europass

Francesco Ciccone

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WORK EXPERIENCE

PhD Student

Università di Bologna [01/01/2022 – Current]

City: Forlì

Country: Italy

PhD in Aerospace Science and Technology, Research topic in Systems for Urban Environment Safety, Environmental Monitoring, and Prevention of Critical or Risk Events. Deep Learning Computer Vision Models for early fire detection and hydrogeological disruption from aircraft. Main activities:
• Research on the use of YOLOv5 for training a small object detection model focused on missing person detection.
• Implementation of the model on edge devices with a focus on optimizing computational efficiency.
• Training a model for the segmentation of landslides from aerial images:
• Design of a novel Convolutional Neural Network (CNN) model for GPS image-based applications.
• Fine-tuning of DINOv2 and RAFT models for GPS image-based models.
• Fine-tuning of the Segment Anything Model (SAM) to develop a Visual Question Answering (VQA) system for damage assessment of landslides.

Research Grant

University fof Bologna [01/08/2021 – 31/12/2021]

City: Forlì

Country: Italy

Research Grant in Aerospace Engineering with focus on Additive Manufacturing Optimization with Artificial Intelligence.

EDUCATION AND TRAINING

Master's Degree in Aerospace Engineering

University of Bologna [01/10/2017 – 01/10/2020]

City: Forlì

Country: Italy

Website: https://corsi.unibo.it/2cycle/AerospaceEngineering

Bachelor' s Degree in Aerospace Engineering

University of Bologna [01/09/2012 – 10/10/2017]

City: Forlì

Country: Italy

Website: https://corsi.unibo.it/laurea/IngegneriaAerospaziale

Deep Learing Application course

IFOA-Reggio Emilia [01/02/2021 – 30/04/2021]

City: Reggio Emilia

Country: Italy

Website: https://www.ifoa.it/sedi/sede-di-reggio-emilia/

Predictive Analysis and IoT course
ASSOFORM-Romagna [01/02/2021 – 31/03/2021]

City: FORLI'
Country: Italy
Website: https://www.assoformromagna.it/

Machine Learning course
Coursera

City: Forlì
Country: Italy
Website: oursera.org/verify/WPBVL448Y6HC

LANGUAGE SKILLS

Mother tongue(s): **Italian**

Other language(s):

English

LISTENING B2 **READING** B2 **WRITING** B2

SPOKEN PRODUCTION B2 **SPOKEN INTERACTION** B2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

Programming language: Python (Pandas, Numpy, Tensorflow, Pythorch) / Microsoft Office / Microsoft Word / Microsoft Excel / Zoom / MATLAB / Scikit-learn for machine learning / Neural networks programming / Excel, Power Query, Power Pivot, Power BI / Knowledge of software CAD: Solidworks / Microsoft Powerpoint

PUBLICATIONS

Methodology for Image Analysis in Airborne Search and Rescue Operations
[2023]

Ciccone, F. , Bacciaglia, A. , Ceruti, A. Lecture Notes in Mechanical Engineering,pp. 815–826

Nowadays, Search and Rescue operations can be performed using manned or unmanned Aerial Vehicles. In this latter case, compact cameras are mounted onboard and a bird's eye view is available to find the missing person. However, the analysis of the video frames can be very challenging and dull for the operators. In this context, the use of graphical methodologies can boost the searching operations and improve the process. In this study, a methodology based on the object detector Yolov5 is introduced: the performances in detecting small objects such as persons in aerial images are evaluated. These algorithms implement shallow layers of the feature extractor to increase the spatial-rich features and help the detector to find small objects. Finally, detection algorithms are tested using a video simulating a scenario for Search and Rescue operations. The filtering of frames containing false positives, is carried out using a classical graphical tool such as the Hamming distance.

Topology Optimization for Thin-Walled Structures with Distributed Loads
[2023]

Bacciaglia, A. , Ceruti, A. , Ciccone, F. , Liverani, A. Lecture Notes in Mechanical Engineering

Additive Manufacturing (AM) is continuously increasing its appeal as a breakthrough production process due to well-established advantages compared to traditional manufacturing strategies based on chip removal or casting. The design of lightweight structures can exploit the AM advantages, thanks to the capability of shaping complex geometries where the constant level of stress can be achieved through Topology Optimization. Moreover, in transportation engineering and lightweight structures in general, thin-shell or thin-walled components are widely used for frames, fuselages, wings, car bodies, coaches, tanks or recipients. However, the application of topology optimization routines on thin-walled structures is not exempt from difficulties. This is true especially in the case of a distributed pressure load coming from fluid-structure interaction analysis. Coupling the benefits of TO methodology with the already good performances of thin-walled structures may lead to mechanically efficient shapes. This research addresses strategies to apply topology optimization on thin-walled structures. The effect of the local concentration of distributed load in a cloud of control points distributed along the surface of interest is considered and tested. Two case studies coming from industrial engineering have been carried out to show the capabilities of the proposed approach.

Optimization with artificial intelligence in additive manufacturing: a systematic review
[2023]

Ciccone,F. , Bacciaglia, A. , Ceruti, A. J. of the Brazilian Soc. of Mech. Sciences and Engineering

In situations requiring high levels of customization and limited production volumes, additive manufacturing (AM) is a frequently utilized technique with several benefits. To properly configure all the parameters required to produce final goods of the utmost quality, AM calls for qualified designers and experienced operators. This research demonstrates how, in this scenario, artificial intelligence (AI) could significantly enable designers and operators to enhance additive manufacturing. Thus, 48 papers have been selected from the comprehensive collection of research using a systematic literature review to assess the possibilities that AI may bring to AM. This review aims to better understand the current state of AI methodologies that can be applied to optimize AM technologies and the potential future developments and applications of AI algorithms in AM. Through a detailed discussion, it emerges that AI might increase the efficiency of the procedures associated with AM, from simulation optimization to in-process monitoring.

FDM Printing Time Prediction Tuning Through a DOE Approach

[2024]

Bacciaglia, A. , Ceruti, A. , Ciccone, F. , Liverani, A. Lecture Notes in Mechanical Engineering

Additive Manufacturing is widely applied in aerospace, automotive and marine engineering. Indeed, large-scale components are often required in these applications, such as for non-structural parts of aircraft, spare parts or small lots of cars or marine components. Fused Deposition Modelling is one of the Additive Manufacturing processes used to affordably convert digital models into mockups, prototypes, and functional parts: a slicing software converts the object's digital model into a list of instructions for the machine. However, commercial slicing software packages often fail to accurately estimate the time required to produce models, especially when their size is significant: the errors could be up to several hours, which cannot be adequate in a real-life industrial context where production must be scheduled in a precise way. This manuscript compares the build time estimation of several commercial slicing software considering a real-life part. Furthermore, the evaluation of the manufacturing setting mainly affects the error in estimating the build time achieved through a Design of Experiment approach. The more time-impacting printing parameters have been detected, allowing fine helpful tuning to increase the accuracy of the build time in commercial slicing software. A case study included in the manuscript supports the analyses. Proper setting of the commercial slicing software can significantly improve the accuracy of the printing time.

Automating Landslips Segmentation for Damage Assessment: a Comparison Between Deep Learning and Classical Models

[2024]

Ciccone F.; Ceruti A.; Bacciaglia A.; Meisina C.

Natural disasters have a significant effect in terms of impacted indi-viduals and casualties. Artificial Intelligence (AI) techniques for automatically segmenting landslides from aerial photos is a relatively new field of research. Segmenting landslips quickly and accurately can significantly aid in assessing the damage caused by natural disasters. This research aims to compare the per-formance of AI techniques with more classical methods for the automatic seg-mentation of landslides from aerial images for damage assessment.

It is presented a dataset of satellite images containing landslides collected in the Broni (Italy) region and annotated to train and test the segmentation model. Both classical image processing techniques, such as thresholding and edge de-tection, and AI-based methods, such as U-Net, are applied to the dataset.

Overall, this research demonstrates that AI-based methods are a promising tool for automatically segmenting landslides from aerial images and can be a power-ful asset in assessing the damage caused by natural disasters. The study also highlights the importance of combining classical and AI-based methods for bet-ter performance, especially in challenging and complex scenes.