POLITECNICO DI MILANO

PhD in SCIENCE, TECHNOLOGY AND POLICY FOR SUSTAINABLE CHANGE - 38th cycle

PNRR_351_PUBBL_AMMIN Research Field: DECISION SUPPORT SYSTEM FOR ENVIRONMENT MONITORING

Monthly net income of PhDscholarship (max 36 months)
€ 1250.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	The PA is facing a challenge induced by the accelerated technological evolution. This demands a renovation of the processes and of the services offered to the citizens. The digitalization of the society also creates a unique opportunity, due to the unprecedented amount of data that now available in all sectors, which can boost the delivery of more accurate and timely responses to the citizens¿ needs. Reaping the benefits of the digital society requires highly skilled personnel and a redefinition of the competencies, organization, strategy and processes of the PA. This cultural and organizational shift can be supported by highly qualified staff, most notably by PHD laureates trained in a multidisciplinary context. A specific sector where the change of pace in the PA capability is needed is environmental monitoring. In this field, the last decade has witnesses the massive deployment of monitoring technologies, from remote sensing to near field data collection. Such a wealth of data can dramatically impact the capacity of the PA to monitor the environment health in real time and respond to hazards in a timely and effective manner. The proposal aims to support the decision-making processes of Pas in the environmental monitoring sector by contributing to the redesign and optimization of organizational models, through technologies and artificial intelligence solutions (data analysis and predictive

	models) capable of guaranteeing greater efficiency. The PHD research will have the objective of bringing to the PA the most advanced competencies in the definition of policies, strategies and concrete processes for integrating the benefits of IoT and Remote Sensing data within the decision making for environmental monitoring. This objective will be pursued with an innovative mix of human-led and machine-led data analysis and prediction. Novel policies, processes, methods and technological infrastructures will be designed with a user-centric methodology so as to optimally fit the PA organizations. The research aims at setting up a multi-disciplinary work program (computer science, computer vision, big data, Earth Observation, social sciences, economics) for improving the PA decision making process through artificial intelligence predictive models based on the analysis of multi-modal data.
Methods and techniques that will be developed and used to carry out the research	The research will implement AI-powered decision support systems and digital processes for data collection and analysis in the territory monitoring field, including methods and techniques for predicting the impact of potential environmental hazards and for supporting the definition of optimal remediation and/or mitigation policies.
Educational objectives	The educational objectives involve the capacity to analyze the current policies and processes of the PA in the environmental monitoring sector, to elaborate innovative policies and processes based on data-driven predictive models so as to maximize efficiency and efficacy through the use of digital tools (AI-powered, multimodal data analytics and DSS) and to deploy and assess the designed decision support systems in complex real-world scenarios
Job opportunities	The doctor will be able to deploy the acquired skill not only in the public administration but also in the industry. Target employers are the environment agencies of the PA and the data hungry industries such as the enterprises servicing the Earth Observation, agriculture, construction and logistics sectors

Composition of the research group	2 Full Professors 2 Associated Professors 2 Assistant Professors 3 PhD Students
Name of the research directors	Piero Fraternali

Contacts
Piero Fraternali *02 23993640* *piero.fraternali@polimi.it* *https://fraternali.faculty.polimi.it*

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	625.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	ARPA Lombardia - https://www.arpalombardia.it/
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Delft University of Technology (TU Delft) - https://www.tudelft.nl
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Attinenza alla tematica prescelta del bando (TDA, PNRR, PA, PC) v. D.M. 351, artt.6-9, comma 1

La proposta ha come scopo quello di supportare i processi di decisione delle pubbliche amministrazioni nel settore del monitoraggio ambientale contribuendo alla riprogettazione e semplificazione dei modelli organizzativi, tramite tecnologie e soluzioni di intelligenza artificiale (analisi dei dati e modelli predittivi)

Impresa, centro di ricerca, pubblica amministrazione (per PA e PC) presso cui si svolgerà l'attività esterna

ARPA Lombardia - Agenzia regionale per la protezione dell?ambiente della Lombardia - si occupa della prevenzione e della protezione dell?ambiente, affiancando le istituzioni regionali e locali in molteplici attività: dalla lotta all?inquinamento atmosferico e acustico agli interventi per la tutela delle acque superficiali e sotterranee, dal monitoraggio dei campi elettromagnetici alle indagini sulla contaminazione del suolo e sui processi di bonifica.
https://www.arpalombardia.it/
Durata prevista: Sei mesi
Sviluppo di soluzioni processi e metodi per la promozione di tecniche di intelligenza artificiale per l'analisi dei dati di monitoraggio ambientale al fine di migliorare la pianificazione degli interventi e l'efficacia del controllo del territorio.
Progetto SAVAGER: progetto interno di ARPA Lombardia per la digitalizzazione dei processi di monitoraggio ambientale nel settore della gestione dei rifiuti (accordo di ricerca con POLIMI-DEIB)

Ente, università, azienda, centro di ricerca presso cui si svolgerà il periodo di studio e ricerca all'estero.

TU Delft Università pubblica.
https://www.tudelft.nl
Durata prevista 6 mesi
Approfondimento dei metodi di human-centric artificial intelligence
Collaborazione di ricerca con prof A. Bozzon direttore del Department of Sustainable Design Engineering (SDE) https://www.tudelft.nl/io/over-io/personen/bozzon-a