
Contents

Agradecimientos	iii
Abstract	v
Resumen	v
Abstract	ix
List of Figures	xix
List of Tables	xxi
1 Introduction	1
1.1 Motivation	1
1.2 Objectives	3
1.3 Structure	4
2 Background	5
2.1 Internet of Things and drone-based edge computing infrastructures	5
2.2 Efficient information processing techniques using swarms of drones	8
2.3 Image semantic segmentation based on convolutional neural networks	10

2.4	Image clustering by using deep learning techniques at the edge	15
2.5	Summary	17
3	The Kuhn-Munkres algorithm for efficient vertical take-off of UAV swarms	19
3.1	Abstract	19
3.2	Introduction	20
3.3	Problem overview	22
3.4	The Kuhn-Munkres takeoff algorithm	24
3.5	Evaluation	26
3.6	Conclusions and future work	32
	References	32
4	AI-enabled autonomous drones for fast climate change crisis assessment	35
4.1	Abstract	35
4.2	Introduction	36
4.3	Background and related work	38
4.4	AI-pipeline proposed for management of natural disasters	42
4.5	Experimental setup	50
4.6	Evaluation	53
4.7	Conclusions and future work	61
	References	62
5	Flood detection using real-time image segmentation from unmanned aerial vehicles on Edge-Computing platform.	67
5.1	Abstract	67
5.2	Introduction	68
5.3	Materials and Methods	71
5.4	Results	80
5.5	Discussion	91
5.6	Conclusions	93
	References	94
6	Discussion	99
6.1	General overview of contributions	99

6.2	Vertical takeoff of drone swarms through the Kunh Munkres algorithm	100
6.3	Unsupervised AI processing pipeline for unknown zone scanning	103
6.4	Acceleration of CNN-based computer vision algorithms at the edge.	105
6.5	Benefits obtained from processing in the UAV rather than in the cloud	106
6.6	Summary	107
7	Conclusions	109
7.1	Concluding remarks	109
7.2	Publications	110
7.3	Future work	112
Acrónimos		114
References		120