SIGBio Record

Newsletter of the SIGBio
ACM Special Interest Group

Notice to Contributing Authors to SIG Newsletters

Editor in Chief's Notes:

This issue presents one contributed article and a summary of a PhD Thesis:

Smart Health Project 2.0: Integration and expectations of "Smart Health" Topics
By M. Macrì, D. Mirarchi, C. Pagliaro, P. Russo, and P. Vizza;

Analysis and Design of New Application Platforms
for mHealth by Giovanna Sannino;

We thank contributors for this issue and hope that readers will find interesting references to their work in Bioinformatics and Health Informatics areas.

SIGBIO Record - Submission Guidelines

Submission categories

Submissions to the newsletter can be either on a special issue topic or on topics of general interest to the SIGBIO community.

These can be in any one of the following categories:
- Survey/tutorial articles (short) on important topics.
- Topical articles on problems and challenges
- Well-articulated position papers.
- Review articles of technical books, products and .
- Reviews/summaries from conferences, panels and special meetings within 1 to 4 pages [1500-2500 words]
- Book reviews and reports on relevant published technical books
- PhD dissertation abstracts not exceeding 10 pages
- Calls and announcements for conferences and journals not exceeding 1 page
- News items on the order of 1-3 paragraphs

Brief announcements Announcements not exceeding 5 lines in length can simply be sent as ASCII text to the
editors by e-mail. SIGBIO Record publishes announcements that are submitted as is without review.

Announcements cannot be advertisements and should be of general interest to the wider community. The Editor reserves the right to reject any requests for announcements at his discretion.

Authors are invited to submit original research papers or review papers in all areas of bioinformatics and computational biology. The papers published in SIGBioinformatics Record will be archived in ACM Digital Library. Papers should follow the ACM format, and there is no page limitation.

http://www.acm.org/sigs/publications/proceedings-templates

Submissions should be made via email to the editors Pierangelo Veltri *(University Magna Graecia of Catanzaro, Italy),*
Young-Rae Cho *(Baylor University)*

Analysis and Design of New Application Platforms for mHealth
- *Ph.D. Thesis* -

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There is no doubt that healthcare is a social-scale problem. Especially with the increase in elderly populations, the burden of healthcare is steadily increasing. Also, healthcare providers are faced with a shrinking professional caregiving force, which means there is a need to involve the patients' family members, friends and communities in the care activities. Thus, there is an urgent need to build collaborative care environments to maximize caregivers' efficacy, to improve the safety and quality of care by providing timely health information to professional healthcare providers, patients and patients' family members or friends.

In this regard, this PhD work has had as its main goal the definition and the realization of a new application platform to easily create mobile apps that can facilitate medical or self-care activities to better support the citizens/patients.

During the first year of doctoral research activities, I firstly focused my attention on the acquisition of the necessary know-how to be able to address the still open issues, and then I dedicated myself to the activities of defining the software architecture of a new platform for mobile health. During the second year of Ph.D. I realized the first platform services intended to collect, analyse and present the information that have allowed us to consolidate a first prototype.

Therefore, the activities of the last year have got to focus on case studies in order to demonstrate the validity and viability of the platform to a wide range of heterogeneous environments.

In detail, the platform has been used in the following diseases/case studies:
- Obstructive Sleep Apnoea (OSA) Monitoring
- Fall Detection
- Prediction of Falls due to Standing Hypotension
- Continuous non-invasive estimation of Blood Pressure

For each cited case study a dedicated m-Health app was developed.

For the realization of those apps, several phases have been addressed, individually for each app, or for each disease/case study:
- a first phase for the study of the application context;
- a second phase for the extraction of the knowledge (logical rules or mathematical models) that should be included in the app, with in some cases a data collection phase by medical protocols;

- a final phase for testing and validation of the results.

With respect to the existing literature, I feel my approach is well positioned and competitive.

The main features of the apps realized by using the developed platform are:

- Non-intrusive: the apps can acquire data in real time from different kinds of wearable sensors and, in addition, can also extract, by using several mathematical models, information that cannot be directly monitored, e.g. blood pressure from Electrocardiogram and plethysmography signals;
- Real-Time: all data, information and all signals that can be monitored are processed and classified in real time on a mobile device without any connection to any server, so you can use the apps everywhere, every time;
- Proactive: the apps can also send notifications and alarms to the users/patients or to the doctors to take different consequent actions to immediately take care of patient's health;
- DSS-based: the decisions about the classification of events are based on an expert knowledge that is represented under the form of an explicit set of IF…THEN rules;
- Personalized: for some case study it is possible to personalize the expert knowledge and so different patients could be represented by (even very) different sets of rules.

The validity of the obtained results in all of the processed case studies/pathologies, published in various international journals, allowed coming to the conclusion that the developed platform is functional, easily extensible, maintainable and equipped with advanced services specifically tailored for Health.

Smart Health Project 2.0:
Integration and expectations of "Smart Health" Topics

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arth Health 2.0 (SH2.0) project begins by the integration of two executive projects "Smart Health and "Cluster ODSH - SmartFSE – Staywell" both developed in order to enhance the life quality in the city within the "Smart cities and communities and social innovations" proposal promoted by the Italian Ministry of Instruction, University and Research (MIUR).

The main goal of SH2.0 is to create and define an innovative and technological infrastructure, as in Cloud environment, for the development of services necessary to the activation of new models in terms of health and wellness. In this context, the first proposal of SH2.0 is to enhance the life style of the citizens, starting from individual activities and adopting correct behaviors; the second aim regards the preventive health care feasible by institutional subjects (as, for example, Ministry of Health) which must be supported in the collection and analysis of data and information necessary to address specific actions and interventions for the early detection of diseases.

The expectation of the project consists in the realization of platforms, software and applications in health environment to support and help citizen and/or patients in the choose of appropriate paths of health and in the prevention and control of specific degenerative disease. Some applications developed in this context have been related to the diabetes, disphonia, headache and wellness.

Moreover, models based on ICT (Information and Communications Technology) solutions and a model based on water contamination have been also presented and proposed to support healthcare for citizens.

SH2.0 project is realized by the collaboration of more partners that allow a consistence and heterogeneous support in many different areas. The list of the partner is reported as following: Engineering and NoemaLife (as project manager), Università degli studi di Catania (UniCT), Consiglio Nazionale delle Ricerche Sicilia (CNR Sicilia), Università degli studi di Palermo (UniPA), Università degli studi di Bari "Aldo Moro" (UniBA), Centro Regionale Information Communication Technology (CERICT), Consiglio Nazionale delle Ricerche Campania (CNR Campania), Consorzio Interuniversitario Nazionale per l'Infortmatica (CINI), Università degli Studi "Magna Graecia" di Catanzaro (UniCZ), Università degli studi di Napoli "Federico II" (UniNA), Consiglio Nazionale delle Ricerche Calabria (CNR Calbria), TELBIOS SrL, TELECOM, OLI Sistemi TQC, Beta8.0, Cooperativa EDP La Traccia, Distretto Micro e Nano Sistemi, DELISASUD, SDN SpA, EXEURA, XENIAPROGETTI, NEATEC, HOSPITAL CONSULTING, UPMC ITALY.

Clinical signal and data analysis for the monitoring of diseases

The aim of the research is focused on the analysis of clinical signals and data to prevent and predict possible disease events. In particular, different types of signals have been considered, analyzed and evaluated in electrophysiology, nuclear medicine and orthopedic fields. Specific algorithms of disease prediction have been defined. In Smart Health 2.0 project, the work consists into the study of the algorithms and analysis techniques of biomedical signals necessary for the monitoring of physiological parameters for the control of a correct style of life, especially for diseases such as diabetes and dysphonias.

Consequently, we focused on the analysis of model, such as decision trees, for the definition of the rules relating to clinical pathologies. We also studied the algorithms used for the analysis of data from specific sensors, especially for the calculation of wellness indices related to physical activity daily, the quality of sleep and food. The work is oriented also into the definition of organizational models and operating protocols, based on ICT solutions, for assistance in support of well-being.

Experiences of ICT in health.

The aim of the project is to experienceservices and applications that are subject of research and development in south of Italy regions. Therefore the goals are: dissemination of programs, services and applications through pervasive and ubiquitous apps; testing of prediction models, control and interoperability of systems usable; testing of the monitoring system of the lifestyle-based mobile devices. For this reason it was decided to test a set of apps (Diabetes, Speech Pathology, Migraine) Wellness and platform for a healthy lifestyle, epidemiological models. The contribution in this activity has provided initially through a careful study of the deliverables. Main objectives were the identification of the scenario and the protocol for the testing phase and guidelines relating to the trial protocol itself. The second activity aims to prepare scenarios for testing and a study of the context. They were, therefore, initiated studies of the reference context, in order to allow the definition of social and epidemiological profile of Calabria.

New approaches for health: empowerment, prevention, wellness and lifestyle.

SmartHealth 2.0 Research activities fall into main areas: (i) Prevention, Wellness, and LifeStyle; (ii) Improvement of health services for the benefit of citizens/patients. In the first area research focused on the Definitions of formal models for knowledge representation and reasoning techniques for data analysis with application on type 2 diabetes mellitus, migraine, wellness and dysphonia. A report about clinical rules related to these pathologies has been produced. Another goal of first area is development a new model for well-being of citizen/patient. Consequently, the study has been focused on the realization of a reports on new strategies in health and on ICT solutions. As a consequence of this study a new model for support of well-being in work, school and environment, with new ICT solutions, has been realized. The second area aims to define the improvement of the effectiveness of care pathways for citizens/patients and their greater involvement in processes of care. In the second area of research, the activities have been focused on the possibility to extend the city's notebook as a basis for the empowerment of citizens/patients. Consequently, the study has been focused on documents containing international and regional experiences on empowerment of the citizens on Electronic Health Notebook.

Epidemiological models for monitoring human health.

We defined a set of meaningful maps in order to represent health risk. Risk maps are maps designed to visualize the spatial contamination distribution of specific bacterial. In the Smart Health project it was developed and studied an epidemiological models for monitoring and prevent the human health contamination. A model that highlights a possible correlation between the groundwater used in agriculture with the bacterial contamination present in plants and animals watered with the same water, was developed. In order to achieve this purpose, GIS provides an appropriate set of tools for managing, storing, displaying and evaluation of information.

Biomedical data analysis for disease early detection.

Biomedical signals are observation instruments of physiological or not physiological activities of human organism such as vocal signals, or intra-coronary pressure wave. The aim of vocal analysis activity, is related both to early detection of organic dysphonia as first symptom of neurodegenerative diseases, and to dysphonia estimation in occupational voices. A contribution

in a vocal analysis algorithm assessment, was done through a testing phase on a free available database of healthy and pathological voices. A further cloud-based system for remote analysis of vocal samples

submitted by patient through smartphone has been realized. This system provides a first-level information on possible voice alterations analyzing pitch and noise normalized energy index (NNE). Focus is now on typical vocal parameters exctraction through a new pathological voices dataset analysis. The goal is to improve classification systems for dysphonia early detection using data mining methods. For what regards intra – coronary pressure signal, instead, it allows to assess the blood vessels injuries, measuring diastolic pressure difference in stenosis proximal and distal region. An intravascular pressure evalutation, jointly to angiographic images study with different softwares aid, has been done in order to define a decisional support angioplasty procedures. Another area of interest is related to Experimentation in Calabria of ICT systems supporting health and wellness. Reporting to this ambit, a plan proposition and a social, demographic, and mortality context study to define good clinical practices for experimentation, have been produced.

ACM-BCB 2015 Call for Papers

Atlanta, GA, September 9–12, 2015

http://acm-bcb.bme.gatech.edu/2015/

The ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM BCB) is the flagship conference of the ACM SIGBio. ACM-BCB 2015 is the conference's sixth year, building upon the success of the first five meetings in Niagara Falls, Chicago, Orlando, Washington DC, and Newport Beach. Since 2013, we have incorporated the new area of Health Informatics in BCB and we look forward to its continual growth.

ACM-BCB 2015 will be held in Atlanta GA, September 9–12, 2015. The conference offers a forum for premier interdisciplinary research linking computer science, mathematics, statistics, biology, bioinformatics, biomedical informatics, and health informatics. The past few decades have seen tremendous growth in the scale and complexity of biological and medical data. This conference serves to showcase leading-edge research on new technologies and techniques for gathering, processing, analyzing, and modeling these big data for a variety of scientific, clinical, and healthcare applications, from bench to bedside.

ACM-BCB 2015 welcomes original submissions that have not been published or under review. Examples of relevant topics include, but are not limited to, the following:

- Behavioral, Environmental, and Public Health Informatics
- Biological Network Modeling and Analysis
- Biomedical Imaging and Data Visualization
- Clinical and Health Decision Support Systems
- Computational Systems Biology
- Epigenomics, Gene Regulation and Transcription
- Genome and Sequence Analysis
- Healthcare Data Quality Control, Privacy, and Security
- Microbiomics and Metagenomics
- Mobile Health and Sensor Networks
- Population, Evolution, and Comparative Genomics
- Predictive Modeling and Analytics in Healthcare
- Protein and RNA Structure and Function
- Proteomics and Metabolomics
- Text Mining of Biomedical Literature and Clinical Notes
- Translational Bioinformatics

Submitted manuscripts should not exceed 10 pages in ACM template on 8.5 x 11 inch paper (http://www.acm.org/sigs/publications/proceedings-templates). ACM-BCB's technical program committee will review all submissions on the basis of their originality, technical soundness, significance, presentation, and interest to the conference attendees. All accepted papers of registered authors will be included in the proceedings published by ACM Digital Library. Details for the conference can be found at the http://acm-bcb.bme.gatech.edu/2015/.

The authors of selected papers will be invited to adapt their papers for being published in a special issue of *IEEE/ACM Transaction on Computational Biology and Bioinformatics* (TCBB), a special issue of *IEEE Journal of Biomedical and Health Informatics* (J-BHI), or a virtual issue of the *DATABASE journal*.

Submission Link: https://www.easychair.org/conferences/?conf=acmbcb2015

Important Dates:
Paper submissions due: **May 8th, 2015 (Friday)**

Notifications sent to authors: **July 10th, 2015 (Friday)**
Camera-ready papers due: **July 24th, 2015 (Friday)**

ACM-BCB 2015 Call for Poster Abstracts

Sept. 9th -12th, 2015, Atlanta, GA

(http://acm-bcb.bme.gatech.edu/2015/)

ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM- BCB) is the main flagship conference of the ACM SIGBio (ACM Special Interest Group on Bioinformatics, Computational Biology, and Health Informatics). ACM-BCB 2015 will be held in Atlanta, GA, during September 9-12, 2015. The conference provides a premier forum for researchers in computer science, mathematics, statistics, biological and medical science to share advances in bioinformatics, computational biology, and health informatics. Physicians, medical, and public health researchers are strongly encouraged to submit abstracts to report how informatics approaches can be applied to solve biological and medical problems.

The abstracts should report results and progresses in bioinformatics, computational biology, and health informatics that include but are not limited to the following topics:

- translational bioinformatics
- microbiomics and metagenomics
- multi-omics data analysis and integration
- population, evolution and comparative genomics
- computational systems biology
- proteomics and metabolomics

- behavioral, environmental, and public health informatics
- clinical and health decision support systems
- bioimage and data visualization
- text mining of biomedical literature and electronic health records
- biomedical and clinical data analytics
- mobile health and sensor network

Important dates:

Submission deadline: **11:59pm (local time) on July 24, 2015**

Notification of Acceptance of Posters: **July 31, 2015**

Submission Link: https://www.easychair.org/conferences/?conf=acmbcb2015 (Please choose poster track in the submission)

Format Requirement: Submitted abstracts should not exceed two pages in ACM template on 8.5 x 11 inch paper (http://www.acm.org/sigs/publications/proceedings-templates). ACM-BCB's technical program committee will review all submissions on the basis of their originality, technical soundness, significance, presentation, and interest to the conference attendees. The accepted poster abstracts of registered authors will have the option of being included in the proceedings published by ACM Digital Library.

ACM-BCB 2015 Call for Workshop Proposals

Atlanta, GA, September 9, 2015 (Wednesday)

http://acm-bcb.bme.gatech.edu/2015/

ACM-BCB'2015 is the flagship conference of the ACM SIGBio. We invite submissions of workshop proposals on any topic of interest to the large ACM and Biomedical research community. Examples of relevant topics include, but are not limited to, the following:

- Healthcare Data Quality Control, Privacy, and Security
- Text Mining of Biomedical Literature and Clinical Notes
- Mobile Health and Sensor Networks
- Big Data and Predictive Analytics in Healthcare
- Clinical and Health Decision Support Systems
- Biological and Health Data Visualization
- Translational Bioinformatics
- Genome and Sequence Analysis
- Protein and RNA Structure and Function
- Epigenomics, Gene Regulation and Transcription
- Microbiomics and Metagenomics
- Population, Evolution, and Comparative Genomics
- Proteomics and Metabolomics
- Computational Systems Biology and Biological Network Modeling
- Behavioral, Environmental, and Public Health Informatics

Each workshop proposal can be up to 6 pages to include the following information:

- Motivation and rationale of the workshop
- Proposed workshop length: one-half day or a full-day with a lunchtime break
- Names and affiliations of main organizers
- A description of the workshop format, i.e. extended research presentations, panels, in-depth tutorials, invited talks, demonstrations:
  - For extended research presentations, a short research abstract and reference papers should be provided;
  - For panels, a short biography and concise position statement from each participant should be provided;
  - For teaching workshops, a draft syllabus should be provided;
  - For demonstration workshops, a general outline of the planned activities and prerequisite materials needed should be described.
- Approximate workshop schedule; how much time will be allocated to each workshop activity.
- An important goal of the workshops is to engage participants via interactions and/or community building. Each proposal is expected to describe its plans to achieve this goal.
- Any other relevant information to your proposal workshop (e.g. has the proposed workshop be done in the past and in other venues? If so, when and where?).

Important Workshop Dates:

Workshop submissions due: **May 15th, 2015 (Friday)**
Notifications of acceptance: **June 19th, 2015 (Friday)**
Workshop materials due: **July 17th, 2015 (Friday)**

FCRC 2015

FCRC 2015 will be held in Portland Oregon from June 12-20. Chaired by Rajiv Gupta of UC Riverside, the conference will assemble a spectrum of affiliated research conferences into a week-long coordinated meeting. The technical program for each affiliated conference will be independently administered, with each responsible for its own meeting's structure, content and proceedings. To the extent facilities allow attendees are free to attend technical sessions of other affiliated conferences being held at the same time as their "home" conference. Conferences include:

CRA-W 2015: Career Mentoring Workshop

EC 2015: The 16th ACM Conference on Economics and Computation

HPDC 2015: The 24th International Symposium on High-Performance Parallel and Distributed Computing

CCC: Conference on Computational Complexity

ISCA 2015: The 42nd International Symposium on Computer Architecture

ISMM 2015: ACM SIGPLAN International Symposium on Memory Management

IWQoS 2015: IEEE/ACM International Symposium on Quality of Service

LCTES 2015: ACM SIGPLAN/SIGBED International Conference on Languages, Compilers and Tools for Embedded Systems

PLDI 2015: 36th ACM SIGPLAN Conference on Programming Language Design and Implementation

SIGMETRICS 2015: International Conference on Measurement and modeling of Computer Systems

SPAA 2015: ACM Symposium on Parallelism in Algorithms and Architectures

STOC 2015: 47th ACM Symposium on Theory of Computing