



Fellow	Dr. Ajeet Ram Pathak
Host Organisation	Norwegian University of Science and Technology (NTNU) Norway
Scientific coordinator	Prof. Anne C. Elster



I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

During my tenure as an ERCIM Postdoc, I delved into exploring the feasibility of integrating machine learning in Geophysical and High-Performance Computing Systems. This allowed me to examine various aspects where AI and HPC can converge to facilitate the efficient handling of diverse tasks in geophysical applications.

In pursuit of this endeavor, I studied the intricate details during CGF workshop at NTNU, where I had the opportunity to present my findings on "Deep Learning for Earthquake Seismic Data Processing." The insightful suggestions and informative sessions offered a deeper understanding of the challenges inherent in handling the dynamic variations of Geophysical data, which further piqued my interest in this field.

I also had the chance to share my insights on the applicability of machine learning for Large-scale CO2 Injection Analysis with researchers at Centre for Geophysical Forecasting. Additionally, I engaged in several productive discussions with fellow researchers at NTNU, where we exchanged ideas and insights regarding Geophysical Systems, its workings, and the need for and applicability of machine learning techniques in seismic imaging and other domains.

Overall, the research and discussions were highly beneficial and instrumental in broadening my perspective on the scope and applicability of machine learning and HPC in addressing the challenges inherent in geophysical systems.

My work during this fellowship enabled me to secure a 3-year fellowship with the Department of Computer Science/ Centre for Geophysical Forecasting at NTNU starting May 1, 2023.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

In Progress: Highlights on Utilizing Machine Learning for High Performance Computing Systems

In Progress: Applications of Machine Learning for Geophysical Forecasting Systems

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

1. International Conference on Applied Artificial Intelligence (ICAPAI 2022) 5th May 2022
2. **Scalperf-2022**(September 18-23, 2022 University Residential Center Bertinoro (Forlì-Cesena), Italy): High Performance Computing for Artificial Intelligence and Machine Learning.
3. **CGF workshop:** Deep Learning for Seismic data Processing (October 5-7, 2022, Scandic Nidelven hotel, Trondhiem)
4. ERCIM FP Community event, 9th November 2021 and 4th November, 2022
5. **Geilo Winter School 2023**, January 22-27, 2023, Geilo, Norway: Computational Statistics



IV – RESEARCH EXCHANGE PROGRAMME (REP)

"I visited the ITIS University of Malaga as part of the Research Exchange Program with the purpose of sharing ideas, presenting my research, and discussing potential avenues of collaboration between our respective research groups."

Meeting with Dr. Antonio J. Fernández Leiva:

During the one-to-one meeting, we talked about integration of AI-HPC and video game mechanics and technology and discuss how this integration can be utilized in various applications, including training programs, simulations, and entertainment. Dr. Antonio also discussed about recent work plan of his group with gaming in different application domains shows a temporal evolution, with a focus on occupational health and safety initially, followed by process safety, patient safety, food safety, and construction safety.

Meeting with Dr. Antonio J. Fernández Leiva's research group:

In the next meeting with Antonio, I had the opportunity to meet with part of his research group. I presented my research work with discussion of the supportive application areas for gaming simulations where AI and HPC are mostly required. The meeting was partially informal, but I found it extremely beneficial as it provided me with valuable feedback and insights into their research.

Meeting with Dr. Carlos Cotta:

In the next meeting, Dr. Carlos Cotta, the other Principal Investigator in Antonio's research group, also joined us. I presented my research again to Dr. Cotta and we discussed possible ways of collaboration between our research groups.

The research visit allowed me to explore the integration of AI,HPC and video game mechanics and technology, and its potential in various applications. Moreover, the use of AI-HPC in video games can also provide opportunities for research in fields such as human-computer interaction and cognitive psychology.

Overall, my visit to the University of Málaga was highly productive. I was able to share my research with Dr. Antonio J. Fernández Leiva and his research group, receive feedback, and explore potential collaborations. The insights and feedback gained during this visit will be valuable for my future research, and I am grateful for the opportunity to meet with such knowledgeable and experienced researchers.