



SceneNet: 3D Reconstruction of Videos Taken by the Crowd on GPU

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IMVC 2015



SagivTech Snapshot

- Established in 2009 and headquartered in Israel
- Core domain expertise: GPU Computing and Computer Vision
- What we do:
 - Technology
 - Solutions
 - Projects
 - EU Research
 - Training
- GPU expertise:
 - Hard core optimizations
 - Efficient streaming for single or multiple GPU systems
 - Mobile GPUs



Mobile Crowdsourcing Video Scene Reconstruction



- If you've been to a concert recently, you've probably seen how many people take videos of the event with mobile phone cameras



- Each user has only one video – taken from one angle and location and of only moderate quality



The Idea behind SceneNet

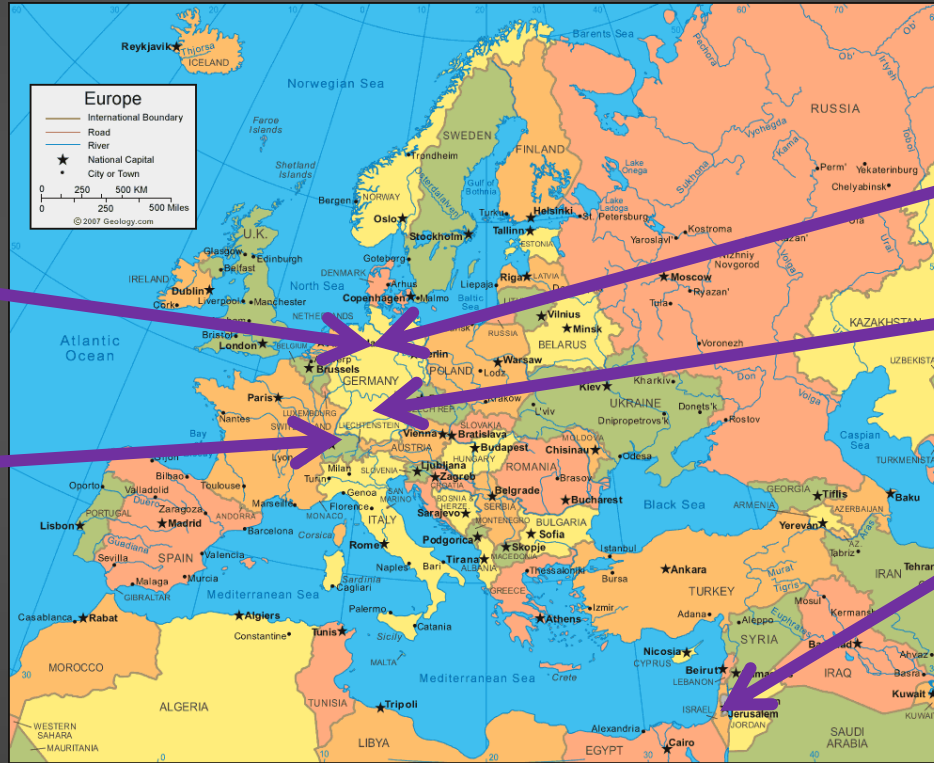
Leverage the **power of** multiple mobile phone cameras
to create a **high-quality 3D** video experience that is
sharable via social networks



SceneNet as a FET SME collaborative project

Uni Bremen

EPFL



SCiLS

ERS

SagivTech



Creation of the 3D Video Sequence



The scene is photographed by several people using their cell phone camera

The video data is transmitted via the cellular network to a High Performance Computing server.

Following time synchronization, resolution normalization and spatial registration, the several videos are merged into a 3-D video cube.

The Event Community



A 3-D video event is created.

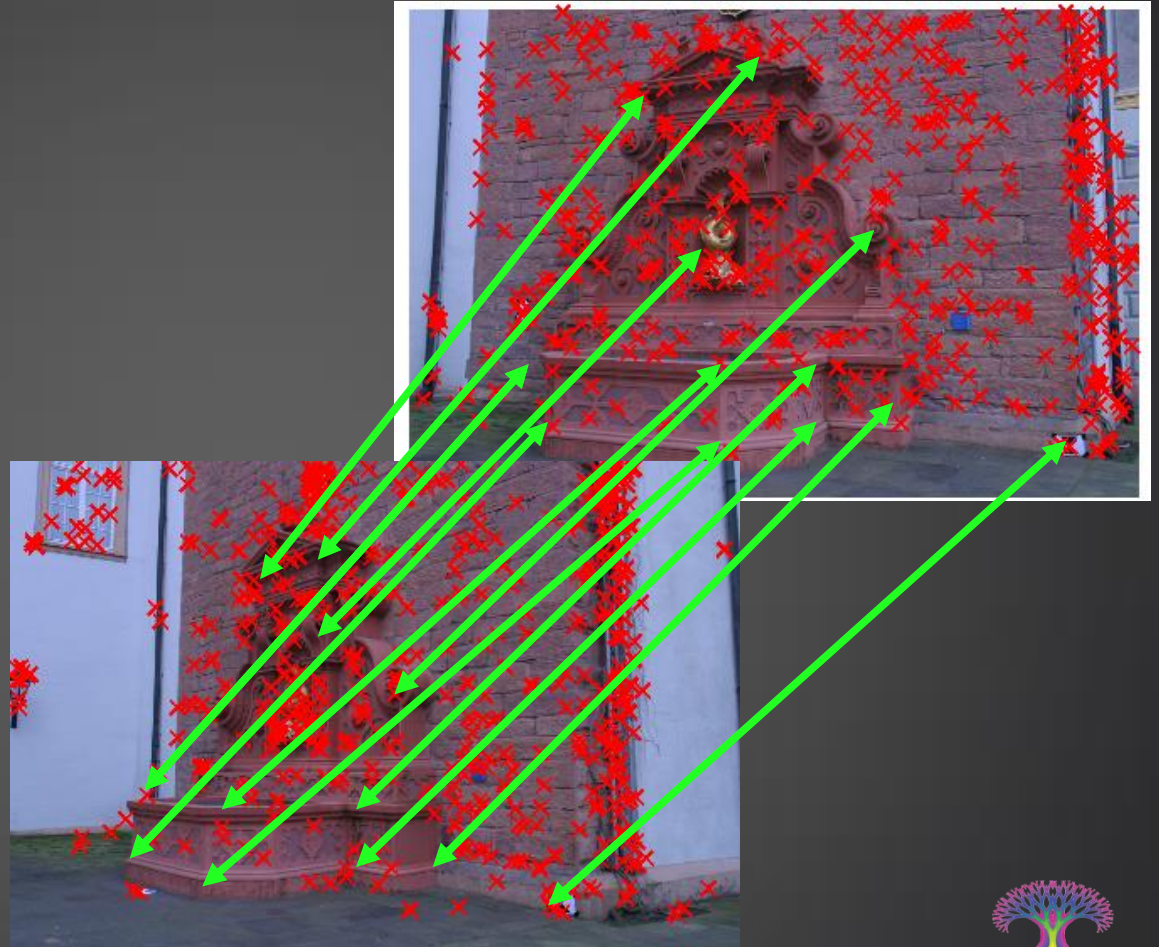
The 3-D video event will be available on the internet as public or private event.

The event will create a community, where each member may provide another piece of the puzzle and view the entire information.

Feature detection +
Matching

Fundamental matrix
estimation

Global registration



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3D model reconstruction

- Robust : works even with a minimal set of inputs
 - two viewpoints already sufficient for dense reconstruction
 - very few erroneous points



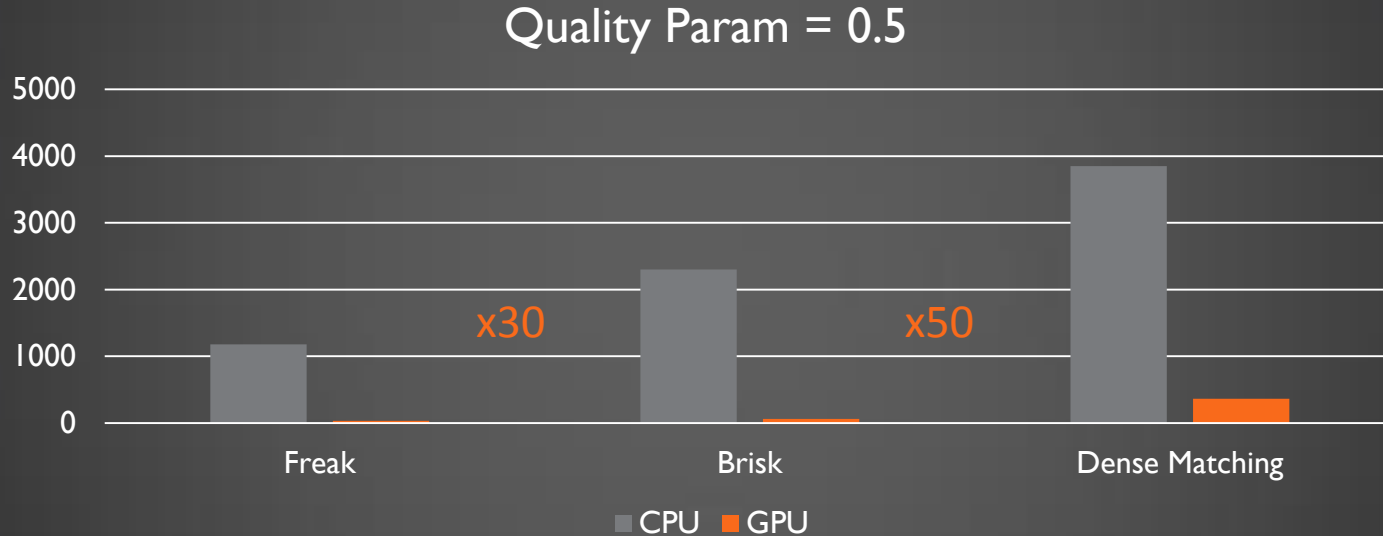
3D reconstruction



Some challenges

- Time synchronization
- Limited bandwidth
- Immense processing power required
- Bad and unstable image quality

3D model reconstruction



SCENE
NET

The Combined Model: Mobile & Cloud Computing



What about on device processing?

- For real-time processing
 - Quality
 - Features
 - Etc
- TKI for the rescue

Image Size	CPU Gold	1 CPU Thread	4 CPU Threads	GPU	Speedup
1024 x 1024	142	18	10.2	4	X2.6
2048 x 2048	740	100	50	9	X5.5

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Thank You

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