

What the Peers Say!



Prof. Nitin Kumar Tripathi

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Prof. Nitin Kumar Tripathi is a Professor of Remote Sensing and Geographical Information Systems at the Asian Institute of Technology, Thailand, with over 35 years of experience in teaching, research, and large-scale geospatial projects. He is serving as Editor in Chief of the International Journal of GeoInformatics and also recently served as Vice President for Academic Affairs at AIT and has previously held key leadership roles such as Dean of the School of Engineering and Technology, Director of Academic Quality Assurance and Accreditation, and Coordinator of the RS and GIS field of study, driving academic innovation and interdisciplinary programs. His research spans health GIS, spatial epidemiology, environment, agriculture, disaster and coastal applications, and machine learning in GIS, while his editorial work, including his role as Associate Editor of the International Journal of Deep Tech in Medical Science and Technology, reflects his commitment to integrating geoinformatics and deep technologies for human-centric healthcare and societal benefit.

Rishi Jain (RJ): Greetings from *IJDMST*. It is a pleasure to interact with you on behalf of our readers. The purpose of this interview is to share the experiences of the peers in research and development, and also to show them the research needs and future trends. I am sure this interaction will benefit them a lot.

Could you briefly share your academic and research journey in Thailand and India and your collaboration with other countries?

Nitin Tripathi (NT): It has been a long journey of research since 1989 onwards which started with my PhD days in IIT Kanpur, India. I was involved in digital image processing of satellite remote sensing data and also thin films of rocks. I struggled with super slow computing infrastructure in those days. I worked on locating coal mining areas in my PhD research and developed several image transforms for extracting geologic features such as lineaments, faults and folds. Later I cruised into environmental, agricultural and urban mapping and modelling for sustainability research. The turning point came with my interest in spatial epidemiological research related to emerging viral diseases and finding relationship with causative factors. It has not been long when I started using IoT and wearable sensors for monitoring remote patients for cardiac and diabetes research.

I was conducting my research with Indian students coming from many provinces Uttar Pradesh, Andhra Pradesh, Telangana, Rajasthan, Madhya Pradesh, Himanchal Pradesh and Bihar. This was

unique mix of opportunity for me to investigate various environmental, agriculture and disaster related issue of huge landscape of India. Once, I moved to Asian Institute of Technology then the scope extended to encompass South Asia, Southeast Asia and Africa. I could work with students coming from more than 15 countries. It also came with huge funding opportunities from international agencies such as UNEP, USAF-AORD, IRD, EU -ERASMAS+, RTG and so on.

RJ: You have spent more than three decades advancing remote sensing and GIS at AIT and served as Dean of School of Engineering and Technology and Vice President for Academic Affairs. Could you briefly trace your academic journey and the key turning points that led you from classical geoinformatics to broader leadership in technology-driven education and research?

NT: I have been involved in development research of technology related to remote sensing, GIS and photogrammetry. I think few of my contribution in remote were novel like – morphological filters for finding folds and faults, layered classification for enhanced accuracy in coastal mangrove classification, Bathymetry using optical satellite data. I also worked on GNSS for ionospheric scintillation monitoring and relating it extreme weather events and also for early prediction of earthquake. Recently, I was excited to use night time remote sensing data for mapping industrial zones and development authentication in association with optical and thermal remote sensing data.

I have several papers related to SDG-Sustainable Development Goals specially for Eastern Economic Corridor in Thailand and Delhi-Mumbai industrial corridor.

However, once I was taking care as Dean of School of Engineering and technology and Vice President of Academic Affairs then I tried to bring together AI and Machine Learning group together on one platform and collaborate to develop a Artificial Intelligence and Simulation Lab. This very advanced facilities has given tremendous boost to the research in application in many areas. I also conducted IAIBIC -Industry Academia International Business Incubation Conclave in November 2024. AIT President signed 14 letters of intents (LoI) with industry to setup companies under BOI Thailand Science and Technology scheme. I hope these missions with extend class toom study to experiential learning opportunities to students. It is needed urgently to fulfil deep tech young knowledge workforce for Industry 5.0.

RJ: Your portfolio covers health GIS, spatial epidemiology, nutrition mapping, and remote cardiac and diabetes monitoring devices. How did health and medical applications become a focus within your geoinformatics work, and what motivated you to engage with this intersection of space, place, and health?

NT: This is very important question related to my passion for research. I guided one PhD student in Dengue fever during 2002-2006. In between, we saw the SARS (Severe Acute Respiratory Syndrome) attack and rapid spread in Southeast Asia. This disease was due to a virus which use to spread from

human to human by air. Several nurses and people lost their lives. This motivated me to use GIS and conduct location based disease monitoring, finding root cause and also find their relation with climate, demography, socio-economic and environmental factors. I conducted around 7 international

conferences and several workshops in this research domain. Some very interesting projects and publications came out and I am sure they are very useful for researchers as well as policy makers.

RJ: IJDMST emphasizes the integration of AI, deep learning, and advanced data analytics into medical science. From your vantage point in remote sensing and GIS, how do you see geospatial intelligence and machine learning jointly transforming disease surveillance, risk stratification, and precision public health?

NT: Cause of disease is all around humans in form of water, air, soil and people carrying virus and also disastrous chemicals. IoT can monitor such causes and flag alarms to be cautious of potential hazard. We have seen that now IoT sensors are being increasingly used to provide data for temperatures, PM 10, PM2.5, Turbidity of water, etc. We also see that thermal infrared sensors are being frequently used to screen people above normal temperature and take them for quarantine. Tracking infected patients is also one of the research issue for controlling the diffusion of infection due to virus. I am sure huge research opportunity exists in AI, ML, DL, IoT, MIoT and quantum computing also.

RJ: You have played a central role in building geoinformatics education and curricula at AIT. What competencies and training models do you believe are essential for preparing the next generation of researchers who want to work at the interface of geoinformatics, AI, and healthcare?

NT: I have 30 years of experience in developing curricula of Remote Sensing and GIS in India and AIT. I have seen drastic changes have come due to technological advances. Many equipment and computing platforms became obsolete such as workstations, super computers, GPU, photogrammetry optical devices, photogrammetry digital stations, GPS has been replaced with multi-GNSS devices, radiometers became very advanced, under-ground profiling instruments have come. Now we have many devices which can allow us for augmented reality and virtual reality using digital 3D maps and enable prudent timely decision and actions for disaster management and sustainable agriculture etc. Machine Learning algorithm have far exceeded the accuracies in health GIS and advent of AI with location enabled data is very useful for finding possibilities of disease in the community. Therefore, a very big challenge is in front of us how to assimilate all these new developments at the same time keeping the basic knowledge as the foundation. Curriculum needs to go for an overhaul to prepare new breed of technical workforce. A casual approach to remove a course and replace with a new one will not work.

RJ: As Associate Editor of the International Journal of Deep Tech in Medical Science and Technology, how do you position the journal within the broader ecosystem of medical informatics and geoinformatics journals, and what unique types of contributions are you most eager to see from authors?

NT: Indeed this I see as an opportunity that medical community which has welcomed AI and robotics should also realize that location, environment and climate in which people live also need to be understood using the potentials of DeepTech. I will like to encourage research in Health IT using database development and also analysing them using AI. In addition, I think the future IT researchers

should work closely with researchers in medical sciences to develop strategies for prevention of diseases.

RJ: The journal's scope spans telemedicine, sensor-based monitoring, blockchain, and AI-driven diagnostics. From your experience with location-based services and sensor networks, what are the major technical and governance challenges in responsibly linking geospatial, clinical, and personal data in these deep-tech healthcare systems?

NT: Yes, Dr Jain. All new technologies you have mentioned are very essential for future research and development. However, there is a of data availability for researchers as most of the patient data is classified. We need to develop huge database varied in nature encompassing various communities, ethnic groups, from all over the world and then conduct research using quantum computing and AI. Only a reliable database can yield a trustworthy and ethical outcome.

Few activities and prominent engagements of Prof Nitin:



RJ: Looking ahead over the next five years, which emerging research directions at the intersection of RS/GIS, AI, and medical science excite you the most, and how do you plan to align your own research and editorial efforts to support these developments for the benefit of patients and communities?

NT: It is a difficult question to limit our research in a narrow domain when exciting opportunities exist along with multitude of challenges. I think 360 degree approach is needed with a group research culture joining hands of IT, DSAI, Geospatial Tech groups with medical science fraternity. However, I will give priority to huge ageing population through Gerontology research and support.

Lastly, I have a message for young researchers in geoinformatics that most importance challenge that humans are facing on Earth is health which is linked to their survival. Therefore, they can join this cause to save humanity from impact of climate change and epidemics Covid, Ebola, Hantavirus, Dengue, Measles, and lifestyle disease syndrome.