PhD Call for / Open Position

Video Detection of Anomalous Events in the Wild

GEINTRA Research Group (www.geintra-uah.org). Electronics Department
Polytechnics School in the University of Alcala
Dr. Javier Macias-Guarasa & Dra. Marta Marrón Romera
Application Deadline: 16 November 2017

1. Description

Intelligent scene understanding is one key technology in Artificial Intelligence. With multiple sensors, it attempts to detect, identify, recognize and understand various subjects (humans/objects) in real-world scenes.

The PhD is focused on understanding what is happening in a video-surveyed scene of interest, because of its critical or security nature, including both activities and behaviour, in the case of individuals, and anomalous events in the case of objects. This demand for intelligent monitoring occurs both indoors and outdoors, in realistic situations (in the wild), including: hot spots in cities, stadiums gateways and surroundings or facilities for leisure and recreation, railway lines (roads, level crossings and entrances and exits of tunnels), access to transportation (train, plane, boat, etc.), public buildings, shopping malls, and, in general, any place where an abnormality detection is relevant to safety.

The objective of the PhD is to contribute to the state-of-the-art in automatically process video sequences of different scenarios of interest and observe the typical and atypical (usual or unusual) activities that take place there in order to determine whether it is a normal or abnormal situation and to monitor in real-time the infrastructure and its usage mainly for safety reasons, in order to decide, at any time, if there is an urgent action to take.

In this context, the PhD will propose new strategies for the detection of group and individual behaviour to identify anomalies applying innovative computer vision and audio, and machine learning techniques, as well as definition and techniques for detecting/obtaining and integrating physical and semantic space-time audio-visual attributes characteristics related to human appearance or behaviour.

Deep learning is widely recognized as one active research direction in machine learning. Its performance already reaches that of human beings in many real learning scenarios, including computer vision. Based on its high interest, the objective of the intended project is to investigate the state-of-the-art deep learning models, testing well-known and novel architectures and algorithms of deep neural networks to design the aforementioned system. Further enhanced technologies based in deep-learning are expected to benefit public security, among other social objectives.

The intended project is not only theoretically significant, but more importantly the research outcomes could be extensively applied in various applications, thus the construction of realistic demonstrators and training databases are also key objectives of the proposal.

The PhD is involved in HEIMDAL project, a follow-up of a long line of research in the area of intelligent spaces and scene understanding. This research has received public funding continuously for more than 18 years. More specifically, HEIMDAL takes as a starting point important results of recent projects, (SD-TEAM-UAH (TIN2008-06856-C05-05), Vishnu (TIN2009-08984), RESELAI (TIN2006-14896-C02-01), Movicon (TRA2005-08529-C02-02), (TIN2008-06815-C02-02), (TIN2010-19654) and SPACES (TIN2013-47630-C2-1-R), with a clear focus on generating demonstrators in a position ready for transfer to the market.

2. Conditions

- We offer the opportunity to do scientifically exciting research in the multi-disciplinary Geintra research group (www.geintra-uah.org),
- The PhD research will be carried out under the supervision of Profs. Macias-Guarasa & Marrón-Romera.
- The research offers a 3-year full-time salaried PhD position (with extension possibilities to a 4th year): in Spain 18.200€ per year (before taxes around 10%).
- Besides, it will also be afforded the research costs, including material, publications and management.
- The work will be deployed in a full-time scheme in the Polytechnics School in the (University of Alcala), within the Electronics Department. Assistance with accommodation can be arranged.
- The PhD will be conducted in English.
- The student will have to register and enrol in the Doctoral Program "Electronics: Advanced Electronic Systems. Intelligent Systems (D441)", directed by the Electronics Department in the University of Alcala, and be awarded a PhD degree from the University of Alcalá, upon successful completion of the program.

3. Elegibility / Requirements

- Master Degree in Engineering, Computer Sciences, Signal Processing, Applied Mathematics, or related.
- Skills in mathematical, signal/systems analysis, and programming.
- Keen interest in the specific area of research, and desire to become expert in computer vision and machine deep learning.
- Ability to carry out independent research, social/communication skills, team spirit and willingness to work in an interdisciplinary environment.
- Good writing, reading, listening, speaking and presentation skills in English.
- Previous experience in computer vision, machine/deep learning, will be valuable.

The position is open to all qualified candidates irrespective of nationality, and the successful candidate is expected to start working by the beginning of 2018 (although the starting time may be open to discussion).

4. Applications

Candidates should send their application electronically and in English, no later than 16 November 2017 by sending an e-mail to geintra@depeca.uah.es including:

- A copy of your passport or official identity document.
- A detailed curriculum vitae (CV), including personal, professional and academic data, and list of research publications (if any).
- A personal letter describing yourself, your qualifications and research aims, and motivating the application and your interest in the position.
- A digital copy of your Bachelor and Master grade certificates.
- A digital copy of Master thesis or other major writing sample.
- 2 formal recommendation letters with company/university letterhead.
- Other documentation that you deem relevant for your application.

For questions you may contact Dra. Marta Marrón-Romera (marta.marron@uah.es)