CBMS 2013

CaptureMyEmotion: a Mobile App to Improve Emotion Learning for Autistic Children Using Sensors

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Abstract

Autism Spectrum Disorder (ASD) is estimated to affect one in eighty-eight children and many mobile apps are available from Google Play or Apple store to help these children and their carer. Our research into apps for autistic children identified that none of the apps use the full potential offered by mobile technology and sensors to overcome one of autistic children's main difficulty: the identification and expression of emotions. This paper describes a mobile app called CaptureMyEmotion that enables autistic children to take photos, videos or sounds, and at the same time senses their arousal level using a wireless sensor. It also allows the child to comment on their emotion at the time of capture. The app has the potential to help autistic children improve their emotions learning based on their own pictures, videos or sounds. It gives the carer a means to discuss the identification and expression of emotions.

1. Introduction

The Autism Spectrum Disorder (ASD) describes a range of conditions typically characterized by social deficits, communication difficulties, stereotyped or repetitive behaviours and interests, and in some cases, cognitive delays [1]. The prevalence of ASD is estimated to be up to 1 in 88 children [2]. Understanding and managing emotions is very challenging for the majority of autistic children and it is of major importance for their integration in classrooms and other social groups.

Autistic children, like other children of their generation, embrace mobile technology and enjoy using smart phones and tablets to learn and play. Most autistic children are visual learners and mobile technology appeals to them [3]. In our research at the University of Technology, Sydney we investigate how mobile technology and sensors can help autistic children and their carer understand and manage emotions.

It is increasingly recognised that autistic children respond well to personalised technology [4-6]. Autistic associations such as *FaHCSIA* [7] in Australia or *Autism Speaks* [8] in the USA have identified the potential of mobile technology on the child's progress and are subsidising or giving tablets away to families with autistic children.

Mobile technology has several advantages for the autistic child and carer:

- Access to tools to play and communicate ubiquitously.
- Easy access to games, music, education tools on the go.
- The carer can easily identify what the child likes to play with and track progress.
- Multimodal input/output with an intuitive interface.
- Easy use of camera and video.
- Easy integration of external sensors that wirelessly transmit data to the device providing additional feedback.
- An action (e.g. taking a picture) can be positioned in context using GPS, time and other data, which can be used at a later stage.
- Using one of the many apps available, the carer can help manage social/emotional skills and behaviour management.
- Mobile devices include features to provide better accessibility for autistic children (e.g. extra large font size, disabling buttons) [9].

Hundreds of Apps exist to help autistic children and their carers or teachers. At the time of writing (January 2013) a search on 'autistic app' returned 1000+ results in Google Play [10]. However, none of these apps use sensor input to measure the emotion of the user. Many autistics have difficulties in expressing or communicating their emotions/feelings in a similar way to how non-autistic people would normally do [11]. Many apps for people with autism or other special needs have been developed for the iPhone and Android platform. A good overview can be found in [12] and [13].

This paper presents *CaptureMyEmotion,* an App for smartphones and tablets, which uses Affectiva's Q sensor to help autistic children gauge the intensity of their emotions. *CaptureMyEmotion* enables children to take photos, videos or sounds and, at the same time, sense and self report their emotion. The collected data gives the carer insight into the child's emotions and offers a means to discuss the identification and expression of emotions. What sets *CaptureMyEmotion* apart is that we combine personally recorded photos, videos or sounds together with contextual information (date, time, location) and emotion data measured by a sensor. This creates a very personalised tool for a child to learn and discuss their feelings. Sensor data is used when the child takes a picture, as well as, when the child discusses the picture with a carer at a later stage. The use of an emotion sensor adds a new dimension to emotion learning by providing additional feedback based on physiological data.

2. Emotions and sensors

According to Schlosberg [14], emotion can be described by two dimensions i.e. arousal (high versus low) and valence (positive versus negative). Based on these two dimensions, 6 basic emotions (disgust, sadness, happiness, fear, anger, surprise) can be identified which exist for all human beings. For example, anger can be classified as high arousal and negative valence.

There is no perfect measure of arousal or valence. However, good approximations can be obtained by measuring arousal from the sympathetic nervous system (SNS) and valence from facial expressions [15].

Nervousness, fear, anger, protectiveness, and lust are enhanced by the sympathetic nervous system and can be measured through physiological changes in the body. Typically, physiological signals such as electrocardiogram (ECG), electromyography (EMG), blood volume pulse, skin temperature, skin conductance or respiration are used to measure arousal [16].

Using physiological signals to recognize emotion has several advantages compared to other methods such as speech and face recognition. Sensors capturing physiological signals are nowadays compact and often allow wireless transmission of the data to other devices such as smartphones or tablets. The sensors are comfortable to wear and are less obtrusive than, for example, being observed by a camera to be able to do facial expression recognition.

Skin temperature measures the temperature on the surface of the skin. When muscles are tense under strain, the blood vessels will be contracted and therefore the temperature will decrease. It is a relatively slow indicator of changes in emotional state.

Skin conductance or electrodermal activity (EDA) is an important signal to measure arousal. Electrodermal activity refers to changes in the skin's ability to conduct electricity. If a person experiences emotional arousal, increased cognitive workload or physical exertion, the brain sends signals to the skin to increase the level of sweating. Skin conductance usually increases when a person is more aroused (engaged, stressed, or excited) and it tends to stay low or drop when a person is less aroused (disengaged, bored, or calm). To detect changes in emotional state using skin conductance, it is important to obtain a baseline indicating the truly lowest tonic skin conductance level. The best way to get a baseline is to measure long-term, and look for the lowest smooth period of skin conductance where there is no physical movement, and where the temperature is clearly body temperature [15].

CaptureMyEmotion uses a wrist worn sensor called the Q sensor from Affectiva (www.affectiva.com). The Q Sensor measures changes in skin temperature, motion, and skin conductivity, and is able to give an indication about the wearer's emotional state. The sensor is easy to wear and is able to transmit the data in real time to a mobile phone. The Q sensor can be worn for a long period of time to obtain a reliable baseline.

A challenging issue is to measure valence. Traditionally, people would rate their feelings along the valence-arousal dimensions. However, self-rating can be highly inaccurate for many autistics so a more objective way needs to be found. Detecting the facial expression automatically can be the solution and one idea is to take a picture of the child when he rates a picture just taken. However, many autistics do not show a particular facial expression so this can be unreliable.

4. CaptureMyEmotion

The app is used to assign emotions to pictures, videos or sounds taken by the child. Our target group is children from 7 years and older who are able to use a smartphone to take pictures. *CaptureMyEmotion* is different from many existing apps since it allows the user to take their own pictures (When we refer to pictures this also includes videos or sounds) and not based on a fixed set of pictures. This will increase the chance that a picture generates a genuine emotion. Additionally, the app can be useful to obtain visual evidence that correlates to a particular emotion as measured by the sensor or self-reporting. For example, the user can be asked to take pictures of objects that make him happy. The app will provide a history of pictures categorized by a particular emotion and this gives the carer an insight into the child's emotions.

Our extensive experience with wireless sensors in health related mobile apps such as *myFitnessCompanion*® (myFitnessCompanion.com) has shown that most users want to have the option to use a sensor or not. The reasons can be diverse and range from cost (too expensive!) to practicality (sensor not at hand). Therefore, the sensor is optional and the app asks the child to manually select the emotion felt just after the picture has been taken. This is useful information, which can lead to valuable discussions with the carer even if the sensor is not used.

If the user wears the Q sensor, the sensor collects in real time accelerometer, skin temperature and skin conductive data associated with the picture taken. Based on the physiological data, the app calculates the arousal level and stores it together with the picture and contextual information (date, time and GPS coordinates). The Q sensor is also used during the discussion with the carer, and it keeps track of the child's arousal level while discussing the picture.

CaptureMyEmotion is developed for both Android smartphones and tablets. The child would typically use the smartphone to take pictures and the carer would use the tablet for evaluation together with the child. Tablets are more suitable for this due to the amount of data displayed. *CaptureMyEmotion* uses Dropbox to share the data between several devices. When the child takes a picture, it is automatically uploaded to a Dropbox account via 3G or WiFi. If the carer deals with several children (e.g. in a classroom situation), the carer can synchronize the data for the various children using Dropbox on the tablet.

The child can select camera, video or sound to capture the object that is in the viewer. The app automatically connects to the Q sensor (if present) and a gauge icon displays, in real-time, the arousal level experienced by the child. The arousal range is stored after a picture has been taken.

After a picture is taken, a screen is shown where the child can select a basic emotion using personalised pictures to represent the various emotions. When an emotion is selected, a sound mimicking the selected emotion is played (e.g. a laughing sound for 'happy'). Sound can be disabled in the settings. When the done button is tapped, the selected emotion is stored together with the Q sensor data and automatically uploaded to the Dropbox account if activated.

CaptureMyEmotion allows the child or carer to set the language, as well as, the images for the emotions. Some children prefer icons (smiley type of images) to real pictures [17].

Pictures, contextual and sensor data are automatically downloaded to the tablet when Dropbox sharing is activated. By default, the pictures are organised in chronological order for each day. This might help reinforce the learning of narrative, which has been observed as difficult for autistic children [18]. Pictures, videos and sounds can also be organised based on date, carer-rating and self reported emotion.

Figure 1. Review screens

Figure 1 (right) shows pictures filtered on 'happy'. Under each picture, it shows the carer rating (thumbs), the number of views and the arousal level (gauge) around the time the picture was taken.

When a picture is selected for review, the child can assign an emotion to the picture again and the next screen shows a summary (Figure 1 right). The summary shows the current emotion coupled with a real-time feed of the arousal level of the user. It also shows the emotion selected by the child at the time the picture was taken together with the arousal range detected then.

When reviewing the pictures, the child has the opportunity to express their feelings toward a certain picture in the company of a carer. The use of the picture, selected emotion and arousal gauge helps the child to overcome the difficulty of communicating with another person. This works in a similar way to the picture card method for children who might not be able to fully verbalise their emotions [19]. Therefore, the review gives ample opportunity to discuss the difference in the emotion felt during review compared to the emotion felt immediately after the picture was taken. This discussion could allow the child to delve into the reasons behind why he felt a certain way at a certain time.

If the child wears the sensor, the real-time arousal level is shown as detected by the Q sensor. This gives the carer insight into what emotion the picture evokes, or can highlight that the child is getting tired of doing the review or being distracted by other external factors. This can be used in the discussion with the child, or as an indicator that the carer should switch to another activity.

The carer can comment and rate the picture as seen fit. The carer rating (number of thumbs-up) allows the carer to express the review result of a picture with the child (e.g.: 0-no review, 1-very poor, 5-very good).

Data accumulated from the carer and user can be presented in progress reports. For example, a graph detailing the total number of thumbs accumulated against time. The child/carer is also able to see how many times a certain rating (i.e. number of thumbs) has been awarded over a certain period of time. Furthermore, the user is able to view the number of thumbs received filtered on a particular emotion, location or comments.

4. Conclusion

This paper presented an overview of *CaptureMyEmotion*, an app for smartphones and tablets. It aims to help autistic children understand their emotions with the support of a mobile device and sensors. Since every child is different, the frequency of use of the app, and the number of feedback sessions highly depends on the child's interest and capabilities, as well as, on the carer's objectives. *CaptureMyEmotion* is a tool and (by choice) it allows the carer choose what they want to do with the collected information. For example, discuss what the child did during the day, understand emotions and identify what makes the child react.

Understanding and managing emotions is important for autistic children since it has an impact on how well they integrate into society.

We plan to trial *CaptureMyEmotion* on autistic and no autistic children to compare the autistic children's reaction to the app against a baseline from non-autistic children. Based on feedback received we will improve the app and then make it available on Google Play.

5. References

All websites have been viewed on the 1st of May 2013.

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CBMS PAPER ACCEPTATION

CBMS 2013 <cbms2013@easychair.org>

to me

Dear Valerie,

Thank you for submitting your work to CBMS 2013.

After careful review and meta-review by the conference chairs, it is our great pleasure to inform you that your paper entitled

CaptureMyEmotion: a Mobile App to Improve Emotion Learning for Autistic Children Using Sensors

has been accepted for presentation in CBMS 2013.

Tomorrow you will be receiving the reviews of your paper, which we expect you to adhere to when preparing the camera-ready copy.

Instructions and deadlines for camera-ready preparation and registration will also be sent tomorrow.

Looking forward to seeing you in Porto in June!

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26TH IEEE INTERNATIONAL SYMPOSIUM ON COMPUTER-BASED MEDICAL SYSTEMS

PORTUGAL

20-22 JUNE UNIVERSITY OF PORTO

FRIDAY 21 June 2013

Afternoon

DATA ANALYSIS 3: Image Data

CHAIR **Agma Traina** Auditorium

16h30

Reducing the Complexity of k-Nearest Diverse Neighbor Queries in Medical Image Datasets through Fractal Analysis
Rafael Dias, Renato Bueno and Marcela Ribeiro

17h00

Can we Distinguish Between Benign and Malignant Breast Tumors in DCE-MRI by Studying a Tumor's Most Suspect Region Only?
Sylvia Glasser, Uli Niemann, Bernhard Preim and Myra Spiliopoulou

17h30

Fully-Automatic Tool for Morphometric Analysis of Myelinated Fibers
Rômulo Novas, Valéria Fazan and Joaquim Felipe

18h00

Graph-Based Retrieval of PET-CT Images using Vector Space Embedding
Ashnil Kumar, Jinman Kim, Michael Fulham and Dagan Feng

18h15

Parallel Multi-Material Decomposition of Dual-Energy CT Data
Rafael Simon Maia, Christian Jacob, J. Ross Mitchell, Amy K. Hara, Alvin C. Silva and William Pavlicek

INDIVIDUALISED CARE 3: Smart Technology II

CHAIR **Peter Lucas** Room 1

16h30

Smart-phone Application Design for Lasting Behavioral Changes
Eleni Stroulia, Shayna Fairbairn, Blerina Bazelli, Dylan Gibbs, Robert Lederer, Robert Faulkner, Janet Ferguson-Roberts and Brad Mullen

17h00

CaptureMyEmotion: a Mobile App to Improve Emotion Learning for Autistic Children Using Sensors
Peter Leijdekkers, Valerie Gay and Frederick Wong

17h15

A Prognosis System for Colorectal Cancer
Tiago Oliveira, Ernesto Barbosa, Sandra Martins, André Goulart, Paulo Novais and João Neves

17h30

A Multi-Functional Mobile Information System for Hospital Assistance
Dario Cavada, Manfred Mitterer, Omar Moling, Francesco Ricci and Floriano Zini

IT ISSUES IN HEALTHCARE 3: Systems Integratio

16h30

HL7 FHIR: An Agile and RESTful Approach to Healthcare Informat
Duane Bender and Kamran Sartipi

17h00

Towards Organ-Centric Compositional Development of Safe Netw Supervisory Medical Systems
Woochul Kang, Poliang Wu, Maryam Rahmaniheris, Lui Sha, Richard Julian Goldman

17h30

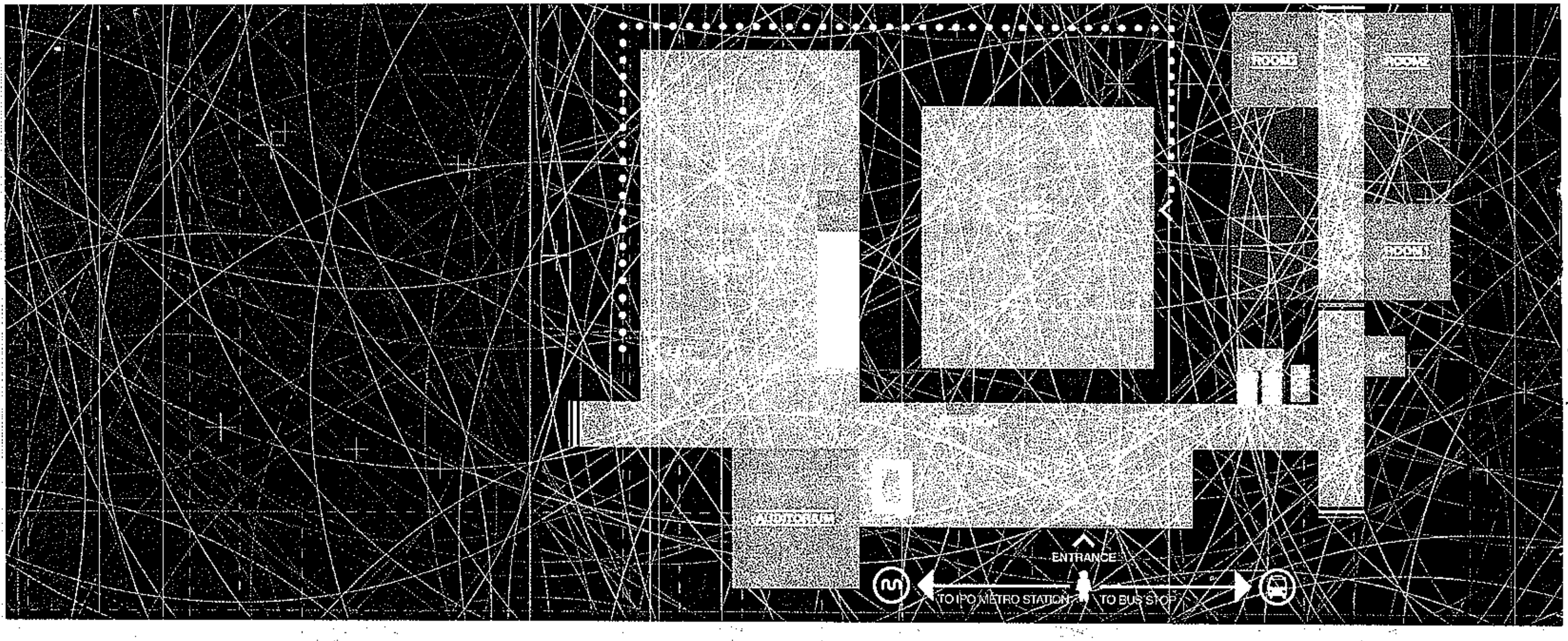
Survey of openEHR Storage Implementations
Samuel Frade, Sergio M. Freire, Erik Sundvall, José Hilário Patriarca-A Ricardo Cruz-Correia

18h00

Integrating Echocardiogram Reports with Medical Imaging
Luís António Bastião Silva, Samuel Campos, Carlos Costa and José L

18h15

Using a Clinical Document Importance Estimator to Optimize an Clinical Report Retrieval System
José Hilário Patriarca-Almeida, Bruno Santos and Ricardo João Cruz-



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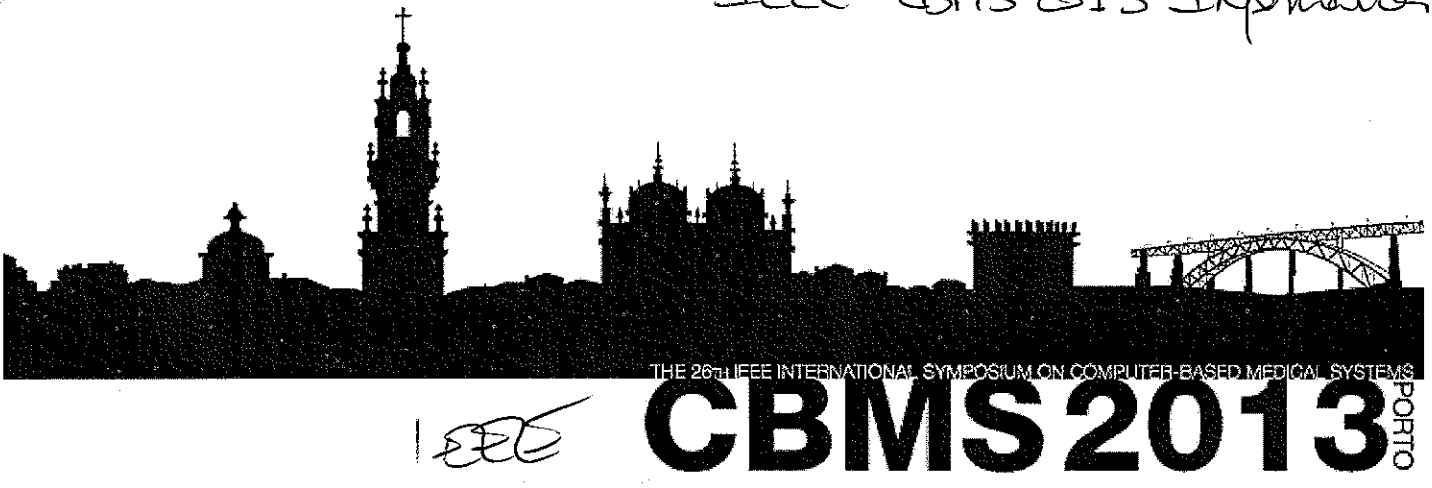

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Useful Links

- CBMS 2012

Call for Papers

The 26th IEEE International Symposium on Computer-Based Medical Systems (CBMS 2013) will be held at the University of Porto, Porto, Portugal, from June 20th to 22th, 2013. The scientific program of CBMS 2013 will consist of regular and special track sessions with technical contributions reviewed and selected by an international programme committee, as well as keynote talks and tutorials given by leading experts in their fields.

The symposium is the premier conference for computational medicine, providing a mechanism for the exchange of ideas and technologies between academics and industrial scientists, and attracts a worldwide audience. Regular and special track presentations will cover a broad range of issues in (but not limited to) the following areas:

- Software Systems in Medicine

- Computer-Aided Diagnosis
- Knowledge Discovery Data Mining
- Knowledge-Based Systems and Techniques
- Decision Support Systems
- Medical Devices with Embedded Computers
- Signal and Image Processing in Medicine
- Medical Image Segmentation Compression
- Machine Vision in Medicine
- Medical Robotics
- Medical Data Streams
- Network and Telemedicine Systems
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- Content Analysis of Biomedical Image Data
- Handheld Computing Applications in Medicine
- Pervasive Health Systems and Services
- e-Health
- Health and Wellbeing
- Learning methods for skewed data

CBMS 2013 invites original previously unpublished contributions that are not submitted concurrently to a journal or another conference. Many of the topics listed on the home page will be represented by corresponding special tracks, while others are solely covered by the general (main) CBMS track. Prospective authors are expected to submit their contributions to one of the corresponding special tracks or to the general track if none of the special tracks are relevant.

Each contribution must be prepared following the IEEE two-column format, and should not exceed the length of 6 (six) Letter-sized pages; the authors may use LaTeX or Microsoft Word templates when preparing their drafts. The papers should be submitted electronically before the paper submission deadline using the EasyChair online submission system. Papers must be submitted in PDF format, with fonts embedded. All submissions will be peer-reviewed by at least three reviewers. Each program committee of the corresponding special track or general track will be responsible for the final decision about acceptance of papers submitted to that track.

All accepted papers will be included in the conference proceedings, and will be submitted for inclusion into IEEE Xplore. At least one author must pay the registration fee before April 24, 2013 for each accepted paper.

Please refer to the IEEE IPR guidelines concerning copyright. Authors of accepted papers must include a completed IEEE Copyright Form with the submission of their final camera-ready paper.

Best papers will be invited to submit extended versions for special issues of journal of the area.

Important Dates

Paper submission: ~~31st January 2013~~ 21st February 2013 ** **EXTENDED** **

Notification: ~~10th March 2013~~ 7th April 2013 ** **EXTENDED** **

Registration for authors: ~~10th April 2013~~ 24th April 2013 ** **EXTENDED** **

Camera-ready paper submission: ~~10th April 2013~~ 1st May 2013 ** **EXTENDED** **

CBMS symposium: 20th - 22nd June 2013

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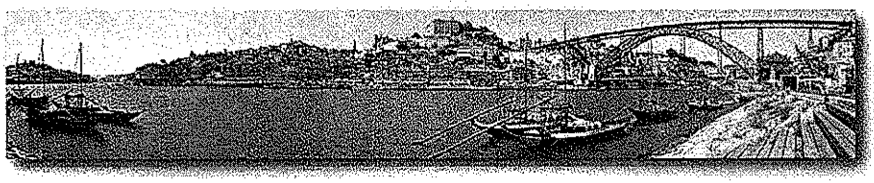

26th International Symposium on Computer-Based Medical Systems (CBMS)
University of Porto, Portugal, 20-22 June 2013

Special Track

EMERGING SMART TECHNOLOGIES FOR INDIVIDUALISED HEALTHCARE

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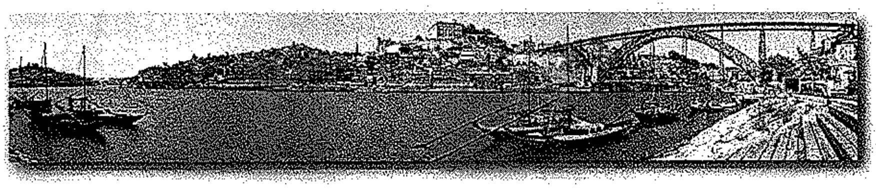

26th International Symposium on Computer-Based Medical Systems (CBMS)
University of Porto, Portugal, 20-22 June 2013

Special Track

EMERGING SMART TECHNOLOGIES FOR INDIVIDUALISED HEALTHCARE

news *The submission deadline is EXTENDED: February 21, 2013*

The current technological developments and the increasing willingness of people to be involved in making decisions about their health or disease, have been paving the way for advances in the area of *individualised healthcare*.

The uncertainty and complexity within this area require *smart* solutions and systems, which are capable to interpret context-specific information concerning the patient and his/her environment.

In this special track, we seek high quality contributions and innovations in the interdisciplinary area of smart healthcare technologies. The track is an integral part of the 26th International Symposium on Computer-Based Medical Systems (CBMS 2013), held at the Univeristy of Porto, Portugal on 20-22 June 2013.

For more information about this track, please contact one of the organisers.

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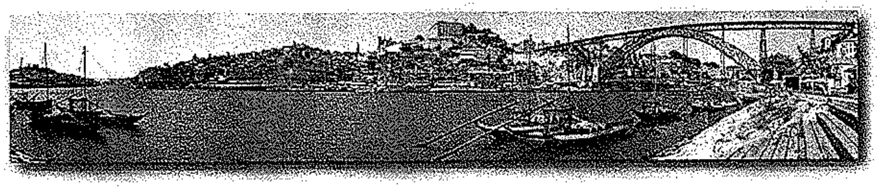

26th International Symposium on Computer-Based Medical Systems (CBMS)
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Special Track

Emerging Smart Technologies for Individualised Healthcare

Topics of Interest

This special track seeks papers that describe original and unpublished contributions covering not only a broad range of current topics of interest but also innovative and future trends in the development of the emerging field of individualised healthcare:

- Intelligent care assistants with embedded individualised decision-support
- Context-aware monitoring devices, sensors and networking
- Home-based diagnosis and treatment support
- Utilisation of workflows for remote chronic disease management
- Advanced healthcare services
- Smart mobile health
- Intelligent approaches to healthcare delivery process
- Preventive and health screening services at distance
- Cloud-based/SOA technologies for individualised healthcare
- Individualised user interfaces, visualisation and patient-device interaction models
- Quality evaluation criteria and evidence-based frameworks

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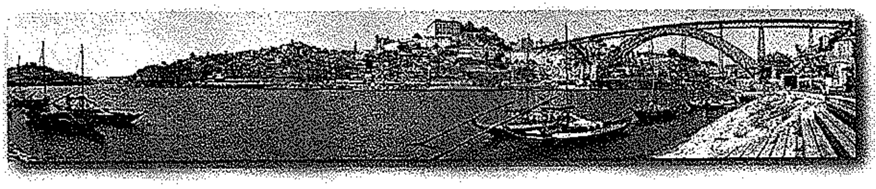

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Scope

The latest demographic changes worldwide and advances in information and communication technologies have motivated the development of healthcare systems moving the point of care closer to the patients allowing them more active involvement. To guarantee maximum health benefits to patients, and reduce the amount of effort and costs for the care givers, these systems should be *smarter* than the former telemedicine solutions lacking support for individualised disease management due to the intrinsic complexity and uncertainty in the medical domain.

Here *smart* implies that the system is capable of interpreting information within context, which can be broadly considered as patient-, disease-, or environment-specific, and attempts to solve problems at a level equivalent to or even better than human experts. The intelligence can be embedded in various ways, for example, by designing and implementing decision-support models, which can run in a stand-alone computing device such as a smartphone, by enabling system's adaptation through user parameters, by embedding alerting modules into sensors or medical devices that can process measurements and warn of changes in a patient's condition.

Deploying such smart technologies is expected to highly support *individualisation*—an emerging dimension of healthcare—by providing services and solutions that are tailored to the individual's needs and preferences. Any development in this direction, of course, faces challenges and requires enhanced efforts with respect to knowledge acquisition and representation, secure and user--tailored system design, evaluation and affordable deployment.

The aim of this special track is to provide a dedicated platform specifically designed for computer scientists, clinical informaticists, researchers, engineers and practitioners to present and discuss their recent work and innovations in the interdisciplinary area of smart healthcare technologies for individualised healthcare, and to consider potential collaborations and future directions for development.

Last updated on 8 April 2013

THE 26TH IEEE INTERNATIONAL SYMPOSIUM ON COMPUTER-BASED MEDICAL SYSTEMS
CBMS 2013 PORTO

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Paper submission: ~~31st January 2013~~ 21st February 2013 ** **EXTENDED** **

Notification: ~~10th March 2013~~ 7th April 2013 ** **EXTENDED** **

Registration for authors: ~~10th April 2013~~ 24th April 2013 ** **EXTENDED** **

Camera-ready paper submission: ~~10th April 2013~~ 1st May 2013 ** **EXTENDED** **

CBMS symposium: 20th - 22nd June 2013

ST01 : Teamwork, collaboration and patient-centered care

Bridget Kane : NTNU, Trondheim, Norway & The University of Dublin, Ireland
Saturnino Luz : The University of Dublin, Ireland
Pieter Toussaint : NTNU, Trondheim, Norway

ST02 : Learning-based biomedical information systems

Mykola Pechenizkiy : Eindhoven University of Technology, The Netherlands
Seppo Puuronen : University of Jyvaskyla, Finland
Paolo Soda : Universita Campus Bio-Medico di Roma, Italy
Francesco Tortorella : Universita degli Studi di Cassino, Italy
Alexey Tsymbal : Siemens AG, Germany

ST03 : Ontologies, terminologies and language processing

Tony Solomonides : NorthShore University HealthSystem, Illinois, USA

ST04 : Grid and cloud computing in biomedicine and life sciences

Giovanni Aloisio : University of Salento & CMCC, Italy
Maria Mirto : University of Salento & CMCC, Italy
Victor Maojo : Universidad Politecnica de Madrid, Spain
Nikos Karacapilidis : University of Patras & CTI, Greece
Tony Solomonides : NorthShore University HealthSystem, Illinois, USA
Alfredo Tirado-Ramos : Emory University, Atlanta, USA

ST05 : Intelligent patient management

Sally Mcclean : Queen's University Belfast, UK
Adele Marshall : University of Ulster, UK

ST06 : Endoscopic image processing and analysis

Andreas Vécsei : St. Anna Children's Hospital, Austria

Andreas Uhl : University of Salzburg, Austria
Michael Liedlgruber : University of Salzburg, Austria

ST07 : Processing and managing medical data streams

Pedro Pereira Rodrigues : University of Porto, Portugal
Mohamed Medhat Gaber : University of Portsmouth, United Kingdom
Carolyn McGregor : University of Ontario Institute of Technology, Canada
Mykola Pechenizkiy : Eindhoven University of Technology, The Netherlands

ST08 : Emerging smart technologies for individualised healthcare

Marina Velikova : Radboud University Nijmegen, The Netherlands
Peter Lucas : Radboud University Nijmegen, The Netherlands
Femida Gwadry-Sridhar : Lawson Health Research Institute, Canada
Ines Dutra : University of Porto, Portugal

ST09 : Computer-assisted analysis of capillaroscopic images

Cesare Valenti : Universita degli Studi di Palermo, Italy
Giuseppe Scardina : Universita degli Studi di Palermo, Italy
Alessio Adamo : Adamo S.r.l, Italy
Paolo Soda : Universita Campus Bio-Medico di Roma, Italy

ST10 : Bioinformatics: towards personalized medicine from omics data

Pietro Hiram Guzzi : University Magna Graecia of Catanzaro, Italy
Giovanni Cuda : University Magna Graecia of Catanzaro, Italy
Marco Gaspari : University Magna Graecia of Catanzaro, Italy
Pierangelo Veltri : University Magna Graecia of Catanzaro, Italy
Mario Cannataro : University Magna Graecia of Catanzaro, Italy

ST11 : Image processing for ophthalmology: challenges in retinal analysis and related fields

Alfredo Ruggeri : University of Padova, Italy
Domenico Tegolo : University of Palermo, Italy
Emanuele Trucco : University of Dundee, UK

ST12 : Security and privacy in healthcare IT

Luis Filipe Antunes : University of Porto, Portugal
Manuel E. Correia : University of Porto, Portugal
Ana Margarida Ferreira : University of Luxembourg, Luxembourg
Catia Santos Pereira : University of Porto, Portugal
Alexandre B. Augusto : INESC-TEC, Portugal

ST13 : Data and information quality in healthcare management

Alberto Freitas : University of Porto, Portugal
Ismael Caballero : University of Castilla La Mancha, Spain
Paulo Oliveira : Politechnic Institute of Porto, Portugal
Cesar Guerra : University of Castilla La Mancha, Spain

ST14 : Fetal monitoring signal analysis

Cristina Costa Santos : University of Porto, Portugal
Hernani Gonçalves : University of Porto, Portugal
Luis Antunes : University of Porto, Portugal

ST15 : Informatics challenges of patient centric health and social care

Claudia Pagliari : University of Edinburgh, UK
Jacob Hofdijk : Casemix, The Netherlands

ST16 : Medical education enhanced by technology and computer driven simulators

Stathis Konstantinidis : Northern Research Institute of Tromso, Norway
Panagiotis Bamidis : Aristotle University of Thessaloniki, Greece
Luis Fernandez-Luque : Northern Research Institute of Tromso, Norway
Adam I. Levine : Mount Sinai School of Medicine, New York, USA
Marina Krol : Mount Sinai School of Medicine, New York, USA
Samuel DeMaria : Mount Sinai School of Medicine, New York, USA

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Invited Speakers

Jeremy Wyatt

University of Leeds, UK

Why engineers and clinicians don't talk the same language - and what to do about it

Abstract: In my experience, many presentations at AIME, IEEE or EFMI conferences describe work by engineers using patients as a source of data to explore new modelling methods, with few papers addressing real world clinical problems, let alone demonstrating convincing solutions to them. At a superficial level, this arises because it is hard to engage doctors in such projects and healthcare and medical work are very complex, so it takes years of exposure to clinicians and their world for an engineer to understand real-world patient management problems in sufficient detail to help solve them. To put it another way, while an engineer might believe they have solved the problem, to a clinician, they have only explored an irrelevant simplification of it. Cynics might be less fair, observing that medical research is well funded, so there is a tendency for engineers to apply any novel engineering method to a simplified health problem. This is more likely to attract funding than applying it to, say, linguistics.

However, I believe the deeper reason that so few bioengineering projects seem to bear clinically digestible fruit is big differences in motivation, perspective and the research methods used in the engineering and healthcare research domains, and in the kind of problems they addressed.

This talk is an attempt to explore the similarities and differences between engineering and healthcare as research disciplines, their respective approaches to problem solving and to build bridges between these two very different worlds. For example, the engineering approaches used in the influential Virtual Physiological Human programme mainly involve data mining and modelling, while clinicians emphasise using psychological, social or other theories to understand and formalise a complex problem first, then use empirical testing to find out whether a theory-based solution works – the evidence based approach.

It is unhelpful for doctors to criticise engineers – and for engineers to criticise doctors – as being poor collaborators in multidisciplinary projects. The aim of this talk is to move beyond name calling and explore common ground constructively and provoke useful reflection and discussion, both within and across these disciplines.

In conclusion, unless we explore this uneasy stand-off between engineers and clinicians, confront it head on and provoke debate, it looks set to continue. This will reduce productivity on both sides and limit the enormous scientific and patient benefits that innovative, well-engineered clinical systems can undoubtedly generate.

Pedro Larrañaga and Concha Bielza

Universidad Politécnica de Madrid, Spain

Bayesian networks to answer challenging neuroscience questions

Abstract: In this keynote lecture we will show how Bayesian networks can address important neuroscience problems. These problems include: (a) neuroanatomy issues, like modeling and simulation of dendritic trees, inferring electrophysiological behavior from morphological neuron characteristics, and classifying neuron and spine types based on morphological features; (b) neurodegenerative diseases, like predicting health-related quality of life in Parkinson's disease, classification of dementia stages in Parkinson's disease and searching for genetic biomarkers in Alzheimer's disease.

Bharat Rao

Deloitte, USA

(tba)

IEEE computer society

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Big Data Analysis

Big Data Systems and Services for Healthcare

Abstract: The discussion involved in this panel aims to contribute to improving healthcare through better data utilization. The escalating demand for integrating distributed data, data streamed from body sensors, other medical episodes, and genetic conditions has influenced both the public and private health sectors demanding results and ideas of how to provide such data infrastructures from which each type of stakeholder can build smart healthcare

applications. Truly effective healthcare needs to make use of all sources of information dealing with highly distributed data at different 'speeds' and levels of openness, frequently crossing organisational borders. Every aspect of medical practice, research and policy ideally needs to make optimal use of information to deliver the best possible healthcare services. There is growing recognition of 'data' being a valuable digital asset providing opportunity for platforms to maximise data exploitation, i.e. "turning data into gold". Healthcare IT systems increasingly do not exist in vacuum, and require an information lingua franca to enable globalisation effects. Other sub-topics that could be potentially covered include the following:

- Systems or services managing healthcare data
- Implications of intersecting social media and Healthcare
- Applied research on utilizing Big Data for releasing medical applications
- Methods or systems for optimizing data utilization
- Challenges for identity management, security authorisation, access delegation, policy, and audit
- Data-oriented architectures for interconnectivity and interoperability
- Systems integrating streaming healthcare data (i.e. from sensors)
- Data mining over large volumes of archived medical data
- Methods for incorporating information exchange standards in medical systems

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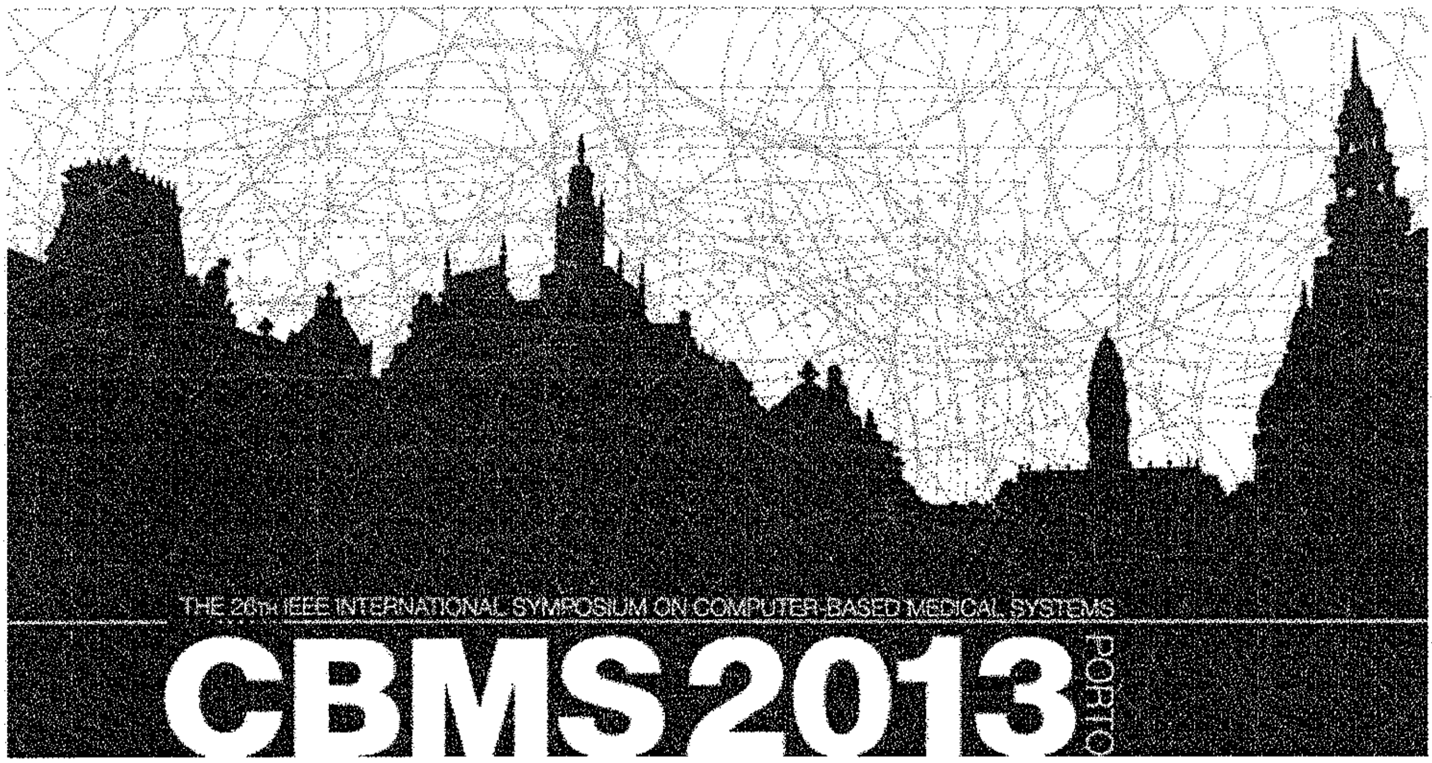

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Organization

CBMS Review

CBMS 2013 <cbms2013@easychair.org>

to me

Dear Valerie,

Please find attached the reviews for your paper.

Apologies for the late notification.

Hope you find the reviews useful.

Best regards,

Pedro Pereira Rodrigues

---------------------- REVIEW 1 ---------------------
PAPER: 36
TITLE: CaptureMyEmotion: a Mobile App to Improve Emotion Learning for Autistic Children Using Sensors
AUTHORS: Peter Leijdekkers, Valerie Gay and Frederick Wong

OVERALL EVALUATION: 1 (weak accept)
Appropriateness for CBMS track: 4 (good)
Overall organization: 3 (fair)
Appropriate title, abstract, introduction and conclusion: 3 (fair)
Style and clarity of the paper: 4 (good)
Technical Content and Accuracy: 2 (poor)
Significance of the work: 4 (good)
Referee's confidence in the paper's subject: 3 (fair)
Should this paper be considered for an award as "CBMS 2013 Best Paper"?: 1 (No)

----------- REVIEW -----------
This work describes the interface of an application for smartphones that can help autist children to recognize emotions and behave socially. The paper is well written and describes the interface discussing situations where the application could be applied. The application is quite nice and may help autist children and their carers to better understand emotions and how to behave socially.

I felt a bit disappointed for not seeing in this paper:

- a description of the architecure of the system from a computational standpoint
- an evaluation of the application in real or simulated situations

For many of the questions raised in the paper there is no answer for: how was the software implemented, which were the architectural design decisions, which were the user interface design decisions, how was performed the synchronization between the time of the interaction with the sensor data etc. Maybe an organization like the one suggested below could help:

- Computational architecture of the system
- Comparison with other software (user interface, functions, objectives)

Specific questions:

- In Section 4, you say "the user can be asked to take pictures of objects that make him happy". According to what I understood from your text, it is very difficult to an autist child to recognize and feel emotions. How are they expected to know what is the meaning of happiness?

- One of your objectives, according to my understanding, is to "teach" a child about different emotions. From the point of view of machine learning, it would be useful to have something like a "ground-truth" to uncover patterns of supposedly "happiness" or "sadness" or any other emotion in a child. How could you obtain "ground-truth" data with your application?

- How do you synchronize the moment of taking a picture with the sensor data in order to store both information together?

- How do you customize the arousal gauge meter for each individual?

- You say "When the Q sensor is used, the app has a learning mode feature that collects...." What do you mean? (maybe if you described the architecture of your system, this could be clearer).

- I think your idea of automatically taking a picture of the child's face while he/she is playing with the app would be very helpful, specially for the carer.

- It would be very interesting and helpful to have some preliminary evaluation of your app.

----------------------- REVIEW 2 ---------------------

PAPER: 36

TITLE: CaptureMyEmotion: a Mobile App to Improve Emotion Learning for Autistic Children Using Sensors

AUTHORS: Peter Leijdekkers, Valerie Gay and Frederick Wong

OVERALL EVALUATION: 2 (accept)

Appropriateness for CBMS track: 5 (excellent)

Overall organization: 4 (good)

Appropriate title, abstract, introduction and conclusion: 5 (excellent)

Style and clarity of the paper: 4 (good)

Technical Content and Accuracy: 4 (good)

Significance of the work: 3 (fair)

Referee's confidence in the paper's subject: 4 (good)

Should this paper be considered for an award as "CBMS 2013 Best Paper"?: 1 (No)

----------- REVIEW -----------

The paper presents a mobile application to help Autistic children and their caregivers to reflect on and help express the child's emotion. The interesting thing about this app is that it connects to an Affectiva sensor for measuring one dimension of emotion (arousal), and this can be used in the app to help the child record their emotion, and can be reported in summary to the caregiver and child later for review.

The application looks very interesting, and is definitely of relevance for the track. There are no experimental results yet -the system is yet to be trialled. It would help the paper to show at least a use case or a sequence of things that would happen during a specific interaction between child/carer/app/emotion sensor.

----------------------- REVIEW 3 ---------------------

PAPER: 36

TITLE: CaptureMyEmotion: a Mobile App to Improve Emotion Learning for Autistic Children Using Sensors

AUTHORS: Peter Leijdekkers, Valerie Gay and Frederick Wong

OVERALL EVALUATION: 1 (weak accept)

Appropriateness for CBMS track: 3 (fair)

Overall organization: 2 (poor)

Appropriate title, abstract, introduction and conclusion: 4 (good)

Style and clarity of the paper: 3 (fair)

Technical Content and Accuracy: 3 (fair)

Significance of the work: 3 (fair)

Referee's confidence in the paper's subject: 4 (good)

Should this paper be considered for an award as "CBMS 2013 Best Paper"?: 1 (No)

----------- REVIEW -----------

The paper describes the design of an app meant for recording situations and the relevant emotions for autistic children. The system itself seems to be a useful tool for patients and their care-givers.

The main problems that I have with the paper are 1) the fact that it is just a system description without evaluation, and 2) the not so clear structure with quite some repetitions and redundancies, and a mix of motivation and system description.

To give an example of the latter: in the introduction a number of advantages of technology for autistic children are claimed, but some of these seems to be biased already towards the functionality of the system. My advice would be to make a clear distinction between the advantages according to the literature (with concrete references) and the design choices behind the system. Related to this, also the related work focuses explicitly on "the type of apps related closely to /CaptureMyEmotion/".

Some small remarks:
* Please explain why you distinguish between "emotion capturing" and "behavioral data collection" apps, since examples of the latter category also do emotion / mood collection.
* Many references occur several times in the paper. Please cite papers only once, or make it explicit if you really need to refer to it for a second time (e.g. "also in [22]").
* The second and third sentences of Section 4 are a repetition of what is said before.
* Does the app only ask the child to manually select his emotion of the sensor is not used? Please explain.
* The system itself does not contain any coaching or intelligent feedback, so it is not really "smart" (see title of track).
* Section 4.3 describes how the system can be used in interaction with the care-giver, and this foreseen interaction has clearly influenced the design of the system. However, I would like to see an explicit description of what has been proven to be a good therapeutic intervention and how this intervention has been translated into the design of the app. This is again a matter of presentation / structure. Part of this is now the Discussion.
* Sentence below Figure 5 doesn't give new information.
* Please explain the thumbs-up rating: what do you mean with "the review result of a picture with the child"?
* Section Discussion should be number as 5.
* In future work you discuss the option to use facial expression detection, while earlier and just after this, you point out that this will not be very useful for autistic children.