Uncertainty Objectives

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This session

- Articulate objectives for uncertainty work
- Identify data sets to be used

Motivation

- We estimate uncertainty in order to communicate expected precision to users.
- We validate uncertainty estimates in order to determine reliability of models that produce uncertainty estimates.

Goals, objectives

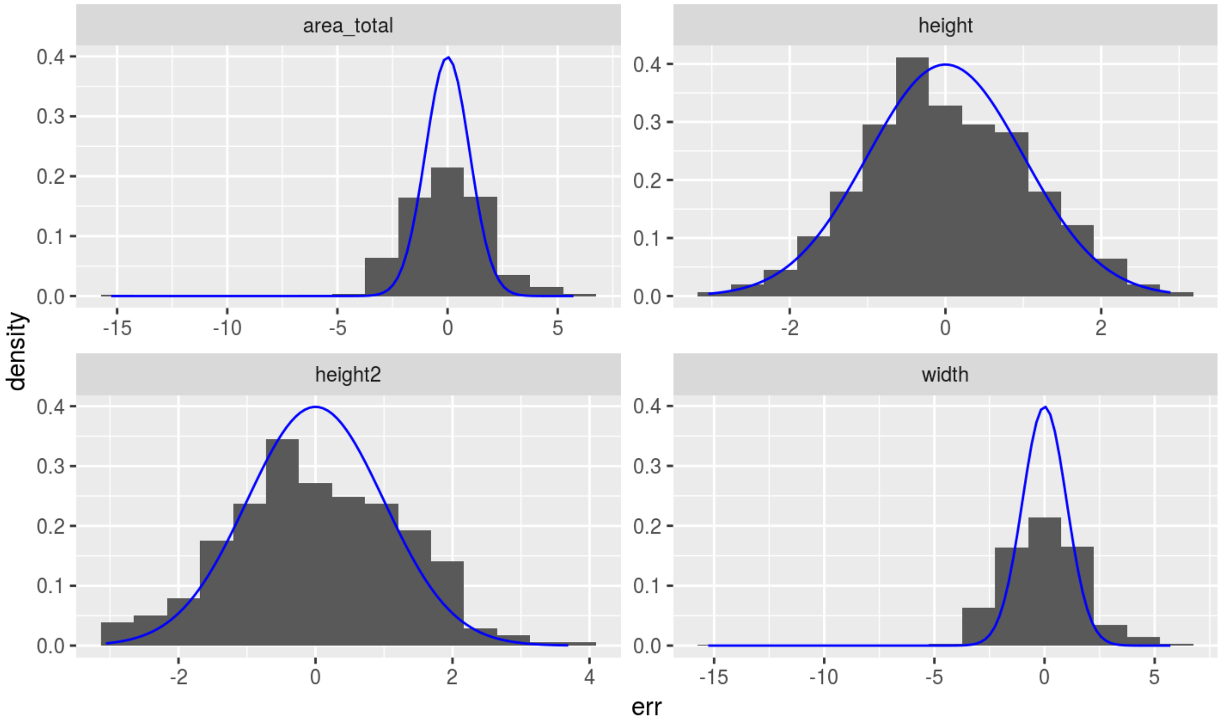
- Model uncertainty to the extent it can be determined between features and times
  - One apprach: just use error budget as uncertainty estimate
    - We can do better!
- Validate uncertainty estimates against (synthetic) truth data in a representative sampling of conditions
  - Agreement should hold across different flow condtions, river morphologies, orientation and position in swath, etc.
  - If uncertainty estimates fail to capture error behavior, update error model accordingly, or flag
- Decompose errors into random (errors diminish predictably with aggregation) and systematic (diminish slowly or not at all)

4/16

Current status

- Brent's models of random error for height, width, area are implemented in RiverObs
- Layover error model (Curtis) not yet implemented in RiverObs.
- Validated against nodes for a single case (Sacramento), single pass, 2 flow conditions

Current status



Datasets required

- Representative sampling of:
    - nodes
    - reaches
    - layover conditions
    - Reach geometry (meanders, etc.)
- All this can be done with SLC simulator!

Open questions

- How to treat layover uncertainty in RiverObs?
- How to treat systematic errors in RiverObs?
  - Contstant from error budget?
- How to determine “truth” for purposes of uncertainty validation?
- Is it OK to overstate the uncertainty?

Truth data matters

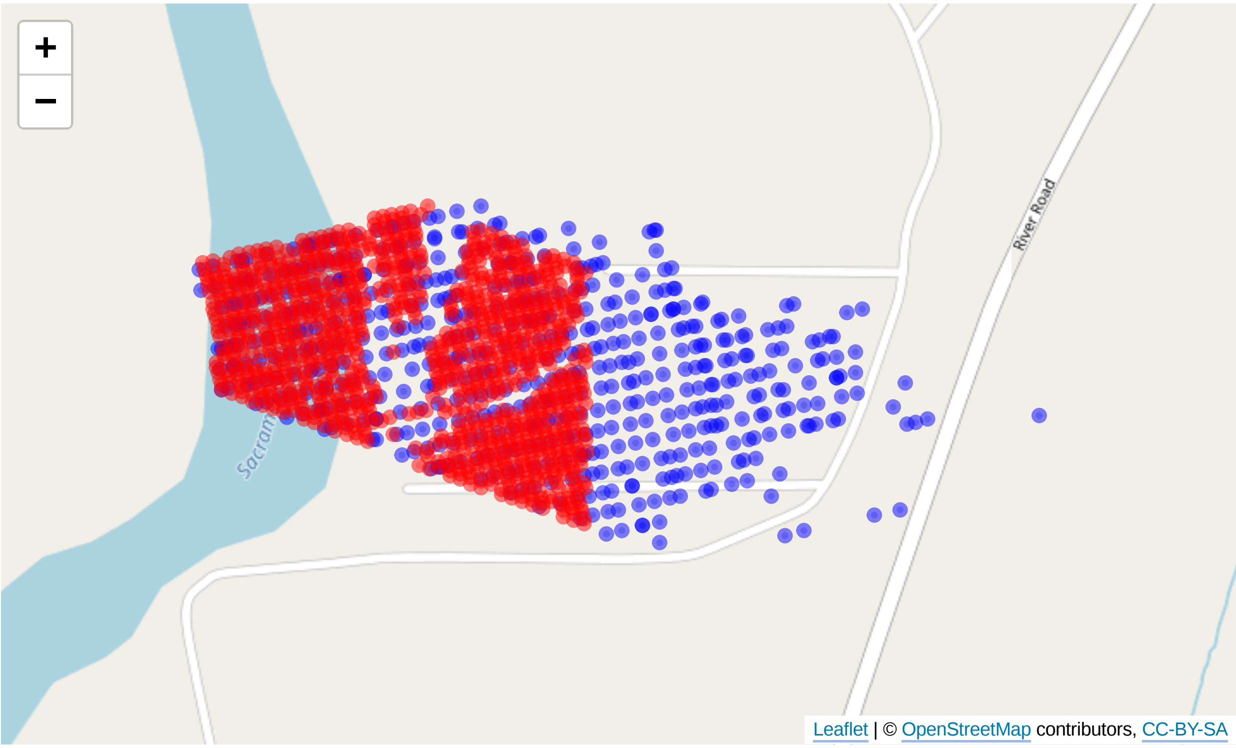
From an algorithm performance standpoint, truth is what we expect the algorithm to detect.

- “practical” truth, not “ideal” truth
- Not trivial to produce this!

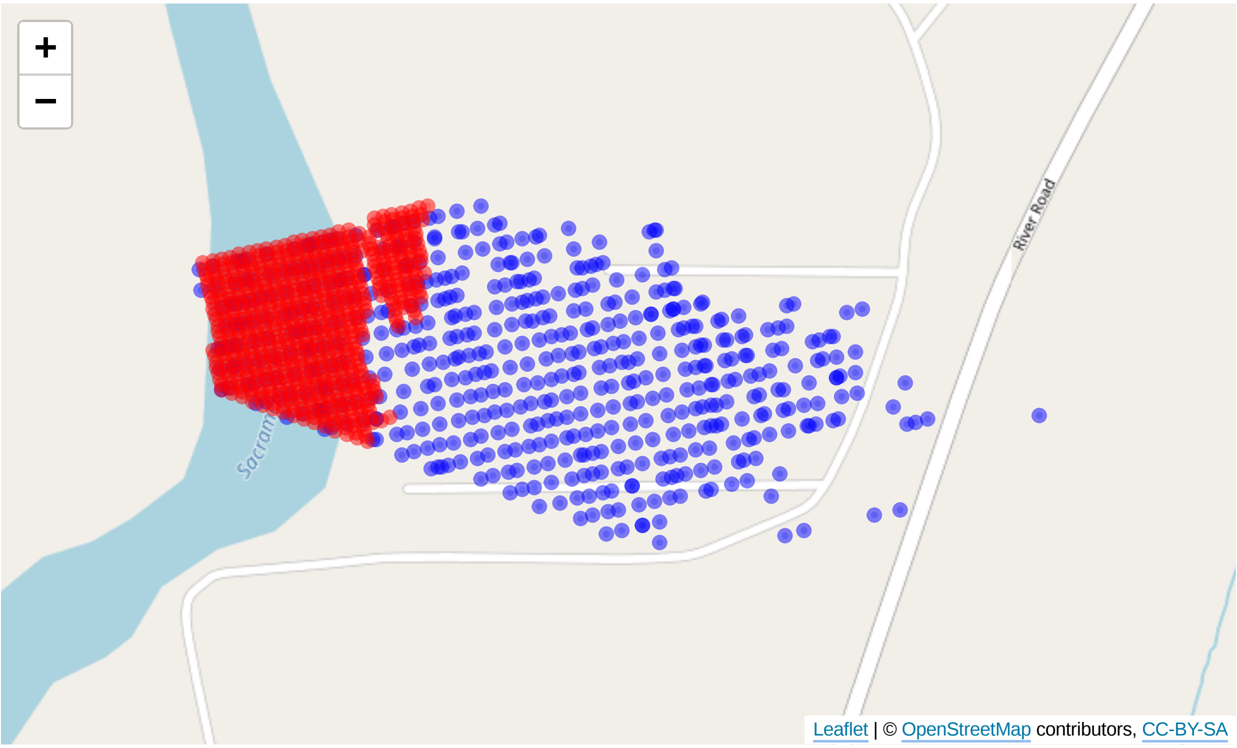
Truth data example

10/16

Truth data example

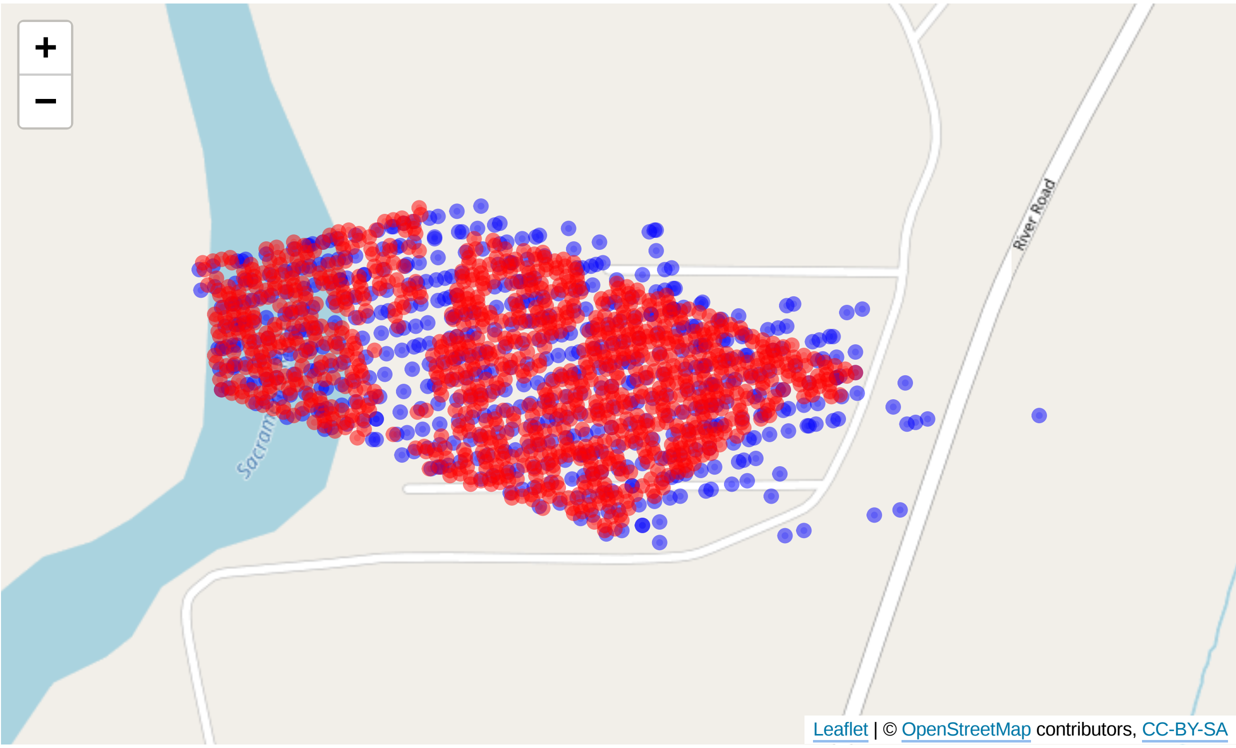


Truth data example



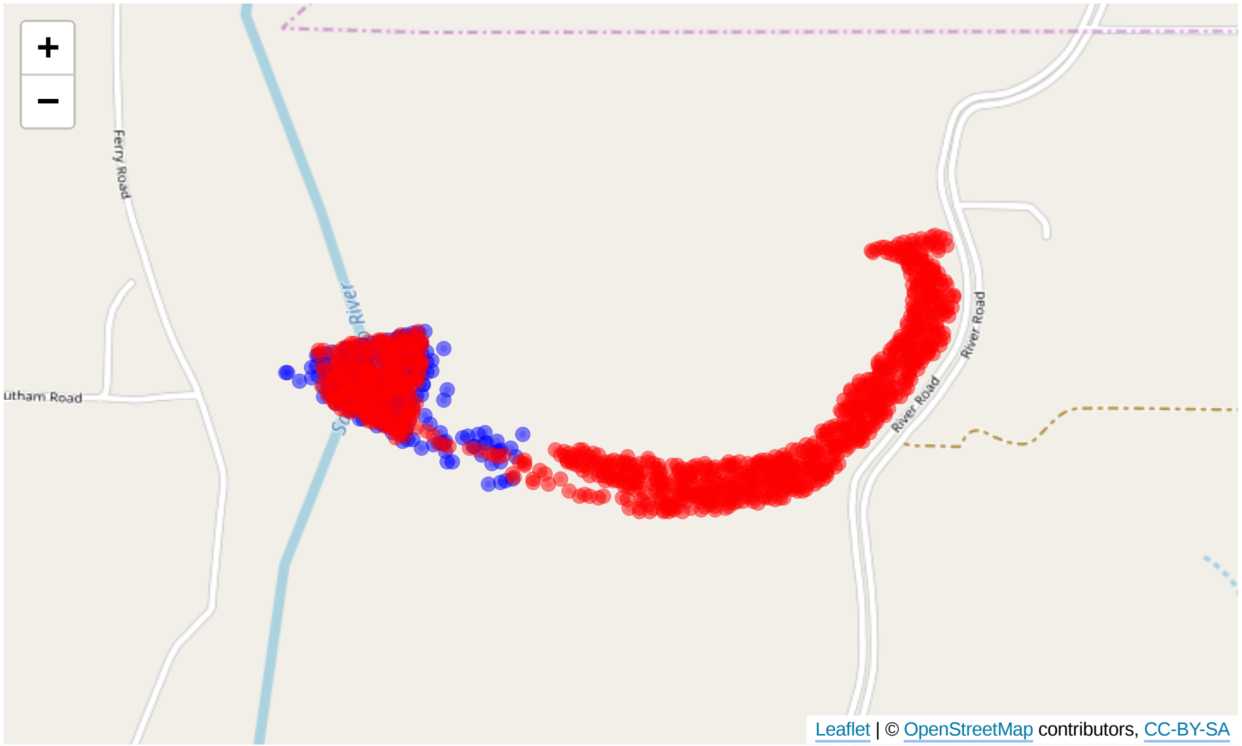
12/16

Truth data example



13/16

Truth data example



14/16

Truth data example

Truth data

Current approach: flag out nodes with “unstable” truth values

- Ignores hardest cases
- Overstates width, area accuracy