|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ficha de Proposta de Dissertação/ Projeto/Estágio Mestrado | | | | |
| **Ano Letivo 2019/2020, Mestrado em Engenharia Informática, FCEE / Universidade da Madeira** | | | | |
|  |  |  | | |
| Informação sobre o(s) Orientador(es) | | | | |
|  | | | | |
| Exploring the potential of machine-learning and earth observations data for climate change mitigation | | | | |
| Título do Projeto | | | | |
| Filipe Magno Gouveia Quintal | | |  | (967549595) |
| Nome do Professor Orientador | | |  | Contacto Telefónico |
|  | | |  | filipe.quintal@staff.uma.pt |
| URL do Projeto | | |  | E-Mail |

Preencher no caso de existir um Co-Orientador ou Orientador Externo:

|  |  |  |
| --- | --- | --- |
| Amâncio Lucas de Sousa Pereira |  | (967734005) |
| Nome |  | Contacto Telefónico |
| Técnico Lisboa, Universidade de Lisboa |  | lucas.pereira@iti.larsys.pt |
| Departamento ou Empresa |  | E-Mail |

Preencher no caso de ser uma dissertação proposta pelo aluno:

|  |  |  |
| --- | --- | --- |
| Manuel Afonso Soares Pereira |  | 2043916 |
| Nome |  | Nº de Aluno |

|  |
| --- |
| Informação sobre a Dissertação/Projeto/Estágio |

|  |
| --- |
| Engenharia Informática |
| Área(s) Científica(s)  Motivação   |  | | --- | | Earth Observation Data (EOD) are sets of data about the physical, chemical and biological systems of the planet. These datasets are collected via remote-sensing technologies, including satellites and more recently Unmanned Aerial Vehicle (UAV).  Using arrays of satellites, organizations like NASA1, and the ESA2 are able to monitor the earth’s temperature, greenhouse gas emissions, forest cover, which are essential to understand the planet and enable the development of tools for climate change understanding, mitigation and adaptation3. For example, the Copernicus Sentinel-5P, launched by ESA in October 2017, is able to track carbon monoxide, nitrogen dioxide, and ozone, along with aerosol which can be used for Pinpointing emissions and pollutions at a global scale.  Vast amounts of these data are now freely available for everyone to use and explore, for example through the application of advanced machine-learning (ML) methods4. However, EOD is inherently big and hard to use, which significantly delays the development of machine-learning pipelines for climate-change research. This as lead to several efforts to develop EOD databases and web-services to assist developers. Still, these efforts have been developed by many different agencies, which makes it difficult to know what the right data is, where to find it, and how it can be leveraged by researchers working in the broad field of environmental sustainability. |   Objetivos   |  | | --- | | Against this background, the main objectives of this thesis are threefold: 1) to gain a deeper understanding on the potential of combining ML and EOD from climate change mitigation, 2) to get acquainted with the different types of EOD data assets, and processing tools, and 3) develop a porotype application that uses EOD and ML algorithms.  The student is expected to:   * Conduct an extensive literature review on how EOD and ML can be leveraged towards achieving the sustainable development goals, in particular climate action. * Explore different sources of EOD, e.g., Copernicus5 and open APIs like the Earth Observation Data Service6 to gain insights on the many different types of resources available * Identify a particular problem related to climate change mitigation/adaptation that can benefit from EOD and ML. * Propose a solution for that problem and develop the necessary methods, e.g., data acquisition, pre-processing, and image classification. Evaluate the developed solution.   References:   1. <https://earthdata.nasa.gov/earth-observation-data> 2. <http://www.esa.int/> 3. <https://www.geospatialworld.net/blogs/satellites-for-monitoring-climate-change/> 4. <http://arxiv.org/abs/1906.05433> 5. <https://www.copernicus.eu/en> 6. <https://earthobservations.org/geo_blog_obs.php?id=443> |   Recursos   |  | | --- | | AT ITI/LARSyS the student will be given access to a computing and data storage infrastructure to help in the development of the thesis work. |   Preencher no caso de o projeto ser desenvolvido numa Entidade Exterior:   |  |  |  | | --- | --- | --- | |  |  | () | | Nome da Entidade |  | Contacto Telefónico | |  |  |  | | Morada |  | E-Mail |   Observações e/ou Pré-Requisitos   |  | | --- | |  | |