

Integrating Technologies for Ambient Intelligence: Convergence of Artificial Intelligence, Machine Learning, Biometrics, Cloud Computing, Internet of Things, and Cyber-physical Systems

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Abstract – Adaptability and advanced services for ambient intelligence require an intelligent technological support for understanding the current needs and the desires of users in the interactions with the environment for their daily use, as well as for understanding the current status of the environment also in complex situations. This infrastructure constitutes an essential base for smart living. Various technologies are nowadays converging to support the creation of efficient and effective infrastructures for ambient intelligence.

Artificial intelligence can provide flexible techniques for designing and implementing monitoring and control systems, which can be configured from behavioral examples or by mimicking approximate reasoning processes to achieve adaptable systems. Machine learning can be effective in extracting knowledge from data and learn the actual and desired behaviors and needs of individuals as well as the environment to support informed decisions in managing the

environment itself and its adaptation to the people's needs.

Biometrics can help in identifying individuals or groups: their profiles can be used for adjusting the behavior of the environment. Machine learning can be exploited for dynamically learning the preferences and needs of individuals and enrich/update the profile associated either to such individual or to the group. Biometrics can also be used to create advanced human-computer interaction frameworks.

Cloud computing environments will be instrumental in allowing for world-wide availability of knowledge about the preferences and needs of individuals as well as services for ambient intelligence to build applications easily.

This talk analyzes the opportunities offered by these technologies to support the realization of adaptable operations and intelligent services for smart living in an ambient intelligent infrastructures.

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