

## Poster Abstracts

### AAAI Spring Symposium on AI and Health Communication

**Farzad Amirjavid, Abdenour Bouzouane, Bruno Bouchard, Ian Douglas Horswill, Bostjan Kaluza, Erik Dovgan, Mitja Lustrek, Matjaz Gams, Violeta Mirchevska, and Nanon Labrie**

#### **Spatiotemporal Knowledge Representation and Reasoning under Uncertainty for Action Recognition in Smart Homes**

We apply artificial intelligence techniques to perform data analysis and activity recognition in smart homes. Sensors embedded in smart home provide primary data for reasoning about observations. The final goal is to provide appropriate assistance for residents to complete their Daily living Activities.

Here, we introduce a qualitative approach that considers spatiotemporal specifications of activities in the Activity Recognition Agent to do knowledge representation and reasoning about the observations. We consider different existing uncertainties within sensors observations and Observed Agent's activities. In the introduced approach, the more details about environment context would cause the less activity recognition process complexity and more precise functionality.

To represent the knowledge, we apply the fuzzy logic to represent the world state by the fuzzified received values from sensors. The knowledge would be represented in the fuzzy context frame. To reduce the amount of collected data, meaningful changes in sensors generated values are considered to do Activity Recognition.

Applying possibility distributions for event occurrence orders and sequences within different scenarios of activities realization, we are able to generate hypotheses about future possible occurable events. The possible occurable events and fuzzy digit parameters of their possible happening moments are represented in matrix format. The hypotheses about possible future observable contexts are generated considering spatial, temporal and other environmental parameters and then they would be ranked.

Our final goal is to better explain the observations. If no possible explanation about observation were found, it would be recognized as abnormal behavior. In the case that

no expected event be observed, we can reason that maybe event has occurred but not triggered and so next available events in previously learned scenarios would be expected. The system patience for number of possible missed events depends to trade-off between the degrees of resident's forgetfulness and probability of events trigger by applied sensors.

*Farzad Amirjavid, Abdenour Bouzouane, and Bruno Bouchard*

#### **A Rapid Prototyping Environment for Character Behavior**

This paper describes a system that greatly simplifies the task of authoring new behaviors for virtual characters, including physical interactions between characters and other characters or objects. The system is implemented within Twig and allows users to interactively generate and test procedural controllers for characters, as well as triggering mechanisms and arbitration mechanisms for behaviors. It allows users to quickly add new behaviors, or reparameterize existing behaviors, without access to a motion capture studio or professional animators, making it a natural choice for AI researchers, particularly those operating within a university environment. Moreover, it allows a level of continuous parameterization that would be difficult to achieve with traditional animation techniques based on state machines and blending.

*Ian Douglas Horswill*

## Intelligent Monitoring of the Elderly in Home Environment

Demographic predictions of population aged 65 and over suggest the need for telemedicine applications in the eldercare domain. Current solutions are mainly focused on fall detection. We present a working prototype of a system that in addition to fall detection monitors a variety of users behavior characteristics that help raise awareness of health risks.

The presented system was developed primarily as a part of the EU-FP7 project Confidence, whose main objective is to build a care system for the elderly. An important advantage of the system is that it is based on localization hardware (that enables context-depended reasoning resulting in a lower false-alarm rate). Localization enables a crucial advantage over accelerometer- based input because knowing that a person is in a bed enables avoiding annoying false alarms even when fast accelerations occur. Also, the localization system is especially suitable for people concerned with their privacy since it is less intrusive than video-based systems.

The system creates a profile of the user based on gait, turning, activity and spatial-activity characteristics. It monitors the state of users health, and more importantly, detects changes in behavior characteristics that potentially indicate a forthcoming or current disease, illness or some other disability. The system utilizes domain knowledge from medical literature on quantitative behavior analysis and combines it with an outlier- detection algorithm in order to identify anomalous behavior. The system can also provide information to relatives, caregivers or physician to help improve the life of elderly. Once behavior characteristics are computed, this opens a whole new set of possible applications. For example, the system can suggest to users actions that enhance their mental and physical health.

The preliminary results are encouraging, showing a potential for the early discovery of specific diseases, disabilities and even forthcoming health risks, all based on changes in behavior.

*Bostjan Kaluza, Erik Dovgan, Mitja Lustrek, Matjaz Gams, and Violeta Mirchevska*

## Arguing Antibiotics: A Pragma-Dialectical Approach to Medical Decision-Making

Over the past decade, the ideal model of shared decision-making has been increasingly promoted as the preferred standard of doctor-patient communication. The model stipulates that doctor and patient should be considered coequal discussion partners that negotiate their preferences to arrive at a shared treatment decision (Edwards and Elwyn 2009). Thereby, the model notably gives rise to the usage of argumentation in medical consultation. Physicians are expected to advance argumentation in support of their advice and can no longer rely merely on their medical authority. Whereas automated clinical decision-support systems may aid doctors establishing their preferred treatment methods, selecting the arguments to support these preferences may be more challenging.

In this contribution, it is suggested that argumentation theories may offer the tools to do so. More specifically, the pragma-dialectical theory of argumentation (van Eemeren and Grootendorst 1992; 2004) is proposed as a solid instrument for analyzing and evaluating argumentation in consultation, as it not only provides a set of reasonableness criteria for argumentative conduct but also can account for arguers' need to effectively tailor argumentative messages to their recipients. The instrumental value of pragma-dialectics in the field of automated argument selection will be elucidated by means of a case study concerning antibiotics. In doing so, this contribution is closely connected to the paper by Rubinelli, Wierda, Labrie, and O'Keefe (AAAI Spring Symposium 2011) and provides an exploratory investigation of the advantages of a pragma-dialectical approach to the conceptual design of automated health communication systems and autonomous health promotion.

*Nanon Labrie*

### References

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