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# NEWSLETTER

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## Editor's Note

Since its inception in 2015, Pakistan Pattern Recognition Society has actively been pursuing the goal of bringing together local experts from various theoretical and application domains of Pattern Recognition to highlight recent research in this fascinating area and discuss possible future directions and collaborations. As part of our own expansion and growth, we are excited to launch the inaugural issue of PPRS Newsletter. The newsletter is specifically designed to represent and connect the relevant community in Pakistan and to reflect their contributions at national and international level. We hope that our readers will find great value in its content and that it will aid them in their own goals to grow and thrive.

*Momina Moetesum (Editor in Chief)*

## Meet the President

**Prof. Dr. Faisal Shafait** received his PhD in Computer Engineering from TU Kaiserslautern, Germany in 2008 with the highest distinction and is currently working as the Director of Deep Learning Laboratory at the National Center of Artificial Intelligence (NCAI), Islamabad, Pakistan.



Dr. Faisal has more than 12 years of industry and academics experience of working for leading organizations and research centers including German Research Center for Artificial Intelligence (DFKI), Germany; Google Inc., USA, and UWA Australia. His research interests include Machine Learning and Data Science with a special emphasis on designing deep learning architectures for solving various computer vision problems in academia and industry.

He recently received IAPR/ICDAR Young Investigator Award by the International Association of Pattern Recognition (IAPR). The award is given after every two years to the most outstanding young scientist (below 40 years age) worldwide in the field of pattern recognition and document analysis.

## Quote of the Day

Understanding Life Begins with Understanding  
Patterns  
(Fritjof Capra)

# Pakistan Pattern Recognition Society (PPRS)

## History

The notion of PPRS originated during ICDAR 2015. With strong encouragement from senior IAPR members like Prof. Simoni Marinai, Prof. Apostolos Antonacopoulos, Prof. Jean-Marc Ogier and Prof. Andreas Dengel. The society was launched at a Special Interest Group meeting at the School of Electrical Engineering and Computer Science (SEECs), National University of Sciences and Technology (NUST), Islamabad in October 2015. A constitution was drafted a month after and 20 members joined the society initially. The society has consistently grown since then, and currently has more than 60 members.



## International Workshop on Pattern Recognition Applications (IWTRA)



In December 2015, first International Workshop on Pattern Recognition Applications was organized in Islamabad. The main objective was to introduce PPRS to larger community of researchers by bringing together the experts of the field and having very interesting talks on state of the art research being done in this domain. Highlight of the event was the presence of Prof. Andreas Dengel (Fellow IAPR) who was instrumental in encouraging future researchers to take up the challenges of Pattern Recognition. Second International Workshop on Pattern Recognition Applications was then organized in November 2016 in Lahore as part of the 6<sup>th</sup> International Conference on Language and Technology.

## Activities

The membership of PPRS as an official chapter of IAPR was approved in December 2016 and since then it has been very active in organizing events like workshops, conferences and symposiums.



Vice President  
(Dr. Sheikh Faisal Rashid)



General Secretary  
(Dr. Adnan Ul-Hasan)



Treasurer  
(Dr. Khurram Khurshid)



Liaison Chair  
(Dr. Imran Siddiqi)



Board Member  
(Dr. Muzammil Luqman)



Manager  
(Momina Moetesum)



Media & Marketing  
Manager  
(Muhammad Jaleed Khan)

## PPRS Student Symposium for Document Image Analysis

Student Symposium on Document Image Analysis is a regular activity held by PPRS where students showcase their research work and get feedback from domain experts. The aim of the symposium is to familiarize young researchers with the latest trends in document image analysis and to promote future collaborations and development.

PPRS organized its first student symposium in December 2016 at Bahria University, Islamabad Campus (BUIC). Second student symposium was held at School of Electrical Engineering and Computer Science (SEECS), National University of Science and Technology (NUST) in March 2018. Third symposium was again held at SEECS, NUST in 2019. Students from various universities actively participate in these events while experts from both academia and industry are invited to deliver talks.

### 1<sup>st</sup> PPRS Autumn School on Deep Learning

With the aim to equip students and young researchers with state-of-the-art tools and technologies in deep learning and computer vision, PPRS organized its first School on Deep Learning in October 2018. The theme of the school was **UAVs and Real-Time Computer Vision**, where well-renowned experts conducted informative tutorials and hands-on training on applications of deep learning and computer vision on real-time data acquired by Unmanned Aerial Vehicles (UAVs). The three days event was hosted at the Resource Center located in the midst of scenic landscapes of one of the most popular tourist destinations of Pakistan, Murree.



International speakers included Dr. Adrian Ulges and Dr. Ulrich Shwanerke from the Hochschule RheinMain, University of Applied Sciences, Wiesbaden, Germany. Local speakers included Dr. Faisal Shafait (SEECS, NUST), Dr. Imran Siddiqi (BUIC) and Dr. Khurram Khurshid (IST). There was an encouraging participation of students and professionals from all over Pakistan.

*Images Courtesy of: Muhammad Jaleed Khan*



# SSDA 2019

3<sup>rd</sup> IAPR Summer School on Document Analysis  
Pakistan Pattern Recognition Society (PPRS)



<http://pprs.org.pk/events/ssda2019.html>

The highlight of PPRS activities is the **3<sup>rd</sup> IAPR Summer School on Document Analysis (SSDA)**. This is an annual event of IAPR since 2017. The first summer school was held in India, while the second in France. The five days mega event was sponsored by IAPR and NUST. Main activities included insightful talks and lectures by international speakers and local experts, hands-on training sessions, a programming and poster competition, cultural night and day excursions.

The school was organized to impart the knowledge of state-of-the-art techniques in Pattern Recognition, particularly Deep Learning with their relevance to Document Analysis. The main activities of the school were planned around this theme to ensure maximum exposure. Some of the main talks given by the domain experts included the following topics.

**Talk: Introduction to the Field of Document Analysis and Recognition**

Speaker: Prof. Dr. Cheng-Lin Liu, CASIA, China

Dr. Cheng-Lin Liu gave an overall introduction to the field of Document Analysis and Recognition (DAR), its potential applications and the involved technical problems. He provided a list of academic resources, including major conferences, journals, and datasets. He outlined some major approaches to the main tasks of DAR which included layout analysis, scene text detection, text line recognition, and graphics recognition.

**Talk: Introduction to Machine Learning and Neural Nets**

Speaker: Prof. Dr. Marcus Liwicki, Luleå, Sweden

In his interactive presentation, Dr. Marcus gave an overview of recent Machine Learning methods, aiming at Document Analysis. He also explained the state-of-the-art methods, which are currently used for semantic segmentation (text, illustrations, lines) and recognition. Furthermore, he provided some hands-on experience to the participants using existing Web-Service based tools (DIVAServices) and tutorials.



Seiichi Uchida

Kyushu University, Japan



Marcus Liwicki

Luleå, Sweden



Cheng-Lin Liu

CASIA, China

**Talk: Introduction to Convolutional Neural Networks (CNNs) and Their Applications**

Speaker: Prof. Dr. Adrian Ulges and Prof. Dr. Ulrich Schwanecke, Hochschule RheinMain, Germany

The talk presented a basic introduction to CNNs, a core concept of deep learning applications in image analysis. Dr. Adrian introduced CNN's basic building blocks (e.g., convolutional layers and pooling), explained the effects of stacking them to deep networks, and addressed the issues of transferring pre-trained CNNs to novel tasks. The talk presented some application examples on the topics of segmentation, style transfer, barcode detection, and forensic facial, and cranial reconstruction.

**Talk: AMIGO – Automatic Indexing of Lecture Footage**

Speaker: Prof. Dr. Adrian Ulges, Hochschule RheinMain, Germany

A practical system for automatic indexing of lecture footage, AMIGO was presented. Educational video is the key driver to e-learning, as it offers rich context, flexibility, and personalized learning speed. Interaction possibilities, however, are often limited to a sequential viewing. To overcome this limitation, AMIGO's goal is an interaction with videos just like with PDFs. One can search for text in e-lectures, copy text from them, navigate between pages/slides, and get links to the interesting parts.

**Talk: LSTM – the Basics and Current Trends; and LSTM for Handwriting Recognition**

Speaker: Prof. Dr. Marcus Liwicki, Lulea, Sweden

In this talk, Prof. Dr. Marcus shed light on the deeper understanding of RNNs and LSTMs and neural networks. He provided an overview of the general visualization techniques like T-SNE, PCA, and LDA etc. Through online visualization tool boxes and relevant articles, Dr. Marcus inculcated in the participants the basics of the tensorflow. He also talked about several activation functions and how efficiently can they be used in the neural network architectures. Dr. Marcus held a very interactive session with the students where they were given small activities to perform on the online tool boxes. A lot of online resource links were shared for the students to explore. He also talked about the latest techniques in Natural Language Processing (NLP), including word embedding, word2vec and their use in text classification. The importance of attention mechanism in LSTM was also outlined. He provided useful repository links to OCR projects relevant to document analysis.

**Talk: Open Research Directions of Document Analysis and Recognition**

Speaker: Prof. Dr. Seiichi Uchida, Kyushu University, Japan

Dr. Seiichi's lecture provided a chance to think about new research directions like the implementation of existing DAR tasks under challenging conditions (like less samples, unbalanced datasets, complex structures, and ambiguity) or totally new DAR tasks, such as understanding human-text interaction, design (typography) analytics, and understanding the behavior of machine learning through DAR. He emphasized the uniqueness of characters and texts which are an important "hub" among various modalities such as bitmap images, temporal signals (e.g., handwriting trajectories), natural language, speech, communication codes, and object labels.

**Talk: Document Analysis Research in Pakistan**

Speaker: Prof. Dr. Faisal Shafait, SEecs, NUST and Prof. Dr. Imran Siddiqi, BUIC, Pakistan

In the end, local speakers provided an overview of research in document analysis being carried out in Pakistan.

**Programming Competition**

Chair: Prof. Dr. Imran Siddiqi, BUIC, Pakistan  
Coordinator: Momina Moetesum, BUIC, Pakistan

A programming competition was planned for the participants during the summer school. An overview was provided by the competition chair, Prof. Dr. Imran Siddiqi from BUIC, in which he explained the purpose of the competition, data and the evaluation metric that will be used during the competition. Afterwards, the participants were provided access to the computing lab, NUST to develop their models for the data provided.



Students and researchers actively participated in this competition from Day-1 to Day-4 at the Computing Labs, SEecs, NUST. The results were announced on the last day of summer school.

## Poster Competition

A poster session was also organized on the 4<sup>th</sup> day of the event, in which the students demonstrated the projects that fell under the scope of Document Analysis and Pattern Recognition. Participants presented their on-going research work and got valuable feedback from the experts. The posters were adjudged by Prof. Dr. Marcus Liwicki, and Dr. Muhammad Imran Malik.

## Awards

The winners of the programming and poster competitions were announced on the last day of the school. A team of students from NUST won the programming competition. In the poster competition, three categories were evaluated: one for the best Ph.D. student poster, one for the best graduate student poster and one for the best poster for research relevant to Pakistan. The best Ph.D. student and best graduate poster awards were won by students from BUIC, while the students from NUST won the best poster award for their research work for Pakistani judiciary.

## Cultural Night and Day Excursion

Participants along with speakers visited the Heritage Museum, Islamabad in the first half of the 3<sup>rd</sup> day. They were introduced to the rich history of Pakistan. In the evening, a cultural show was arranged where Pakistani singers performed on local melodies. Foreign guests were presented with *Ajrak* (a traditional block-printed shawl from Sindh Province) and a woolen cap from Northern Areas of Pakistan. At the end of cultural show, a social dinner was organized.

## Participants

A total of one hundred and twenty-nine participants attended the summer school including local students (93), international students (6), professionals, and industrialists (30). There was a plausible attendance of females. In order to assure maximum participation of the students and to promote the research in document analysis and pattern recognition at national level, a total of 3900 USD were utilized as students' scholarships. Thirteen students were awarded scholarships.

*Documented By: Dr. Faisal Shafait*



*The organization of the international summer school on document analysis in a developing country like Pakistan is a big achievement. The event attracted national media attention and a special report was aired on Pakistan Television (PTV) about the impact of this school. The international speakers and participants lauded the hospitality and management of local hosts. We are expecting the growth of pattern recognition and document analysis community in Pakistan as a result of this event.*



## PPRS @ DAS 2020

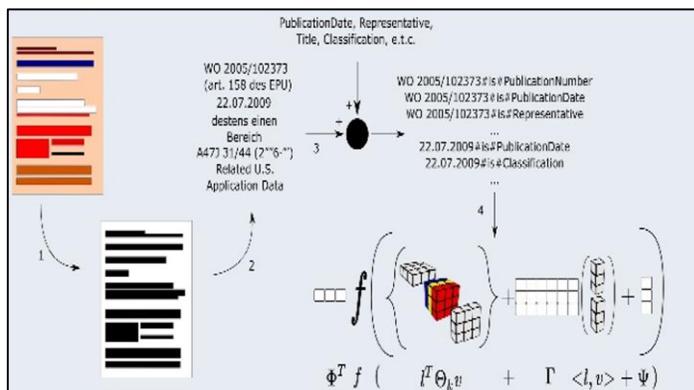
DAS is an IAPR sponsored international workshop that focuses on system-level issues and approaches in document analysis and recognition. The event is organized every two years and allows document analysts from around the globe to showcase their contributions. This year, due to current pandemic situation, DAS 2020 was held as a fully virtual conference from July 26<sup>th</sup> to July 29<sup>th</sup>, 2020.

Despite being virtual, there was an active participation of researchers and experts. Like always, PPRS had a visible participation in DAS 2020 as well. Dr. Faisal Shafait chaired the concluding Discussion Group Session. Dr. Adnan-UI-Hasan co-authored a paper titled **Named Entity Recognition in Semi Structured Documents using Neural Tensor Networks** with Dr. Muhammad Imran Malik and Dr. Faisal Shafait that was presented at the event. Several other PPRS members like Nosheen Abid and Momina Moetesum participated in the different Discussion Group Sessions as well.

*Reported by: Hira Masood*

### Paper Abstract:

*Information Extraction and Named Entity Recognition algorithms derive major applications related to many practical document analysis system. Semi structured documents pose several challenges when it comes to extract relevant information from these documents. The state-of-the-art methods heavily rely on feature engineering to perform layout-specific extraction of information and therefore do not generalize well. Extracting information without taking the document layout into consideration is required as a first step to develop a general solution to this problem. To address this challenge, we propose a deep learning based pipeline to extract information from documents. For this purpose, we define 'information' to be a set of entities that have a label and a corresponding value, e.g., application number: ADNF8932NF and submission date: 15FEB19. We form relational triplets by connecting one entity to another via a relationship, such as (max temperature, is, 100 degrees) and train a neural tensor network that is well-suited for this kind of data to predict high confidence scores for true triplets. Up to 96% test accuracy on real world documents from publicly available GHEGA dataset demonstrate the effectiveness of our approach.*



DAS comprises invited speaker presentations, oral, poster and tutorial as well as working group discussions. Proceedings are published by Springer. The topics of interest include but are not limited to:

Document Analysis Systems

Document Understanding

Document Authentication

Document Retrieval

Historical, Forensic and Multimedia Document Analysis

## Upcoming Events Alert

### WEBINAR

# ROLE OF ARTIFICIAL INTELLIGENCE IN ENVIRONMENT MONITORING

August 24, 2020 | 1300-1600 Hrs (PKT)

#### BOOK YOUR PLACE NOW!



SCAN ME

The webinar is free and open for all.

[bit.ly/2DD0Osa](https://bit.ly/2DD0Osa)

Join our international and national domain experts in the webinar to unveil how artificial intelligence and data science are reshaping environmental monitoring. We have limited spots, and registrations are being handled on a first come, first served basis.

### SPEAKERS

Prof. Dr. Adrian Ulges  
HSRM, Germany



Prof. Dr. Ulrich Schwanecke  
HSRM, Germany



Dr. Sajid Ghuffar  
Institute of Space Technology



Dr. Muhammad Shahzad  
SECS, NUST



Dr. Imran Malik  
SECS, NUST



Mr. Asif Javed  
Bahria University

### HOSTS



Prof. Dr. Khurram Khurshid  
Institute of Space Technology



Prof. Dr. Faisal Shafait  
National University of Sciences & Technology



Prof. Dr. Imran Siddiqui  
Bahria University



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Ideas for features you'd like to see in the PPRS Newsletter?

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