Scientific Report

First name / Family name	Antitza Dantcheva
Nationality	Austrian
Name of the *Host Organisation*	INRIA Sophia Antipolis
First Name / family name of the *Scientific Coordinator*	Francois Bremond
Period of the fellowship	01/03/2014 to 20/07/2015

I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

The scenario of interest concerns Alzheimer's patients. It takes place during regular interviews between a medical doctor and these Alzheimer patients, at an Alzheimer center in Biot, France. In these interviews, the patients are confronted with music from their past. During the interviews, the patients are observed while they undergo *reminiscence and revidiscence*, which induce different reactions.

The goal in this scenario was to study such reactions of Alzheimer's patients in controlled settings and decipher the way patients' face can project the different states of expressions and emotions.

We have (a) acquired a multisession 2D+depth video-dataset depicting numerous Alzheimer's patients, (b) automatically processed the data (by extracting faces (Viola Jones algorithm), extracting different basic features, such as signal displacement of tracked points within the face (Kanade Lucas Tomasi algorithm) or HOG (Histogram of Gradients)), (c) analyzed these features towards behavioral response-analysis of Alzheimer's patients in musical mnemotherapy.

Also, we have analyzed the human smile based on a benchmark dataset (UvA NEMO) and studied the extraction of smile-dynamic-based gender information.

During my Fellowship I have been working closely with medical doctors and psychologists, in order to identify the proper semantic information and the proper indicators that allow for automated expression recognition. Such a collaboration was possible within the novel and dynamic framework "Cognition - Behaviour Technologie" (CoBTek).

Results of the conducted and future research can be directly applied towards building a smart interaction tool that can "read" the emotions of Alzheimer's patients and induce positive emotions by playing positively-associated music. This is shown to increase the life-quality of Alzheimer's patients, by improving their social behavior, reducing apathy and agitation, shifting mood, stimulating positive interactions, facilitating cognitive function, and coordinating motor movements. Such a tool serves the bigger idea of creating a smart and remote healthcare, which is necessary now, because the increasing prevalence of chronic disorders and its impact on functional decline is challenging the sustainability of healthcare systems.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

Dantcheva, Antitza; Elia, Petros; Ross, Arun
What else does your biometric data reveal? A survey on soft biometrics
To appear in IEEE Transactions on Information Forensics and Security, 1-26, 2015*.

Dantcheva, Antitza; Francois Bremond

Can a smile reveal your gender?
To be submitted

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

ABCDE ERCIM Seminar 2014, Pisa, Italy.

IV – RESEARCH EXCHANGE PROGRAMME (REP)

REP 1:

Name of REP Organization: University of Cyprus, Nikosia
Country: Cyprus
Local Scientific Coordinator: Prof. Dr. Yiorgos Chrysanthou
Department: Computer Science Department
Dates: 14.04.2015-20.04.2015

The team under Prof. Chrysanthou works on expression analysis from body, which is nicely linked to my research activities related to expression analysis from face. We discussed and exchanged about different methods and possible collaborations.
I gave a seminar entitled "Soft Biometrics. Traits and Applications".

REP 2:

Name of REP Organization: Secure Business Austria II (SBA II)
Country: Austria
Local Scientific Coordinator: Edgar Weippl
Dates: 06.07.2015-10.07.2015

SBA is a research center focused on Information Security. Their work is complementary to my background in biometrics (specifically automated face based person recognition). We found exciting intersection points between biometrics and network security and discussed writing a research proposal.
I gave a seminar entitled "Soft Biometrics: Applications in Security, Beauty Estimation and Healthcare".