



# MobiNetVideo Newsletters

#4 - December 2019

TEC2017-88169-R MobiNetVideo (2018-2020)

Visual Analysis for Practical Deployment of Cooperative Mobile Camera Networks

<http://www-vpu.eps.uam.es/MobiNetVideo/>

## Fourth semester progress report

During this semester, Deliverable D3 “Technologies for mobile camera networks” version 1, was September 2019. There was no need for new versions of WP1 deliverables. Research activities have been progressing properly. Several publications are under preparation. Several datasets (“A Lifelogging Scene Recognition dataset” and “A Unified Semantic Segmentation dataset”) have been produced and we are working towards making them publicly available.

We are working towards the rescheduling of the Project workplan.

## Fourth semester results

### Master thesis

**Learning how to modify training rates in scene-recognition**, Miguel Basarte (advisor: Marcos Escudero-Viñolo), Trabajo Fin de Máster (Master Thesis), Master en Investigación e Innovación en TIC - Programa Internacional de Múltiple Titulación IPCV (Image Processing and Computer Vision Master Program), Univ. Autónoma de Madrid, Jul. 2019.

**Abstract:** In this Master’s Thesis, we pretend to find a measure that allows modifying the value of the learning rate of each individual neuron in a convolutional neural network. Specifically, we aim to handle the effect of the phenomenon known as Catastrophic Forgetting. Starting from a network trained for a source task, this concept refers to the loss in performance that the network undergoes for the source task, when it is trained for a new target task. To this aim, we begin by adapting a neural networks visualization tool to draw conclusions about the behavior and activity of neurons. Using this information, we hypothesize that those neurons with higher activity along the data-set images

maybe considered useful for the source task and those with lower activity are prone to be treated as free space for the network to learn the target task. To quantitative account for this activity, we leverage on the entropy of the distribution of the neurons' activities to design weighting functions to dynamically adapt the learning rate of each neuron according to it. In the evaluation section, we compare the results of these functions against a classical fine-tuning strategy focusing on obtaining networks whose joint performance for the source task and the target task is as close as possible to the performance obtained by two different networks fully-trained for each task separately. Obtained results suggest that all the proposed functions perform better than the fine-tuning strategy in this scope, and some of them perform close to the fully-training paradigm.

### Graduate thesis

Reconocimiento de escenas exteriores mediante redes neuronales profundas entrenadas con la base de datos places (**Scene recognition using Deep Neural Networks trained with the Places database**), Santiago Vicente Moñivar (advisor: Miguel Ángel García), Trabaja Fin de Grado (Graduate Thesis), Grado en Ingeniería de Tecnologías y Servicios de Telecomunicación, Univ. Autónoma de Madrid, Oct. 2019.

**Abstract:** The following Final Degree Project has been based on two fundamental pillars. One of them is the creation of a database of exterior scenes, which will be used to test with the PLACES365 network, and the other one the modification of a network in order to perform a training and a subsequent testing with the aforementioned dataset. First, a database with ten different classes has been generated and formed by exterior images of buildings distributed along the campus of the Universidad Autónoma de Madrid. Afterwards, a study of the PLACES365 convolutional neural network has been carried out, specifically ResNet50, implemented and trained by the MIT, applying our database. On the other hand, transfer learning has been done, modifying the aforementioned network, adding three new layers at the end, with the aim of adapting it to the new database being able to classify among the ten classes created for the different faculties. Finally, a comparative study has been made between the different results obtained with the testing, analyzing the potential reason for the failures that have been generated.

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