CS6670: Computer Vision

Noah Snavely

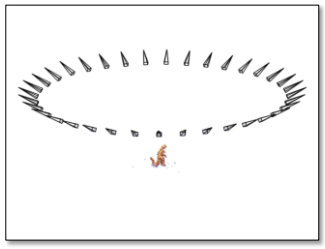
Lecture 23: Structure from motion 2

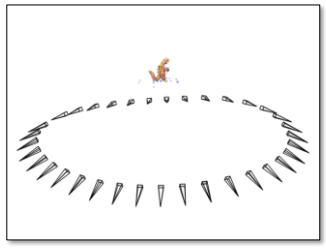
Readings

- Szeliski, Chapter 7.1 – 7.4

SfM – Failure cases

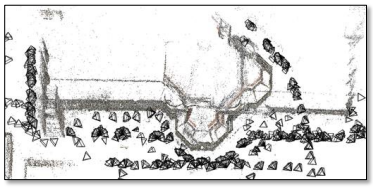
- Necker reversal



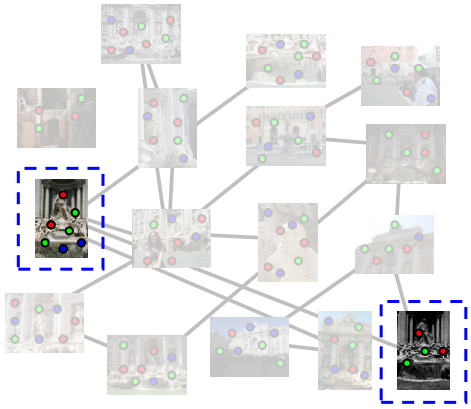


Structure from Motion – Failure cases

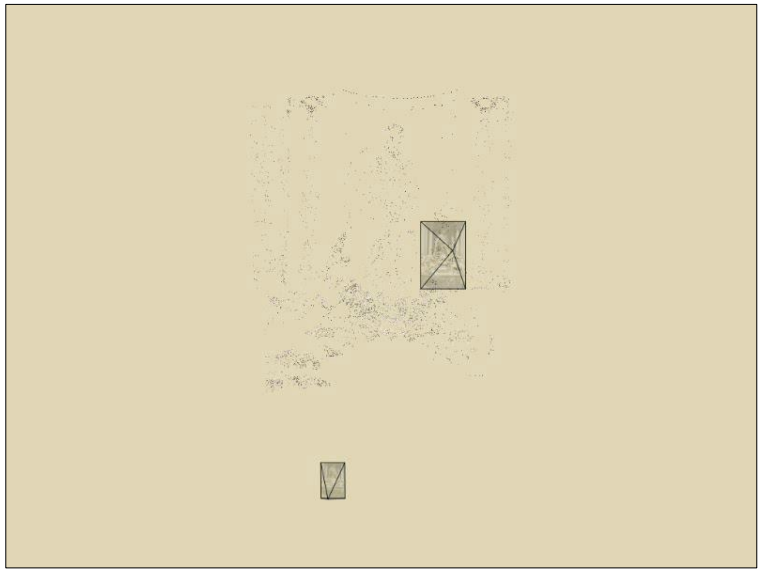
- Repetitive structures



Incremental structure from motion



Incremental structure from motion

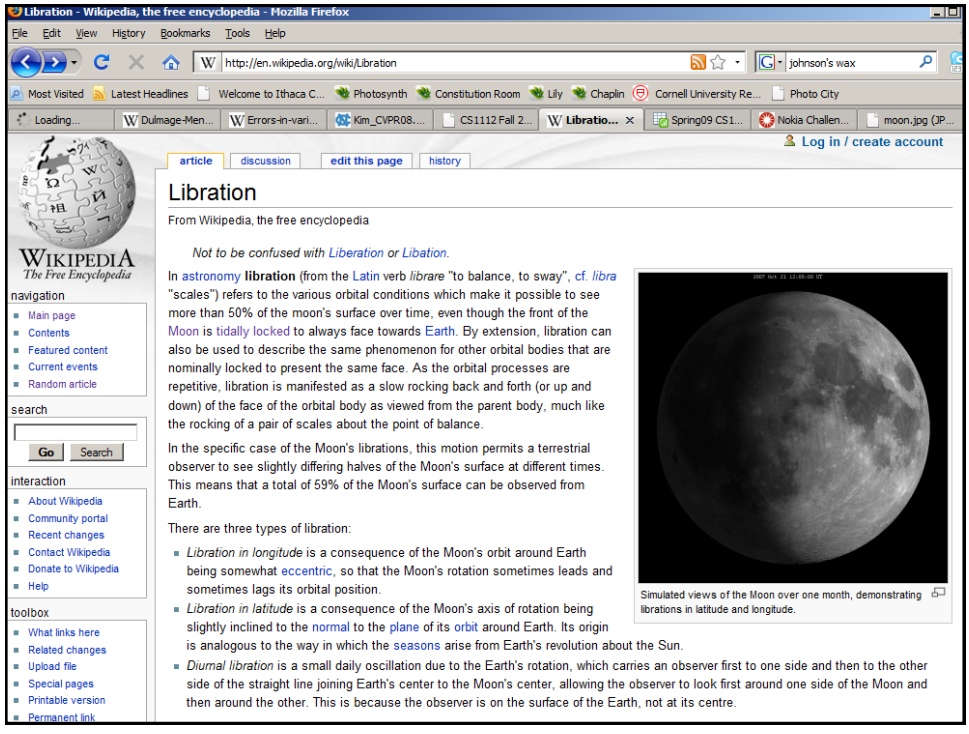


Incremental structure from motion

Incremental structure from motion

Photo Explorer

Demo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Not to be confused with Liberation or Libation.
In astronomy libration (from the Latin verb librare "to balance, to sway", cf. libra "scales") refers to the various orbital conditions which make it possible to see more than 50% of the moon's surface over time, even though the front of the Moon is tidally locked to always face towards Earth. By extension, libration can also be used to describe the same phenomenon for other orbital bodies that are nominally locked to present the same face. As the orbital processes are repetitive, libration is manifested as a slow rocking back and forth (or up and down) of the face of the orbital body as viewed from the parent body, much like the rocking of a pair of scales about the point of balance.
In the specific case of the Moon's librations, this motion permits a terrestrial observer to see slightly differing halves of the Moon's surface at different times. This means that a total of 59% of the Moon's surface can be observed from Earth.
There are three types of libration:
Libration in longitude is a consequence of the Moon's orbit around Earth being somewhat eccentric, so that the Moon's rotation sometimes leads and sometimes lags its orbital position.
Libration in latitude is a consequence of the Moon's axis of rotation being slightly inclined to the normal to the plane of its orbit around Earth. Its origin is analogous to the way in which the seasons arise from Earth's revolution about the Sun.
Diurnal libration is a small daily oscillation due to the Earth's rotation, which carries an observer first to one side and then to the other side of the straight line joining Earth's center to the Moon's center, allowing the observer to look first around one side of the Moon and then around the other. This is because the observer is on the surface of the Earth, not at its centre.
Simulated views of the Moon over one month, demonstrating librations in latitude and longitude.

Questions?

SfM applications

- 3D modeling
- Surveying
- Robot navigation and mapmaking
- Visual effects…
  - (see video)