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Dieter Fritsch's Wrap-Up (Summary)

The Photogrammetric Week Series
54th Photogrammetric Week, Sept. 9-13, 2013

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Conference Speech (U. Franke): "How Cars Learned to See"

- Today: Stereo Vision + Motion = 6D Vision
  - "Photogrammetric Driver Assistance" Stereo Vision with SGM embedded in S-Class, E-Class, "Stixel" act as super pixel
- Tomorrow: Autonomous Collision Avoidance by Steering (ACAbS)
  - (disparities 2-4pix only, vision in cars gets more stable – autonomous drive traditional Bertha Benz Route Mannheim-Pforzheim, Sept 09, 2013 successful
- The Day after Tomorrow: Autonomous driving on highways & urban environments
  - Towards semantic segmentation
  - More sensors (stereo, LiDAR, RADAR)

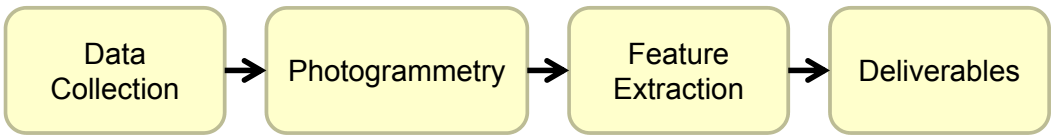
Excellent example of real-time stereo vision using dense image matching!

News from Open PhoWo Partners

- Hexagon (J. Ickes): Example USDA NAIP Program
  - 2.72 Mio km² (7.5 x Germany) was flown & processind in 4-5 months
  - new sensors: Leica ADS100 / RCD30 Oblique / Z/I DMC Iie / ALS70
  - Hexagon acquired GeoSoft (Mobile Mapping) with Pegasus SW 06/2013
  - GeoCue viewer / Oblique viewer
  - UAV for Infrastructure inspection Aibotix

➔ "Next 2 years will be more dynamic than the past"

- Trimble Geospatial (R. Humberg)
  - Connect Smartphones, total stations, UAVs & Mobile Mapping
  - Trimble UX5 Aerial Imaging Rover
  - Convert imagery to information



News from Open PhoWo Partners

- IGI mbh (A. Grimm): Historic Review
  - CCNS-5 connectivity to all sensors
  - GyroCopters/Cavalon new platforms for Photogrammetry-on-Demand
  - Mobile Mapping on streets and rails by one car (Nissan)
  - IGI Penta DigiCAM

- Vexcel Imaging / Microsoft (A. Wiechert): 10 years of UltraCam (2013)
  - Jan. 2013 UltraCam Osprey ➔ oblique camera system
  - flagship UltraCam Eagle (c=210/100/80mm)
  - Oct. 2013 UltraCam Hawk will replace UltraCam Lp
  - UltraMap V3 with embedded DIM

- BAE Systems (S. Walker): Geospatial eXploitation Products (GXP)
  - Socet GXP with more functionalities for SOCETSET users
  - GXP Xplorer: crawler to find image data etc.
  - GXP WebViewer: view images instantly
  - GXP Mobile Apps

News from Open PhoWo Partners

- VisionMap (A. Gozes)
  - VM A3 Edge, new camera model of VisionMap
  - VM A3 LightSpeed is VM's fully automated processing system
  - VM A3 Flight Viewer, runs on laptop
  - 3D Modelling with A3D software
- Institute for Photogrammetry, UniS (K. Wenzel): SURE
  - SURE – Surface Reconstruction Using Imagery, Dense Image Matching package
  - For airborne and close-range imagery
  - Free-of-charge for academia

Tuesday, Sept.10th 2013

1st Topic "Data Collection from Air, Space and Ground – An Update"

- 2 Case Studies on oblique image data processing
  - MV Stereo obtained from 75-80% forward overlaps
  - Good results for 60% cross overlaps
  - ISO may play crucial role for penta-view imagery
  - in-situ camera calibration by Legendre or Fourier additional parameters
- Four new oblique camera systems RCD30 / MS-VI Osprey / Penta DigiCAM
  - Penta view as quasi-standard
  - Well-suited for generation and update of 3D city models
  - A3 Edge – a very efficient photogrammetric data collection system

Tuesday, Sept.10th 2013

- Proposal: Contour flying for airborne data acquisition
  - maintain GSD also in modulated terrain
  - CF more suitable than multiple levels
  - Input: Rough/coarse DTM, add. parameters (min. flying height/climb/descent rates)
  - ➔ you cannot follow every terrain
- Remotely Piloted Aircraft Systems (RPAS) replaces UAV/AUS
  - Classification: < 5kg ➔ < 25kg ➔ < 150kg ➔ > 150kg
  - Civil RPAS needs regulations
  - RPAS Roadmap in EU – 1st milestone 2016, 2nd milestone 2022
  - 3 Case Studies: 2 fixed wing presentations, 1 Hexacopter
    - meet demands of NMCAs wrt cm accuracy
    - problems with flight permissions, at least in Germany

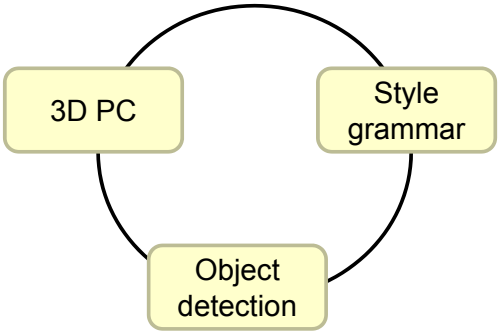
Wednesday, Sept.11th 2013

- TanDEM X Mission – Deliverables
  - DSM 12m/30m/90m grid, problems with water surfaces σ_{ab}~10m, σ_{rel}~2m
  - Astrium will sell DSM/DTM: WorldDEM™ DSM/DSM hydro/DTM (real surface)
- Unconventional LiDAR:
  - LiDAR is operational countrywide in Finland (tree inventory, biomass estimation etc.)
  - Backpack Mobile LiDAR
  - RPAS & LiDAR
  - Hyperspectral LiDAR (brings color to the point clouds)
  - VR 3D Models and game engines

Wednesday, Sept.11th 2013

2nd Topic "Advanced Methods of Computer Vision and Photogrammetry"

- Keynote L. van Gool „Image-based 3D City Modeling and Mobile Mapping"
  - Camera-only mobile mapping
  - Recognition of urban object classes, automatic recognition of traffic signs
  - Inverse mobile mapping, inverse procedural modeling with style grammars



Quote: "We need to learn automatically style rules or start from more generic ones"

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Wednesday, Sept.11th 2013

- Most methods of CV & photogrammetry like SfM, DIM is integrated in workflows/products for archeology, monument reconstruction
  - Photos are directly transferred to PC (WiFi SD Cards)
- New LiDAR technologies
  - Dual channel design (oscillating mirror, rotating polygon wheel/mirror)
  - Very accurate, detailed analysis of sampling patterns, high res (up to 100 pts/sqm)
  - High performance airborne LiDAR is in progress

Thursday, Sept 12th, 2013

- Interesting developments in high res satellite maging
  - WorldView-1, WV-2, GeoEye1, Pleiades: GSD 0.5m
  - Tri-stereo +-12.5°/0°geometry allows for DIM
  - Products: Orthophotos, DSM/DTM, frame 15*15sqkm
- EuroSDR Project: Benchmark on Dense Image Matching & DIM on GPUs
  - Comparison of 5 commercial/5 sw packages from academia/NMCAs
  - 2 datasets: Vaihingen/Enz GSD 20cm, Munich GSD 10cm
  - EuroSDR BoD will decide to continue this test with other preferences (10/2013)
  - Visit www.eurosdr.net
  - GPU implementation is very fast and allows for multi voxel presentations in object space

Friday, Sept.13th 2013

3nd Topic “Solving the Future Mapping Problems – all About 3D Modelling”

- Keynote D. Thalmann “Towards Virtual Life in 3D Cities Modeling“
  - Today: 100.000 humans in real-time moving in a virtual city
  - Hybrid architectures: Level of Interest (LoI), Nav graphs to allow for 35.000
  - Virtual crowds make 3D city models livelily, simulate effects: lane, panic,..
  - Combination of cars and humans is possible, and will be (interdisciplinary) work in future
- Civil Engineering needs precise DTMs (in rural terrain)
  - Requirements: 5m grid with 10cm vert accuracy
  - OpenStreeT Map is nice, but cannot fullfill these needs
  - 1cm vertical accuracy for the final road construction
  - Coming next: energy-based in-vehice navigation - CE is ready for integration 3D city models, virtual crowd etc

Friday, Sept 13th, 2013

- Cultural Heritage needs 3D reconstructions/preservations
  - Technologies: TLS, photogrammetry (macro), structured light, photos (micro)
  - New: combination of MVS (n:1) & photometric stereo (1:n)
  - Informative depth of 3D architectural representations for macro
  - Geometry and semantics, reasoning from semantics to geometry & vice versa
  - Spatio-temporal modelling, nubes platform on the web, cloud computing
  - E-Documentation of cultural heritage is most important

„If it is not in the computer it does not exist

- S. Lawler: “3D Mapping and Photogrammetry“
  - Pivoting on real world dimensions,like people, places, calendar and things
  - Wearible computing devices & sensors, smartphones, tablets
  - Physical and digital worlds converge - The “internet of things“
  - It‘s time for the map to change

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