

RIPS 2006: Areté Project Description

Project title: Video images mapping and compression for efficient data downlink.

Project description

In processing airborne optical imaging data, a major bottle neck is the bandwidth for transferring the imagery to the ground. It is desirable to compress the data prior to sending it to the ground. If the data is registered and ground mapped prior to ground transfer, significant compression should be possible. The aim of the 2006 RIPS project is to quantify the compression gain generated by registering and mapping imagery onboard, prior to sending the data to the ground and at the same time determines the required processing power. Areté will provide sample field data of the testing of the mapping and compression algorithms developed by the project.

Objective

Investigate and develop efficient mapping algorithms to register unstabilized or partially stabilized video images and compression schemes to increase the data downlink capacity on fixed bandwidth

Approach

1. Investigate schemes for compressing video sequences of data and apply selected schemes to unprocessed data.
2. Stabilize the imagery in the image plane and quantify how much additional compression can be achieved.
3. Register and ground map the data and quantify if significant further compression can be achieved (existing Arete ground mapping code can be used).
4. Estimate the computing power required to perform the compression in real time.

Outputs

- Developed or adopted algorithm description, performance documentation and demonstration
- Demonstration of the algorithm application on provided data
- Software implementation of the algorithms
- Algorithms description and documentation
- Final Report

Program Conduction Plan

Kick-off meeting: Areté staff to give an overview of the problem statement and expected program outputs. More meetings will be scheduled to go over research details (transferring Areté's understanding of the problem to the students and bring them up to speed)

Weekly meetings: One or more Areté staff will meet with the student team to answer questions, provide research guidance and review progress status. Students are expected to give verbal presentation of work progress, discuss issues at these meetings.

Midterm written report: Student team will write a brief report of their research work and status. This report will serve as the draft and outline of the project final report.

Final report and presentation: The students will write a final report with supporting or appending documents (if necessary) such as algorithm/software description. Areté staff will assist in the report development (not writing) and proofreading. Students will also make a verbal presentation of the final result. Areté staff will provide assist and guidance for the presentation.

Areté staff support: Designated Areté staff will be available most of the time for consultation via email, telephone or pre-arranged visits.

UCLA faculty support: The students are expected to do the research with some support of designated UCLA faculties. The students are expected to engage with these faculties when their expertises are called for.

Program Deliverables

1. Mid-term briefing about the selected algorithms and approach (with rough outline of final report and rough draft of the algorithm descriptions.)
2. Final report with full description of the analyses, algorithms, results and demonstration.
3. Demonstration of algorithms using Areté provided data:
 - Quantitative results description
 - Algorithm demonstrations