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What is Rephotography?

Take a picture of the same scene (same perspective) at two different points in time



Applications: scientific (change over time analysis, historical record), artistic (image blending, time lapse photography)

Previous Work

Inaccurate manual rephotography

A non-mobile system

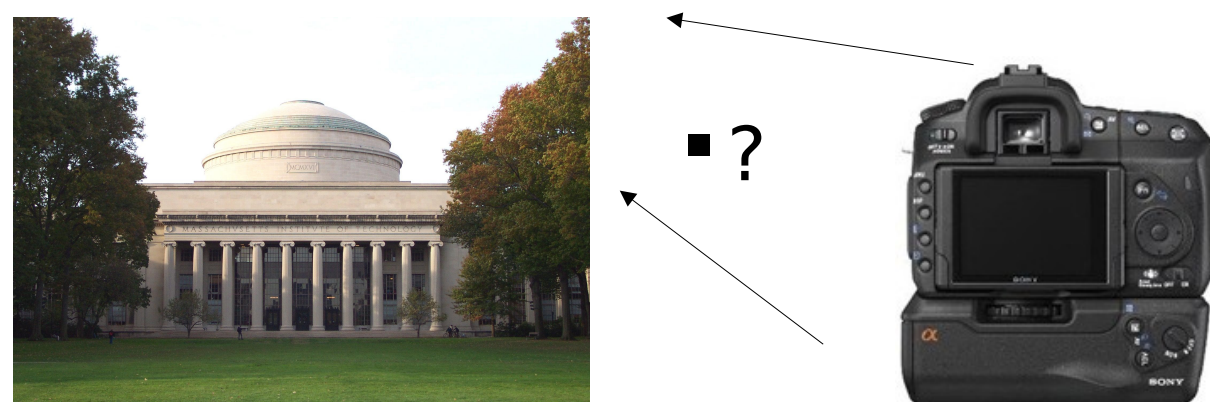


Algorithms

- Visual SLAM
- Bundle adjustment

Challenges

- Seven degrees of freedom: rotation, translation, camera zoom
- Camera pose estimation – where is the camera in space?



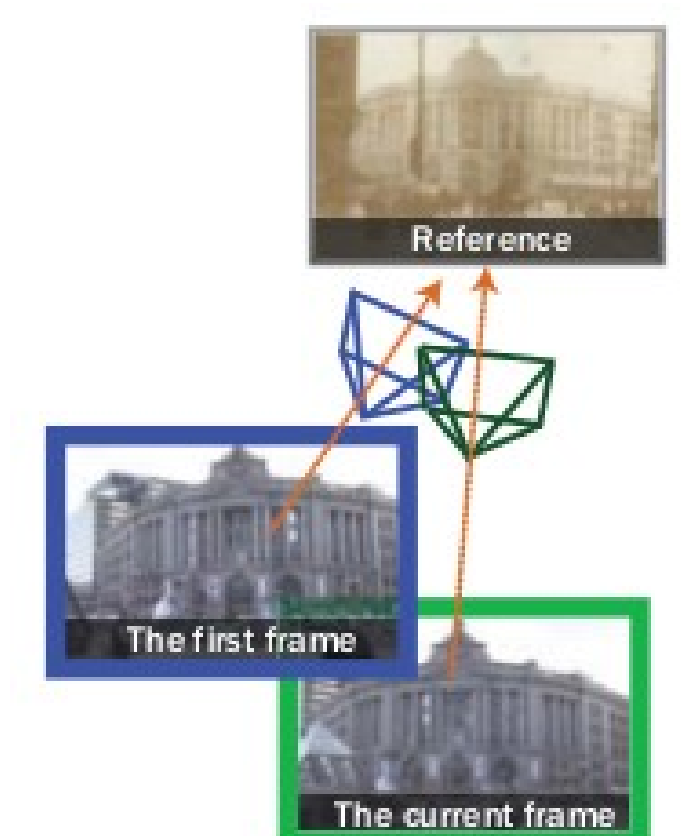
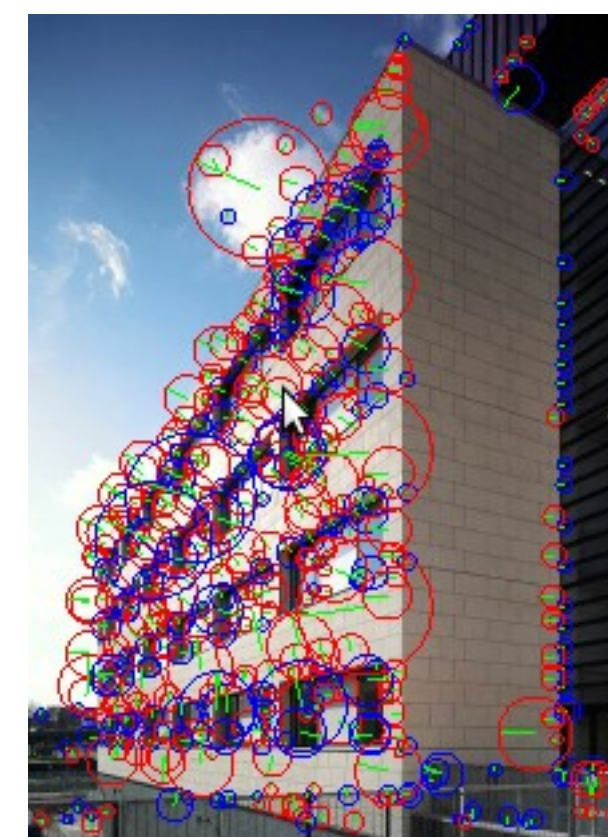
- Correct UI/code design for user feedback/input
- Scene changes for feature extraction from external factors (weather, lighting, erosion)



Visual SLAM, Bundle Adjustment

- Reference points in image using feature detectors

- Create a map of points related to the camera position and the scene



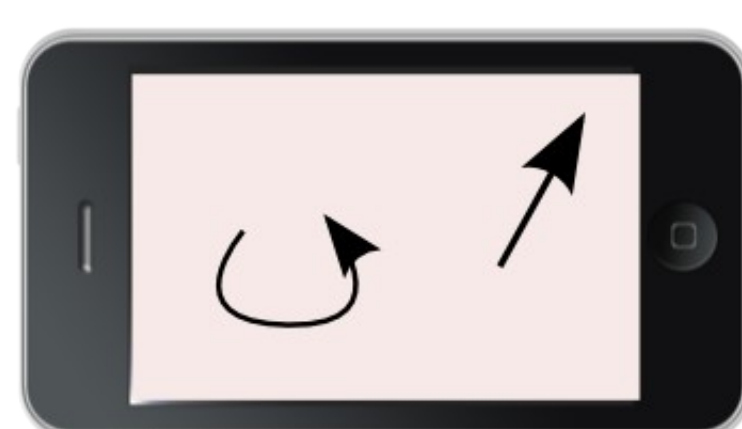
- Use bundle adjustment for re-establishing the map of points to determine the transformation from the current map to the old map

Why Mobile? Why iOS?

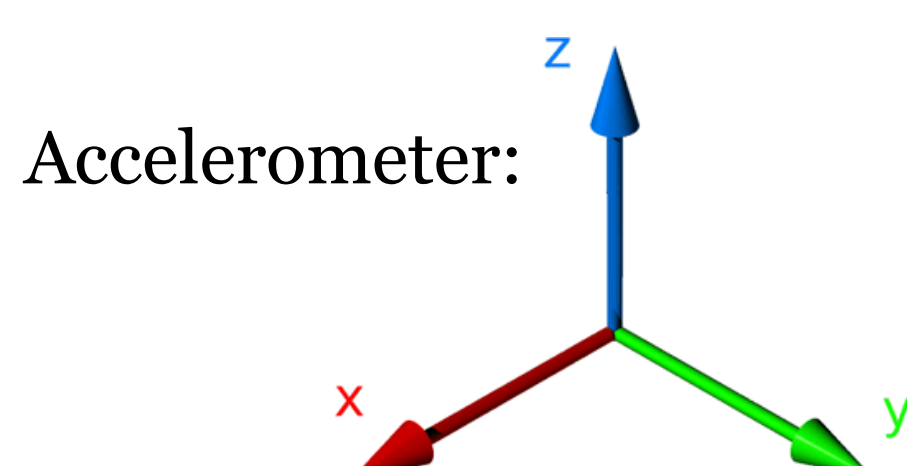
- Ubiquity
- Easy distribution



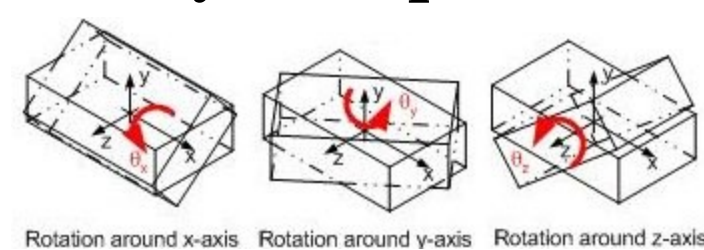
- User experience
- Interactivity and feedback to decrease error
- Ability to automatically take photo when correctly aligned



- Camera location information:

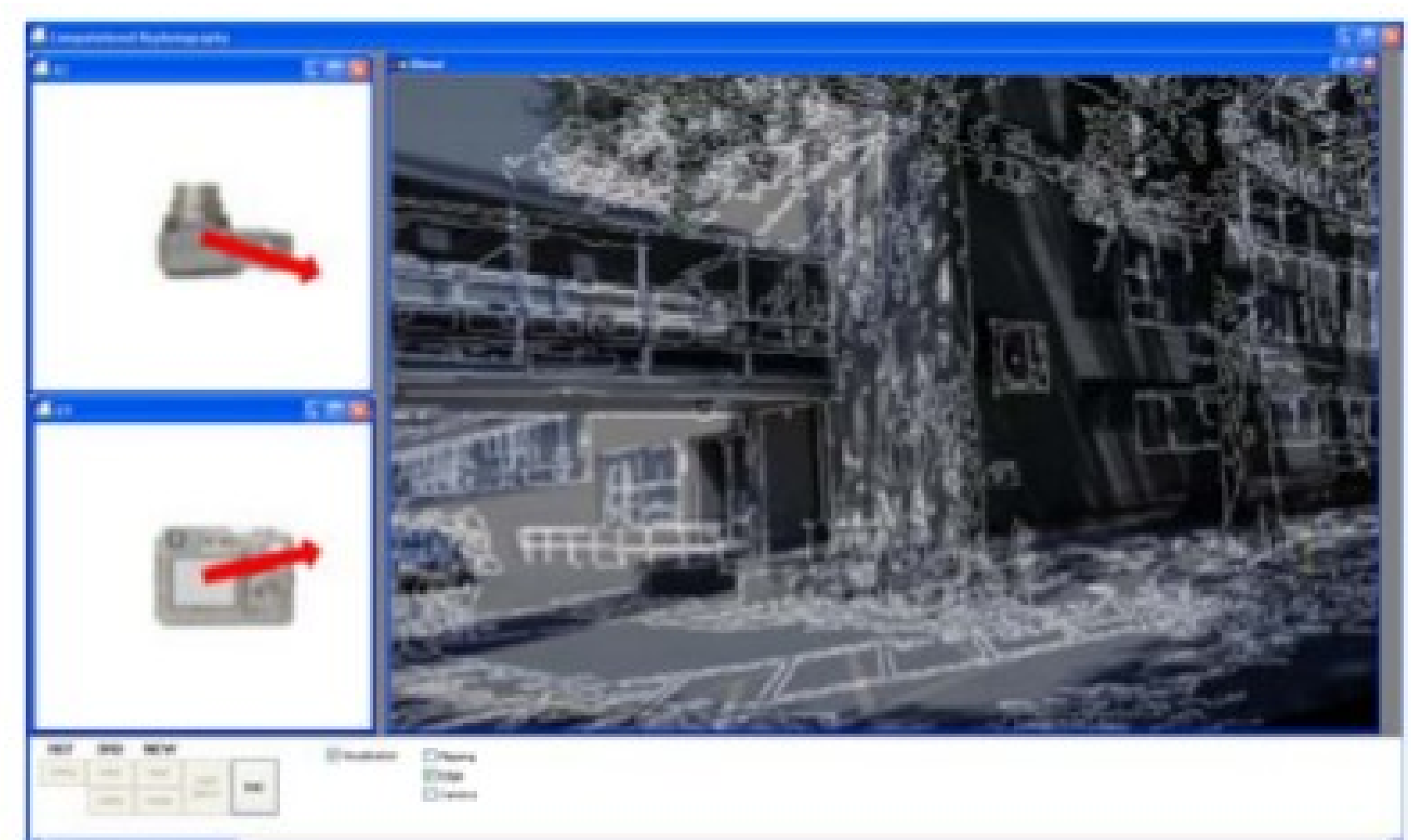


Gyroscope:



Anticipated Results

- iOS (iPhone/iPad) app in Apple Store
- Accurate and automatic rephotography – better than manual



- Intuitive user interface
- Cool rephotographed results!