Using Custom Transportation Data Collection Software with Handheld Computers for Education, Research, and Practice

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Outline

- Goals
- Requirements
- Data Collection Scenarios
- Solutions
- Applications
- Conclusions
- Next Steps
Goals

- Facilitate data collection for research
- Incorporate the data collection process into the classroom and laboratory
- Give students first-hand experience collecting data
- Teach lessons about data quality, data accuracy, and time and expense
Requirements

- Make use of commodity hardware
- Emphasize portability
- Low equipment cost
- Encourage exploratory learning
Data Collection Scenarios

- Recording location in one, two, or three dimensions over time
- Association of features with geographic locations
- Recording the occurrence of individual events at a specific point over time
Solutions

- Considered laptops
- PalmOS handheld computers as platform
  - Equipped with GPS receiver
- Open source software
- Two separate software packages
  - ITS-GPS
  - ITS-Count
- Cost per unit of $100-$300
ITS-GPS: Location and Time Based Data

- Handles recording location over time and associating features with geographic coordinates
- Uses a GPS receiver as its main data source
  - Point and continuous features
ITS-Count: Count and Classification Data

- Deals with counting different classes of events at a single point over time
Data Retrieval

Windows application used to retrieve data from handheld computers as CSV, DBF, or GIS Shapefile

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Application 1:
Cumulative Passenger Vehicle Counts for Undergraduate Assignment

- Students recorded vehicle count data at signalized intersection approach
Educational Results

- **Final exam question**
  - How would you measure saturation flow?
- **Overall, student performance on the question was very poor**
- **4 students using ITS-Count scored approximately 38% higher, with an average of 63%**
Application 2: Sidewalk Data Collection

- Continuous feature logging used to record the presence of sidewalks
- Analysis with roads, tax lots, and transit stops
Application 3: Travel Time Research at the ITS Lab

- Probe vehicles deployed to validate the license-plate matching Frontier Travel Time system
- Bus dispatch system (BDS) data from Portland transit agency (TriMet) compared with ITS-GPS data from probe vehicles to predict arterial travel times
Application 3:
Probe Vehicle Trajectories for Arterial Travel Time Study
Application 4:
Travel Time Study by Practicing Professional

- DKS Associates traffic study in Sherwood, OR
- Also light rail speed profiles in Tacoma, WA
Additional Application
Conclusions

- Project resulted in creation of two software packages for PalmOS handheld computers
- Education, research, and professional data collection facilitated
- Small size, low cost, ease of use
- Transportation concepts reinforced by student use
Next Steps

- ITS-Count upgrade allows recording up to five categories simultaneously
- ITS-GPS code streamlined for responsiveness
- Java-based retrieval program in development for cross-platform use
- Custom version of ITS-GPS created for bicycle transportation surveys
Acknowledgements

- Dustin Luther of DKS Associates
- Peter Koonce of Kittelson & Associates
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- Department of Civil and Environmental Engineering at Portland State University
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Feedback

- Please let us know about any additional features or updates that you would find useful.
- The software is available from our website and source code is available upon request.

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