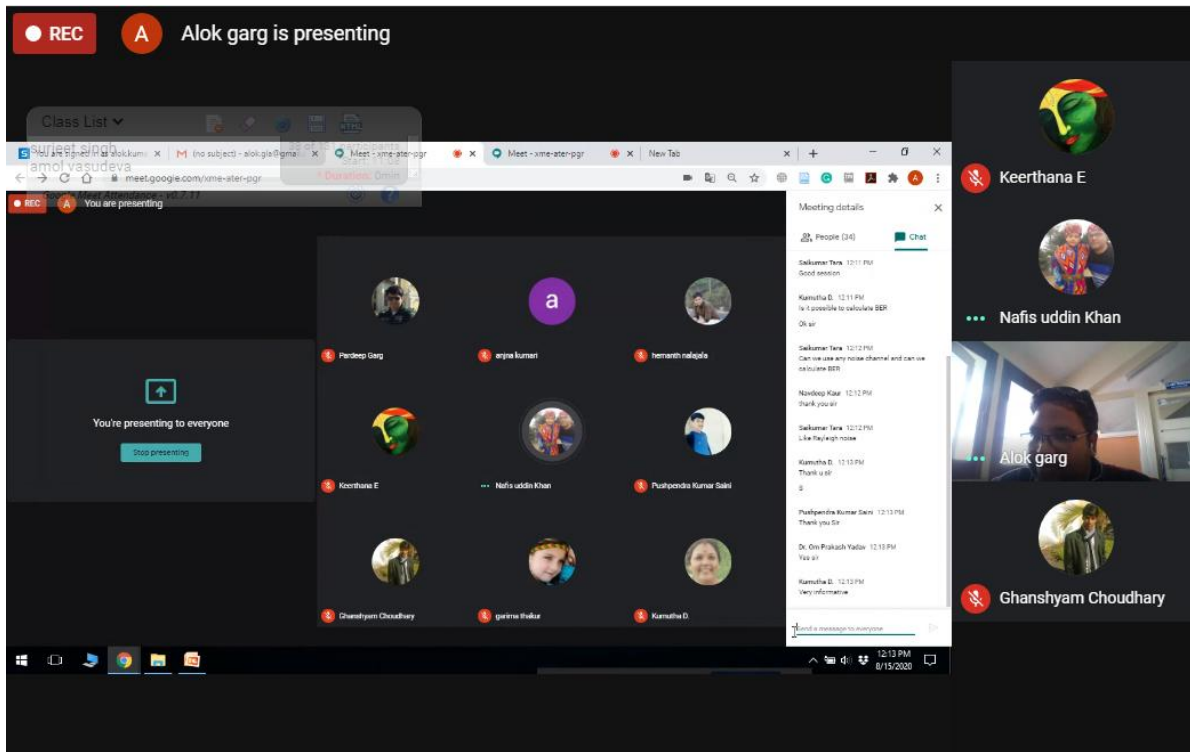
```
In [ ]: train_data, labels = generate_data(11)
train_data
```

As we can see from the preceding output, inspect the first data point with its coord...

meet.google.com is sharing your screen. Stop sharing hide corresponds to a single data point. We can also

- Y Yugal Kumar
- J Jagpreet Sidhu
- Deepnarayan Tripathi

Eleventh session was taken by **Dr. Alok Kumar** on role of threshold in spectrum sensing and he also highlighted on open research directions in this area.



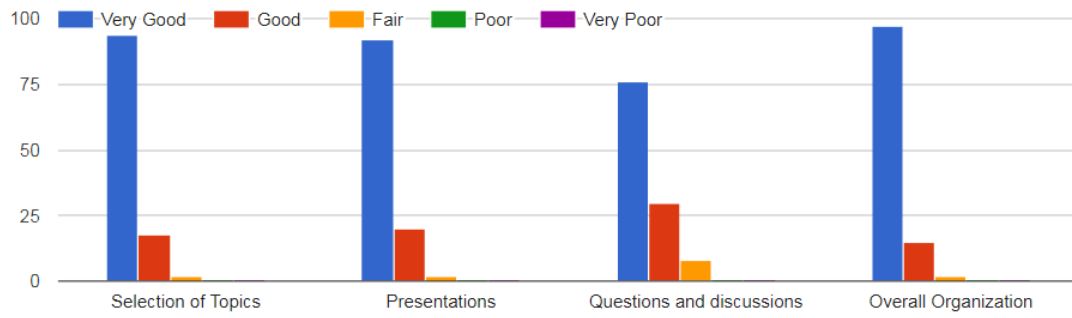
In the last session of the course, queries of the participants were answered by all speakers and suggestions from the participants were taken.

The short term course was concluded with valedictory function. The highlights of the course were given by **Dr. Vikas Baghel**. The valedictory speech was given by **Dr. Nafis U. Khan**. The vote of thanks was given by **Dr. Sunil Datt Sharma**. He highlighted the immense contribution of the Organizing Committee members and experts. He presented a special thanks to **Prof. Vinod Kumar**, Vice–chancellor, **Prof. Samir Dev Gupta**, Dean Research and **Dr. Rajiv Kumar**, Program chair & HoD ECE. He also showed his gratitude towards all speakers for their wonderful talks. He also thanked all the participants who made this event a grand success by participating wholeheartedly.

Feedback by Participants:

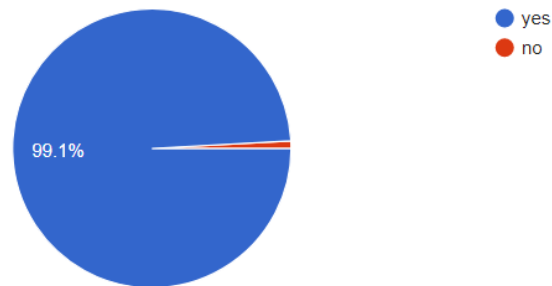
Most participants felt that the correct direction and knowledge for conducting scientific research was obtained in the short term course.

What is your rating of the following aspects of STC?



Did the STC meet your learning and research objectives?

114 responses



What is your overall evaluation of the short term course?

114 responses

