

**Report on the visit of IEEE Computational Intelligence Society
Distinguished Lecturer Professor Sushmita Mitra
to the Rio de Janeiro Chapter**

Due to the social distancing measures imposed by the COVID-19 pandemic, Rio de Janeiro received Professor Sushmita Mitra's lecture via Zoom Meetings. Details on this event are presented below.

- **Distinguished Lecture**

Date: September 10th, 2020, 9:00 AM to 10:10 AM (Rio de Janeiro time)

Organizer: Harold Dias de Mello Junior (Chair of the CIS/IEEE Rio de Janeiro Chapter)

Location: remote meeting (via Zoom)

Title: Intelligent Biomedical Image Analysis

Abstract: This talk's focus will be on image analysis, mainly related to brain tumor MRIs (gliomas) – involving intelligent decision-making. It will encompass segmentation, classification, feature extraction & selection to improve diagnosis, prognosis, and treatment planning towards tumor management. Beginning with an introduction to the nuances of MRI and deep learning, we will introduce a fast localization and detection algorithm involving saliency, followed by a single seed delineation technique for the tumor. Finally, we will describe a couple of deep learning-based approaches for the detection, classification, segmentation, and survival prediction in glioma patients.

Description: This event was announced on the Rio Chapter's Website:

<https://r9.ieee.org/rdj-cis/cis-distinguished-lectures-program-intelligent-biomedical-image-analysis-nov-10th-2020-9-am-brt/>

Previously, all Chapter members were notified by email.

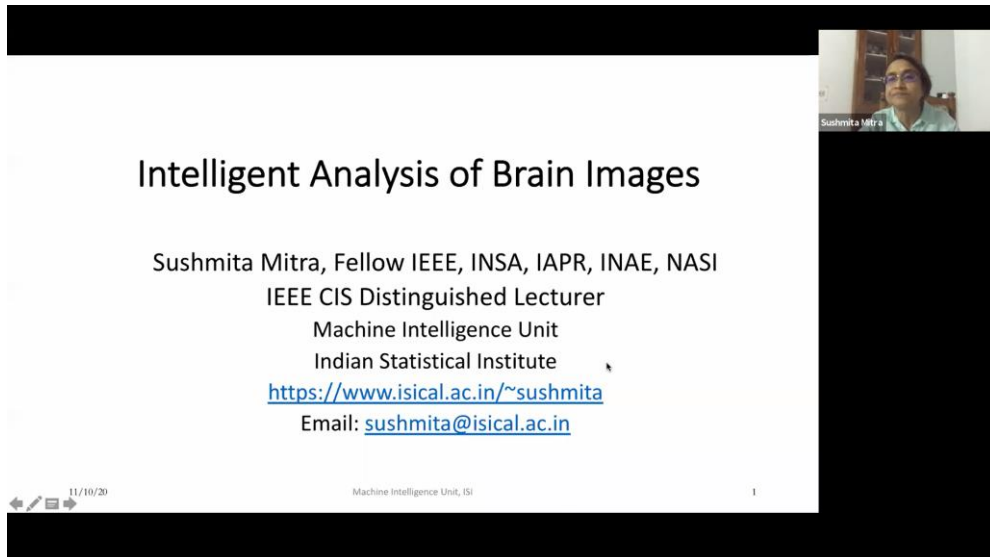
The event was also published on the group of the Brazilian Computational Intelligence Society and even on international lists.

A pre-registration was made on the Rio Chapter's Website. We had 84 registrations approved. However, due to technical problems, the lecture was attended by up to 44 attendees, including undergraduate, graduate, professors, and researchers. Professor Sushmita presented the state-of-the-art models for medical image segmentation and classification with a clear language and accessible to all participants. The 50-min talk was very well received and gave rise to some participants' questions, with about 20 minutes of detailed answers by DL Sushmita. The Rio de Janeiro Chapter kindly thanks professor Sushmita Mitra and IEEE CIS DL Program.

This lecture is available privately on the Rio de Janeiro Chapter channel on YouTube for its members.

<https://www.youtube.com/channel/UC23cn4CMWhUOYlyhTcxJUA/>

Some photos of the meeting are included below.



The screenshot shows a presentation slide with the following text:

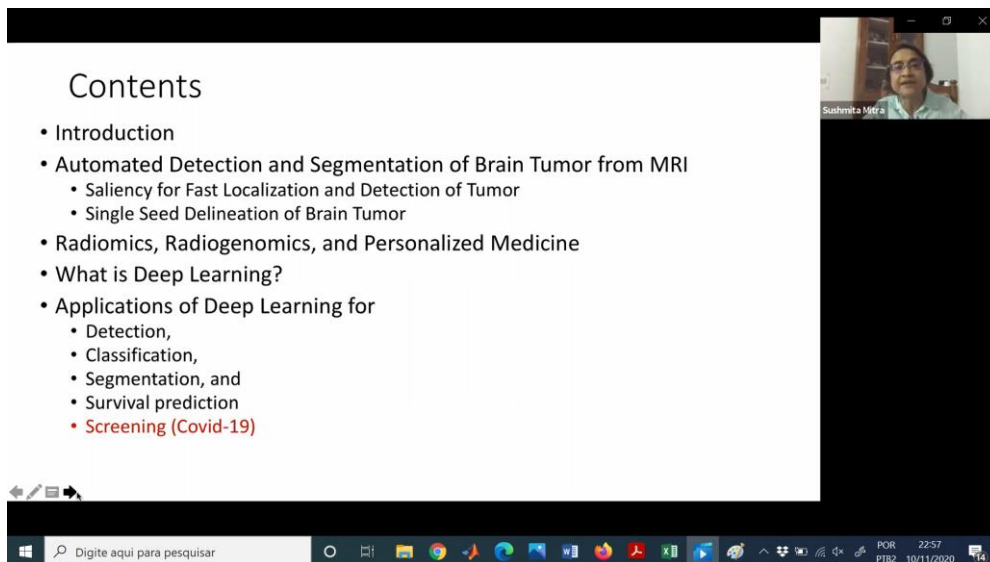
Intelligent Analysis of Brain Images

Sushmita Mitra, Fellow IEEE, INSA, IAPR, INAE, NASI
IEEE CIS Distinguished Lecturer
Machine Intelligence Unit
Indian Statistical Institute
<https://www.isical.ac.in/~sushmita>
Email: sushmita@isical.ac.in

At the bottom left, there are navigation icons and the date "11/10/20". At the bottom center, it says "Machine Intelligence Unit, ISI". At the bottom right, there is a small number "1".

On the right side of the slide, there is a small video window showing a woman, identified as "Sushmita Mitra", speaking.

Professor Sushmita starts its talk



The screenshot shows a presentation slide with the following text:

Contents

- Introduction
- Automated Detection and Segmentation of Brain Tumor from MRI
 - Saliency for Fast Localization and Detection of Tumor
 - Single Seed Delineation of Brain Tumor
- Radiomics, Radiogenomics, and Personalized Medicine
- What is Deep Learning?
- Applications of Deep Learning for
 - Detection,
 - Classification,
 - Segmentation, and
 - Survival prediction
 - Screening (Covid-19)

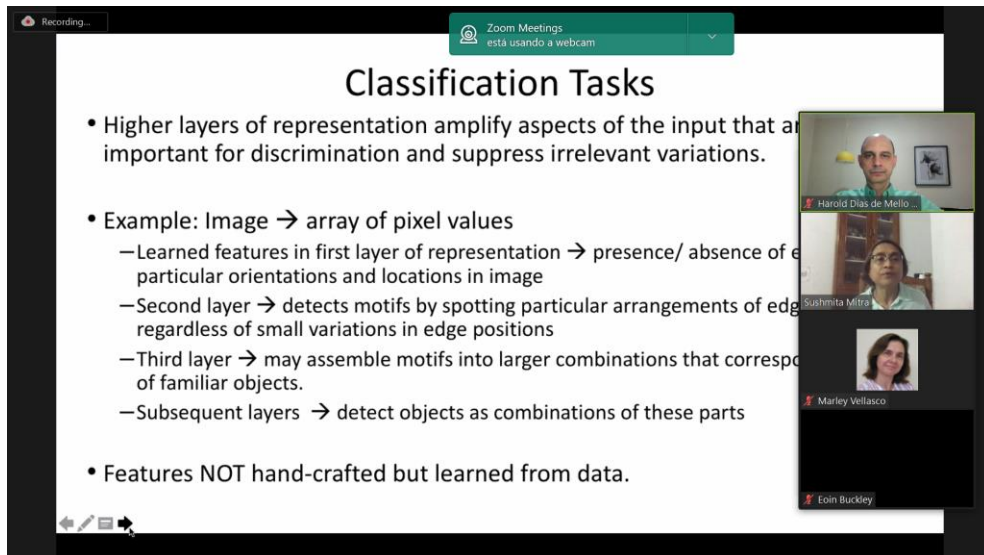
At the bottom left, there are navigation icons. At the bottom, there is a Windows taskbar with a search bar containing "Digite aqui para pesquisar" and various application icons. The system tray shows "POR 22:57 PTB2 10/11/2020".

On the right side of the slide, there is a small video window showing a woman, identified as "Sushmita Mitra", speaking.

Recording... Zoom Meetings está usando a webcam

Classification Tasks

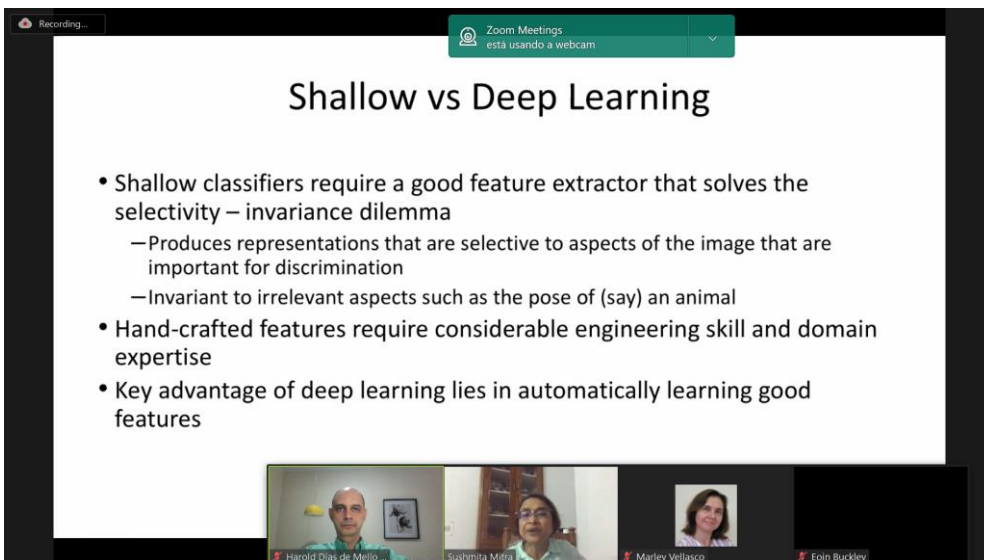
- Higher layers of representation amplify aspects of the input that are important for discrimination and suppress irrelevant variations.
- Example: Image \rightarrow array of pixel values
 - Learned features in first layer of representation \rightarrow presence/ absence of edge at particular orientations and locations in image
 - Second layer \rightarrow detects motifs by spotting particular arrangements of edges regardless of small variations in edge positions
 - Third layer \rightarrow may assemble motifs into larger combinations that correspond to familiar objects.
 - Subsequent layers \rightarrow detect objects as combinations of these parts
- Features NOT hand-crafted but learned from data.



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Shallow vs Deep Learning

- Shallow classifiers require a good feature extractor that solves the selectivity – invariance dilemma
 - Produces representations that are selective to aspects of the image that are important for discrimination
 - Invariant to irrelevant aspects such as the pose of (say) an animal
- Hand-crafted features require considerable engineering skill and domain expertise
- Key advantage of deep learning lies in automatically learning good features



Zoom Meeting Zoom Meetings está usando a webcam

Three level ConvNet architectures

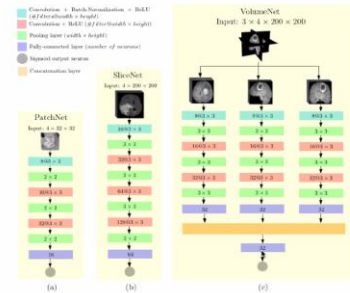


Fig: (a) patchNet, (b) SliceNet and (c) VolumeNet

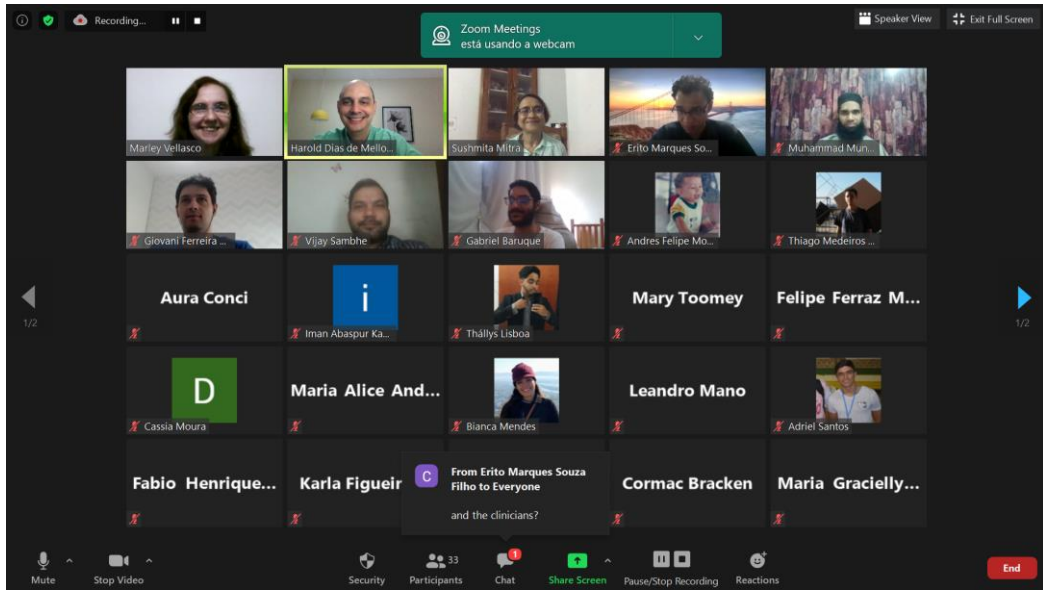
Participants (38)

Find a participant

- HD Harold Dias de ... (Host, me)
- Sushmita Mitra
- Adriel Santos
- AC Alimed Celecia
- Andres Felipe Morales
- BL Barry Lawton
- Bianca Mendes
- Carla Cristina Passos Cruz
- Carlos Goulart
- D Cassia Moura
- CB Cormac Bracken

Zoom Group Chat

Windows taskbar: Digite aqui para pesquisar, 09:42, 10/11/2020



Printscreen at the end of the Professor Sushmita talk