Motivation

Big density — Big data

- Mobile devices
- WSNs
- Smart Objects[1]
- RFID

Personalized Networked Spaces (PNetS)

Environments that enable opportunistic wireless access to nearby resources, services, and applications both mobile and embedded in the environment.

Need for:

- search mechanisms for human users in PNetS
- a cohesive data model for pervasive computing applications

Search of the Here and Now

Search of the here and now must be performed in the here and now.

Tight spatiotemporal integration of user behavior and the immediate environment

Short-lived

Large volumes

Amount available far exceeds amount used

Highly dynamic

Heterogeneous

Intermittent connectivity

These interdependent factors preclude the extension of traditional information retrieval techniques (e.g., indexing) to PNetS and require the development of novel search mechanisms for pervasive computing environments.

A Pervasive Computing Data Model

Key concern:
Association of physical space with virtually accessible data and resources

Application

Data Model

How is data created?
How is data stored?
How does data move?
How does data die?

Digital Data

Physical Data

Applicaton

Rule

General-Purpose Data Model

Facilitate service composition
Reduce developer responsibilities
Data exploits its own contextual dependencies

Digital

Physical

Spatiotemporal Trajectory

Datum (D)

Captures:
- Initial relationship (P, D)
- P’s expected dynamics
- P’s actual dynamics

Evaluation

Simulated PNetS

Performance analysis
Overhead, latency, memory, power

Global view of PNetS
Baseline for quality measurements

Real-World Deployments

myGender™, a mobile interface for the Gander search engine

Mobile Middleware components
Verification
Real-world measurements

References

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