**Session/workshop/talk Report 1**

**Topic:** Is Economics from Afar Domain Generalizable? Combining Machine Learning & Satellite Imagery to understand Economic Wellbeing

**Speaker (s):** Dr. Mohsin Ali

**Organization / Company:** Associate Professor Information Technology University  
**Contact Details of the Speaker:** mohsen.ali@itu.edu.pk

**Start and end time of session:** 12:00 -12:40

**Key Messages/Points/highlights Discussed: (You may add as much as you can)**

1. Domain Shift
2. choosing pseudo labels
3. Prediction of Uncertainty
4. ML algorithms predict when it meets certain conditions.
5. Methods to pick predictions that have a high chance of being right.
6. Exploit Learned Distribution: Test and training data can come from different distributions.
7. Slum in Pakistan’s Context: Road segmentation in Peshawar etc.

**Major Learning Outcomes: (You may add as much as you can)**

1. Overcoming Data Limitations through Perseverance.
2. Machine Learning Models Shed Light on Economic Status, with Some Constraints and Boundaries.
3. This research demonstrates how a model trained on data from Lahore and Hyderabad is used to identify slums and roads in Peshawar city.
4. Addressing the High Cost of Sensing by Utilizing ML Algorithms on Limited Training Data for Testing with Extensive Datasets:

**Tools and techniques Used:**

1. Monte Carlo
2. Pseudo Labels

**Audience Strength:** Auditorium Full (300 plus)

**Recommendations for improvement of work (150-200 words):**

The main recommendation is to improve the clarity and depth of the information presented during the seminar. Currently, the content might seem unclear and too theoretical. It's important to offer clear and detailed explanations to help all participants understand the subject better. Additionally, using helpful visual aids like charts and diagrams was very effective. Therefore, including more of these visuals can significantly enhance understanding.

**Weaknesses of the work (100 - 150 words):**

The main problem with our research is that the data we have isn't great. To make our results clearer, we need more data. We should look for additional information to improve our findings. This will help us make our study better overall by having a stronger and more complete set of data to work with.

**Session/workshop/talk Report 2**

**Topic:** Geomatics Technology in the Assessment of Renewable Energy Resource Potential

**Speaker (s): ):** Dr. Jeark A. Principe

**Organization / Company:** Associate Professor, Department of Geodetic Engineering, College of Engineering University of the Philippines Dilman

**Contact Details of the Speaker:** japrincipe@up.edu.ph

**Start and end time of session:** 12.45-1.30  
**Key Messages/Points/highlights Discussed: (You may add as much as you can)**

1. Spatial-oriented Analysis
2. Global Energy Mix and Fossil Fuel Reliance
3. Multidisciplinary Approach in Environmental Studies
4. Interdisciplinary Exploration in Geospatial Sciences
5. Impact of Fossil Fuels on Energy Composition
6. Environmental Factors Influencing Solar PV Performance

**Major Learning Outcomes: (You may add as much as you can)**

1. Dust, snow, and temperature fluctuations are key elements contributing to a reduction in solar cell efficiency over time.
2. Adequate precipitation can help cleanse solar panels by washing away dust, while prolonged dry periods can worsen panel performance due to dust accumulation.
3. Leveraging satellite-derived weather data can mitigate solar cell efficiency limitations by providing valuable insights for better energy generation.
4. Utilizing geomatics technology enables a comprehensive evaluation of renewable energy potential from solar and wind sources by considering environmental variables like weather patterns and geographical features.

**Tools and techniques Used:**

1. Mean Computation.
2. Least-square method.
3. SWR per day.

**Audience Strength:** Auditorium Full (300 plus)

**Recommendations for improvement of work (150-200 words):**

To enhance the quality of our study, a thorough examination of diverse factors beyond just dust's influence is imperative. A comprehensive analysis of various elements will provide a deeper understanding and enrich the research, offering more effective ways to utilize energy resources. Moreover, integrating real-life examples, such as comparing solar energy usage in different regions like Australia and Lahore, will shed light on unique challenges and opportunities. This comparative approach will facilitate the creation of tailored solutions for specific areas, making our research more valuable and practical in the realm of sustainable energy utilization.

**Weaknesses of the work (100 - 150 words):**

The presentation was engaging and accessible for a diverse audience, including those not well-versed in the subject matter. However, it lacked fundamental information, which made it challenging for individuals from various fields to grasp key concepts. Supplementing the presentation with essential background knowledge would have facilitated better understanding for everyone. On the positive side, the presentation was effective for non-experts, presenting information in a clear and engaging manner. However, it missed referencing research sources and origins of the information shared, unlike the previous seminar. It would be beneficial to include these details for individuals keen on delving deeper into the topic and accessing additional learning resources. Adding these aspects would enhance the overall quality and comprehensiveness of the presentation.

**Session/workshop/talk Report 3**

**Topic:** Physics-Informed Machine Learning Models for Self-adapting Network of Digital

Twins

**Speaker (s):** Dr. Ashiq Anjum

**Organization / Company:** School of Computing and Mathematical Sciences, College of Science and Engineering, University of Leicester, UK

**Contact Details of the Speaker:**  [a.anjum@leicester.ac.uk](mailto:a.anjum@leicester.ac.uk)

**Start and end time of session:** 1:35-2.40

**Key Messages/Points/highlights Discussed:**

1. Advancements in Intelligent Technologies
2. Impact of IoT and New Challenges
3. Diverse Waves in Edge Analytics
4. Digital Twins and Optimization
5. Integration of Reality and Simulation
6. Enhancing Digital Twin Quality and Interpretability
7. Incorporating Physics in Digital Twin Development

**Major Learning Outcomes:**

1. Utilizing Edge AI and contextual edge intelligence empowers machines to comprehend and make decisions within their immediate environment. It's akin to providing them with an intelligent brain to discern appropriate actions in real-time.
2. Creating digital twins necessitates dealing with a significant amount of data. To streamline this process, we reduce and optimize the data, essentially crafting a condensed version that is more manageable and easier to work with.
3. Augmented reality adds virtual things to your real world, like placing digital objects in your room. Virtual reality, on the other hand, takes you entirely into a made-up world where everything is computer-generated.
4. When instructing machines, it's crucial to adhere to the rules and principles governing the physical world. This means solving supervised learning tasks while respecting the laws of physics and other relevant real-world constraints.
5. When instructing machines, it's crucial to adhere to the rules and principles governing the physical world. This means solving supervised learning tasks while respecting the laws of physics and other relevant real-world constraints.

**Tools and Techniques Used:**

1. Edge AI
2. Physics Informed Neural Networks

**Audience Strength:** Auditorium Full (300 plus)

**Recommendations for improvement of work:**

The presented work is notable for its impressiveness and contemporary relevance, showcasing a commendable level of effort and proficiency in conveying the subject matter. It is evident that the research is both impressive and current, reflecting its timeliness and significance. To further elevate its quality, refining the selection of mathematical models and enhancing the dataset for improved accuracy would be beneficial. Despite these potential areas for improvement, the seminar remains the most captivating and engaging among recent events, standing out for its modernity and intriguing subject matter.

**Weaknesses of the work:**

Dr. Ashiq Anjum's presentation was unfortunately cut short due to time constraints, leading to an incomplete coverage of the intricate details and nuances of their work. While I didn't identify any significant issues with the content discussed during the seminar, there was a concern about the pace at which Dr. Ashiq spoke. This faster pace resulted in important aspects about Edge AI and Physics-Informed Neural Networks (PINN) not being sufficiently highlighted.

**Session/workshop/talk Report 4**

**Topic:** Certified and Explainable Sustainable Cyber Security

**Speaker (s):** Dr. Taimoor Khan

**Organization / Company:** Director Cyber Assurance Lab, Centre for Sustainable Cyber Security, University of Greenwich, UK

The session was shifted to the next time slot due to time contraints.

**Session/workshop/talk Report 5**

**Topic:** Workshop on Deep Ensemble Learning for Video and Image Analytics

**Speaker (s):** Dr. M. Atif Tahir

**Organization / Company:** FAST NUCES, Karachi Campus

**Contact Details of the Speaker:** atif.tahir@nu.edu.pk

**Start and end time of session:** 10:15-1:00

**Key Messages/Points/highlights Discussed:**

1. Machine Learning Introduction: Machine Learning involves training models to learn patterns and make predictions without explicit programming, a crucial part of artificial intelligence.
2. Supervised Learning: In this ML approach, models learn from labeled data, understanding input-output relationships to make predictions or classifications.
3. Unsupervised Learning: ML models learn patterns and structures from unlabeled data, finding inherent relationships or groupings without specific guidance.
4. Types of Supervised and Unsupervised Learning: Supervised Learning includes tasks like regression (predicting continuous outcomes) and classification (categorizing data). Unsupervised Learning involves clustering and dimensionality reduction for organizing and simplifying unlabeled data.
5. Reinforcement Learning: This ML paradigm has an agent interacting with an environment, learning to make decisions by receiving feedback in the form of rewards or penalties to optimize a specific objective.
6. Deep Ensemble Learning: Deep Ensemble Learning combines multiple deep learning models' predictions, enhancing overall performance and generalization across various ML tasks.

**Major Learning Outcomes:**

1. Foundational Grasp of Machine Learning (ML): Established a solid understanding of the fundamental concepts and principles that underpin Machine Learning (ML) as a field.
2. Comprehended Supervised Learning in ML: Identified and comprehended Supervised Learning as a vital ML approach, utilizing labeled datasets to train models for making accurate predictions or classifications.
3. Insight into Unsupervised Learning in ML: Developed an understanding of Unsupervised Learning as a critical ML approach used to uncover patterns and structures within unlabeled data, contributing to enhanced data analysis.
4. In-Depth Understanding of Reinforcement Learning: Delved into Reinforcement Learning, a significant ML paradigm that involves an agent interacting with an environment, receiving feedback in the form of rewards or penalties to make informed decisions and optimize a defined objective.
5. Comprehensive Workshop Exercises Overview: Explored the workshop exercises, which were strategically designed using multiple-choice questions (MCQs) and short questions. The challenging format aimed to effectively evaluate participants' comprehension and gauge their progress in learning.

**Tools and techniques Used:**

1. Machine Learning
2. Deep Learning Ensemble Classifiers

**Audience Strength:** Lab-2 Full (300 plus)

**Recommendations for improvement of work:**

The workshop was an exceptional learning experience! It seamlessly blended informative sessions with engaging, hands-on activities that captivated every participant throughout the entire duration. The abundance of interactive elements ensured that everyone remained deeply involved and interested in the subject matter. The workshop's design allowed for a dynamic learning environment where participants could not only grasp theoretical concepts but also apply them in practical scenarios.

**Weaknesses of the work:**

The workshop was truly excellent, providing a rich and engaging learning experience. The wide array of activities incorporated into the session ensured that participants remained actively engaged and interested throughout the entire duration. The well-thought-out activities were not only informative but also interactive, allowing attendees to apply the concepts they were learning in real time.