

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

Rio de Janeiro received Professor Jie Lu's lecture via Zoom Meetings. Details on this event are presented below.

- **Distinguished Lecture**

Date: August 17th, 2021, 8:30 AM to 9:40 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: Concept Drift Detection and Adaptation

Abstract: Concept drift is known as an unforeseeable change in underlying over time. The phenomenon of concept drift has been recognized as the root cause of decreased effectiveness in many decision-related applications. A promising solution for coping with persistent environmental change and avoiding system performance degradation is to build a detection and adaptive system. This talk will present a set of methods and algorithms that can effectively and accurately detect understand, and adapt concept drift contents include (1) two novel competence models to indirectly measure variations in data distribution through changes in competence. By detecting changes in competence, differences in data distribution can be accurately detected and quantified, then further described in unstructured data streams; (2) algorithms for determining a drift region to identify when and where a concept drift takes place in a data stream, and a local drift degree measurement that can continuously monitor regional density changes. (3) a fuzzy adaptive regression approach to dynamically recognize, train, and store patterns. The approach assigns the membership degree of the upcoming examples belonging to these patterns to identify which pattern the current examples belong to during the modelling process. The new algorithms and techniques can be applied to data-driven prediction in complex real-world environments.

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

<https://r9.ieee.org/rdj-cis/cis-distinguished-lectures-program-lecture-concept-drift-detection-and-adaptation-aug-17th-2022-830-am-gmt-3/>

Previously, all Chapter members were notified by email.

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

A pre-registration was made on the Rio Chapter's Website. We had 47 registrations approved. However, the lecture was attended by up to 26 attendees, including undergraduates, graduates, professors, and researchers. In a comprehensive approach, Dr. Lu initially presented fundamental machine learning concepts to introduce the definition of concept drift. Next she talked about the motivations and difficulties of handling concept drift. Subsequently, Professor Lu described the learning process and strategies under concept drift. Then she addressed the solutions her research group has given to the challenges present in each step of the concept drift process and its detection. She presented the fuzzy competence model based on drift detection among the various models. The lecture concluded with a summary indicating the "disaster" of learning when testing data does not conform to the same pattern as training data.

The 55 minutes talk was very well received and gave rise to some participants' questions, with about 15 minutes of detailed answers by the DL. The Rio de Janeiro Chapter kindly thanks professor Jie Lu 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/watch?v=obn3UcOGej4>

Some photos of the meeting are included below.

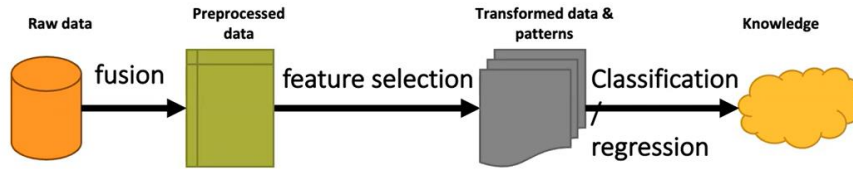


Professor Lu starts his talk

1. Introduction



- **Machine learning** is a computational process of discovering patterns (knowledge) from historical data



- The overall **goal** of machine learning is to extract useful information from data and transform it into an understandable structure (e.g. rules, classification function,...) for **further use**.

The screenshot shows a Zoom meeting interface. The main content is a slide titled "Machine Learning" with the following text and diagram:

• **Machine learning** is a computational process of discovering patterns (knowledge) from historical data

The diagram on the slide shows a flow: Raw data (cylinder) -> Preprocessed data (green box) -> Transformed data & patterns (stack of papers) -> Knowledge (cloud). Below this, a separate flow shows: New Data (blue box) -> Knowledge (cloud) -> Support Decisions (blue box).

• The overall **goal** of machine learning is to extract useful information from data and transform it into an understandable structure (knowledge) for **further use**.

The slide footer includes "4 UTS:AAII Australian Artificial Intelligence Institute" and the UTS logo.

On the right side of the Zoom window, there is a "Participants (24)" list with names and icons for each participant, including Harold de Mello Junior, jje Lu, Amanda Lucas Pereira, Felipe Fink Grael, Daniel Lara, Andrei, Douglas Dias, Almed Celecia, Allan de Lima, Bilal Majeed, Diogo Ferreira de Lima Silva, and Donal Devine.

Zoom Meeting

You are viewing jie Lu's screen

View Options

Participants (26)

Find a participant

HD Harold de Mell... (Host, me) [M] [V] [A]

jie Lu [M] [V] [A]

FB Fabiano Baldo [M] [V] [A]

AC Alimed Celecia [M] [V] [A]

AM Alisson Marques da Silva [M] [V] [A]

AD Allan de Lima [M] [V] [A]

Amanda Lucas Pereira [M] [V] [A]

A Andrei [M] [V] [A]

Bilal Majeed [M] [V] [A]

CO Ciro Olímpio de Melo [M] [V] [A]

D Daniel Lara [M] [V] [A]

David Coelho [M] [V] [A]

DP Diego Paez [M] [V] [A]

Douglas Cardoso [M] [V] [A]

Invite Mute All

3. Drift Detection

- Concept Drift detection is about to detect a drift occurs or not, which is usually achieved by hypothesis tests that monitoring
 - the changes of outputs (error) of learners and
 - the changes of raw data distributions.
- It is the most popular proactive technique for learner adapting drifts

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graph LR
    SD[Stream data] --> TL[Training and learning]
    TL --> P[Prediction]
    P --> DD{Drift detection}
    DD -- No --> TL
    DD -- Yes --> DU[Drift understanding]
    DU --> DA[Drift adaptation]
    DA --> U[Update]
    U --> TL
  
```

Our solutions on drift detection:

- 3.1 Competence model-based drift detection (2014)
- 3.2 Fuzzy competence model-based drift detection (2018)
- 3.3 Online competence model-based drift detection (2016)
- 3.4 Equal density estimation-based drift detection (2016)

Concept drift detection via equal intensity k-means space (2020)

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POR PTB2 09:07 17/08/2022

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Recording...

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jie Lu [M] [V] [A]

Marley Vellasco [M] [V] [A]

FB Fabiano Baldo [M] [V] [A]

AM Alisson Marques da Silva [M] [V] [A]

AD Allan de Lima [M] [V] [A]

Amanda Lucas Pereira [M] [V] [A]

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Invite Mute All

Marley Vellasco

Harold de Melo Junior

jie Lu

Douglas Dias

Fabiano Baldo

Felipe Augusto Silva

Ciro Olímpio de Melo

Heitor Lopes

Allan de Lima

David Coelho

Fabiano Baldo

Amanda Lucas Pereira

Felipe Fink Grael

Andrei

Douglas Cardoso

Daniel Lara

Fabiano Baldo

Tiago Silveira

Diego Paez

Alisson Marques da Silva

Bilal Majeed

Julia Grando

Gauri Vaidya

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Printscreen at the end of Professor Lu's talk