Enriching Mobile User Experience Through The Cloud

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Motivation

- Mobile devices are limited by:
  - CPU Performance
  - Energy
  - Storage
  - Bandwidth

- In contrast, the cloud has abundant:
  - Computing Power
  - Storage Capacity

- Strengths of the cloud can compensate for limitations of mobile devices
- Rich sources of user data can be used to make intelligent optimizations

Key Techniques

- **Aggregation**: Identify related user activities and batch them to improve efficiency
- **Filtering**: Avoid sending unnecessary information to and from mobile devices
- **Speculation**: Perform computations ahead of time, before they are needed by the user

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Key Idea

Improve mobile application experience through cloud-based user profiling.

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Key Abstraction: Region of Interest (ROI)

- User’s focus of interest: semantics, time, space
- Learned via past interactions

Personalized Content Aggregation

- Retrieving content has a cost: latency, energy, network communications
- Mitigate this with precomputation, prefetching
- **ROI**: content filtering based on user interest

Real-time Collaborative Editing

- Collaborative mobile apps: Whiteboard, Text Editor, Slideshow, Design Editor
- Communication-intensive, users may receive unnecessary updates from others
- **ROI**: smart batching, forwarding of updates

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Results

Content Aggregation

Twitter News Streams

- Combined Benefit of Optimization
- Optimization Comparison
- Significance reduction in latency

Collaborative Editing

Wikipedia Article Edits

- Consistency Energy Tradeoff
- Overall Benefit Across Users
- Overall reduction in data transfer