Surfel Based Geometry Reconstruction
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Problem:
In data acquired by scanning (Fig 1), sampled points are almost never on the discontinuities, which aggravates reconstruction of sharp features.

Solution:
- Represent the scanned surface as the collection of small planar patches, surfels, associated with each data point.
- Define a MRF-based prior on the set of surfels, optimize, and retrieve the surface.

Surfel representation:
- Corresponds well to the data creation process.
- Sidesteps the problem of dealing with triangulation, which is often arbitrary.

Method:
- Associate a planar patch (a surfel) to each vertex or a point (Fig.2).
- Formulate an interaction for a pair of neighboring surfels based on:
  - parallelism (depends on surfel orientations),
  - overlap (depends on a local distance between surfels).
- Maximize parallelism and overlap in a piecewise-smooth fashion.
- Retrieve the surface as a dual mesh, by estimating the intersections of surfels.

Results:
Using the surfel representation we can recover the sharp features from the noisy scans with great accuracy (Fig 3).