Bio of Dr. Lipika Dey

Lipika Dey is a Professor of Computer Science at Ashoka University, India. She was earlier a Chief Scientist at Tata Consultancy Services (TCS), Research, where she headed research in the theme of Economic and Financial Intelligence. Her research interests are in the areas of Artificial Intelligence, Natural Language Processing and Data Analytics. She has a keen interest in the fields of healthcare and sustainability analytics based on multi-structured data. She loves to focus on building predictive models based on Augmented Intelligence gathered from heterogeneous data accrued from multiple different sources. She has several international publications and patents. Prior to joining TCS, Lipika was a member of faculty at the Department of Mathematics, IIT Delhi. Lipika was elected to the Fellowship of Indian National Academy of Engineering in 2021. She is also a Fellow of Asia-Pacific Artificial Intelligence Association (AAIA). She was also awarded the Distinguished Scientist award by TCS in 2012.

Lipika has a PhD in Computer Science and Engineering from IIT Kharagpur, where she had also done her graduation and post-graduation in Mathematics and Computer Science. As a member of Association for Computing Machinery (ACM), the world's largest educational and scientific computing society engaged in the advancement of computing as a science and a profession, Lipika is actively involved in mentorship programs for PhD scholars and activities to promote Women in STEM.

Analysis of Healthcare Data - Explainability using rough sets and LLMs

Lipika Dey

The success of deep-neural networks for tasks like prediction as well as content generation, has raised expectations for their use in various application areas. The Healthcare sector, with an ever-increasing availability of data, is one of the most prolific areas focused on using these technologies for a multitude of applications. Healthcare data is available in many different forms which include structured reports as well as images and texts in the forms of test reports, nursing notes, prescriptions and so on. Healthcare analytics also make extensive use of bio-medical literature. A wide range of tasks are focused towards prediction of future events for hospital logistics management, like predicting length of stay of a patient in hospital or Intensive Care Unit, patient re-admission probability, predicting whether the patient would need a particular procedure and so on. Another line of research is focused towards personalised healthcare. These are aimed at deriving insights about individual patients or small patient cohorts, in order to deliver more targeted treatment as well as hospital experience to each patient. Predicting adverse effects of drugs for a particular patient is an important problem in the area. Designing personalised treatment plans, based on insights obtained from patient cohorts of similar patients, is also an important task.

While all the above areas have benefited with the application of deep-neural models, especially while working with unstructured data like text and images, one of the critical aspects essential for healthcare applications is explainability of the model. A significant amount of research is focused on interpretability of the models and generating post-hoc explanations, to make the models more acceptable [1, 2]. However, the problem is very complex, as applications need explainability from different perspectives, depending on the end-users.

In this talk we will be presenting the utility of model-agnostic explanation generation techniques like SHAP and LIME in explaining predictions [3, 4, 5]. We also show that using these in conjunction with multiple representations for the same data point, helps in generating alternative view-points about the same entity, which helps in interpretation and decision making. While we have worked primarily with text data in conjunction with a few physiological parameters, the core idea can be extended to include other forms of data also. Specifically, rough set concepts, which are ideally suited to interpret data that has inherent uncertainties and incompleteness, can add on to this capability [6]. Though at a very nascent stage, there are attempts to integrate rough-set concepts with deep neural networks to enhance the interpretability of the models. At the simplest level, rough sets have been applied for feature selection and dimensionality reduction before applying deep-learning models. However, the rough sets can be used at a much more complex level as techniques for approximations as well as for designing hybrid model architectures.

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