

DM511 Application of Artificial Intelligence for Disaster Management (3-0-0-6)

Course Content

Study of natural and human introduced disasters: Physics of development of natural disasters (tsunami, floods, fire, typhoon, earthquakes, global scale diseases like COVID); propagation of disaster; Data acquisition for disaster affected areas; System-based approach for disaster modelling: spatial modelling, temporal modelling, spatio-temporal modelling; Synthetic simulation of disasters for propagation, modelling, and mitigation; Conventional methods of physical and stochastic modelling (regression and filter-based methods); Artificial intelligence and machine learning (evolutionary algorithms, expert systems, neural network) for disaster management: modelling the propagation of natural disasters, development of strategies for mitigation, and relief. Error and accuracy estimate and predictions. Study and modelling of historical disasters (e.g. Amazon forest fire, Bhopal gas tragedy, COVID spread, Indian tsunami etc).

Text/ References

1. Ibragimov, R., **Mathematical Modeling of Natural Phenomena**, December 2017, Nova Science Publishers Inc, USA.
2. Slavova, A., and Zecca, P., **Modeling Natural Phenomena via Cellular Nonlinear Network**, Cambridge Scholar Publishing, 2017.
3. Agterberg, F.P., **Geomathematics Mathematical Background and Geo-Science Applications**, 1974.
4. Lam, L., and Narodisky, V., **Modelling Complex Phenomena**, Springer-Verlag New York Inc.
5. Pourghasemi, H.M., and Rossi, M., **Natural Hazards GIS-Based Spatial Modeling Using Data Mining Techniques**, Springer International Publishing, 2019