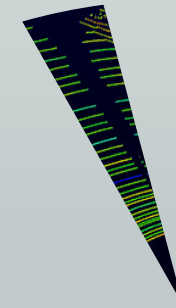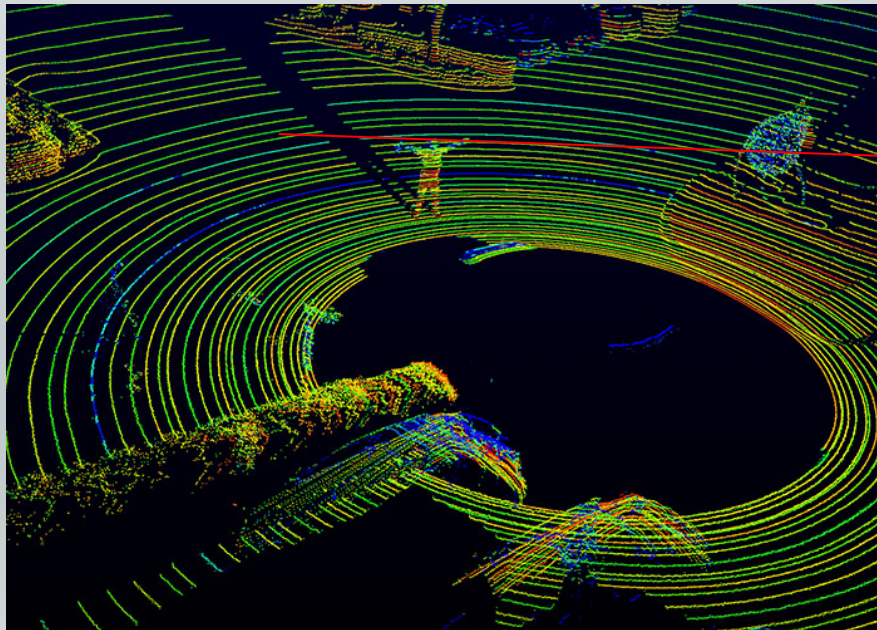# Proposed Method

Two-step filtering

First, this method groups all the points that have same horizontal angle as a point set. Then it performs calculation set by set. In each point set, this method applies two-step filter which uses angle and then distance of two consecutive points to differentiate ground points from vertical points.
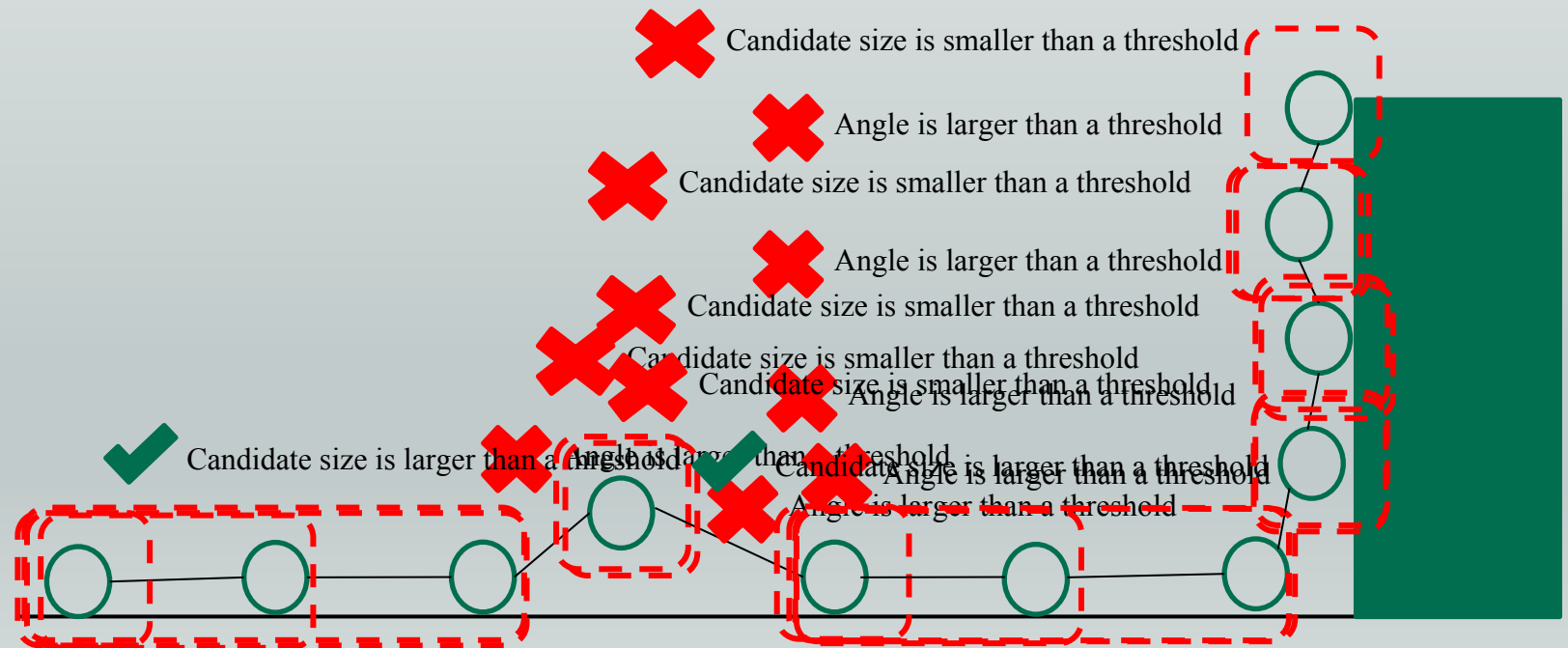

One point set

Proposed Method

Angle based filter

The first step in two-step filter is an angle based filtering. If the angle of two consecutive points is smaller than an angle threshold, it then added to "candidate group". The calculation continues until the angle is larger than the threshold, then size of the "candidate group" is checked. If the number of points is large enough, they are all marked as ground points.

○ Un-computed points

● Ground points

● Vertical points

● Remaining points

┈ Candidate group

— Calculate Angle

— Calculate Distance

Candidate size is smaller than a threshold

Angle is larger than a threshold

Candidate size is smaller than a threshold

Angle is larger than a threshold

Candidate size is smaller than a threshold

Candidate size is smaller than a threshold

Candidate size is smaller than a threshold

Angle is larger than a threshold

Candidate size is larger than a threshold

Angle is larger than a threshold

Candidate size is larger than a threshold

Angle is larger than a threshold

Angle is larger than a threshold
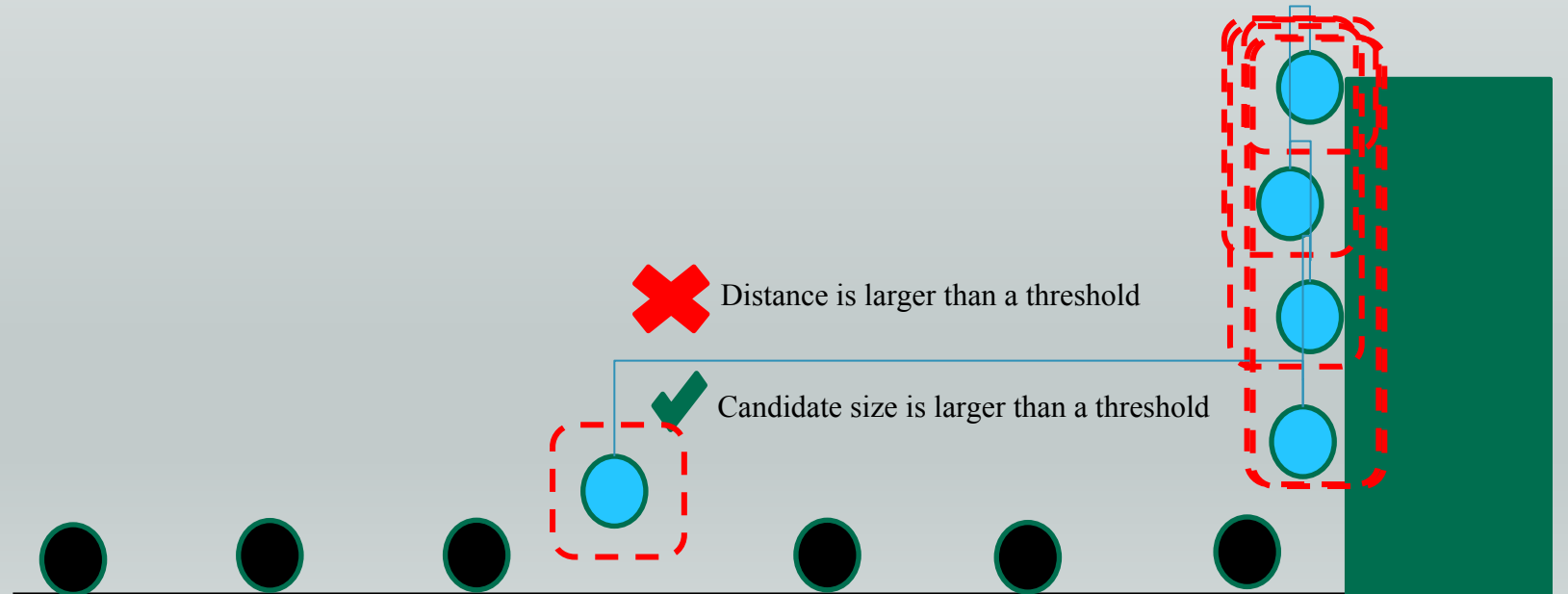
Angle is larger than a threshold

Proposed Method

Distance based filter

  The remaining points from the previous step are filtered by comparing distance between consecutive points to a dynamic threshold. If the points are close to each other enough it then marked as vertical points. The rest are marked as ground points.
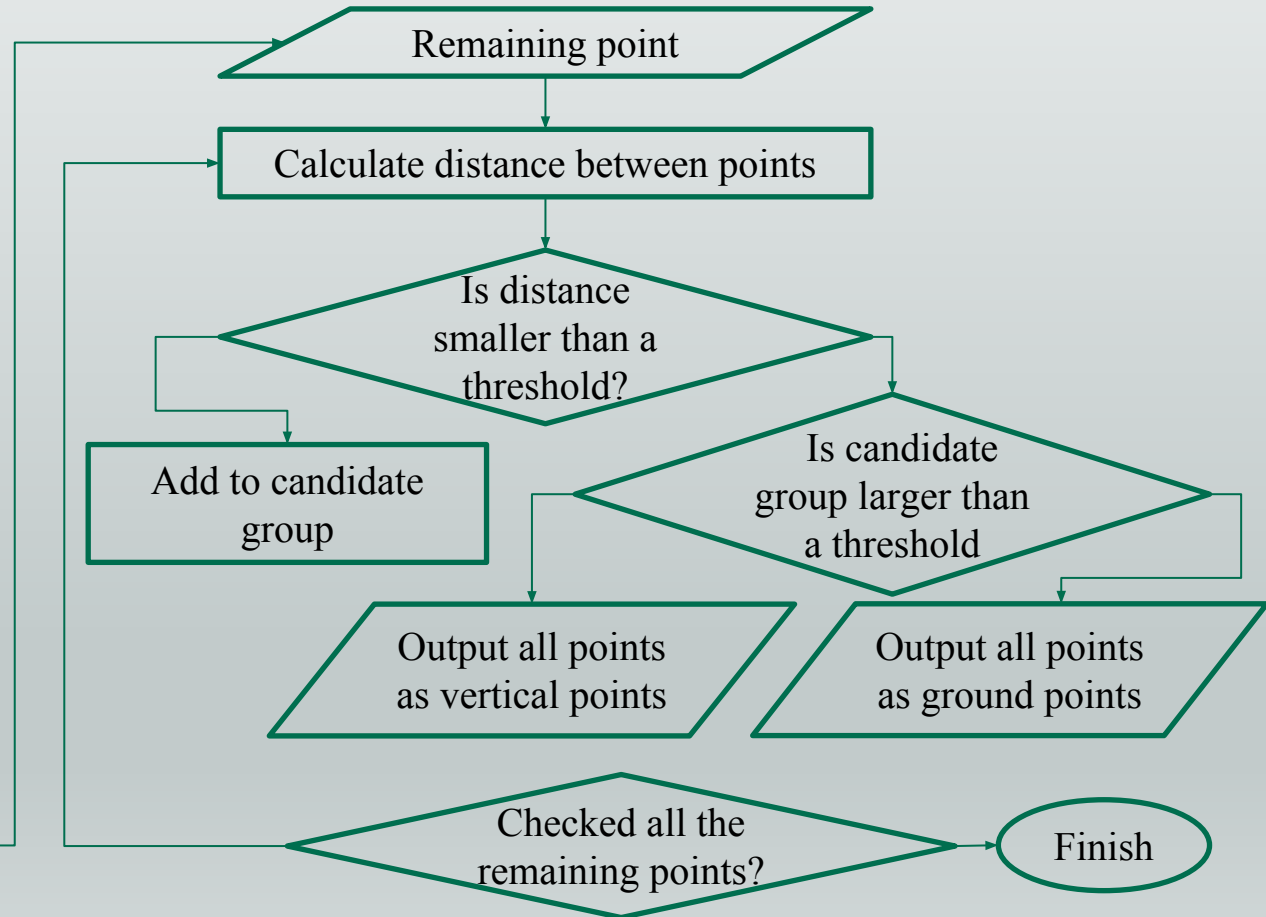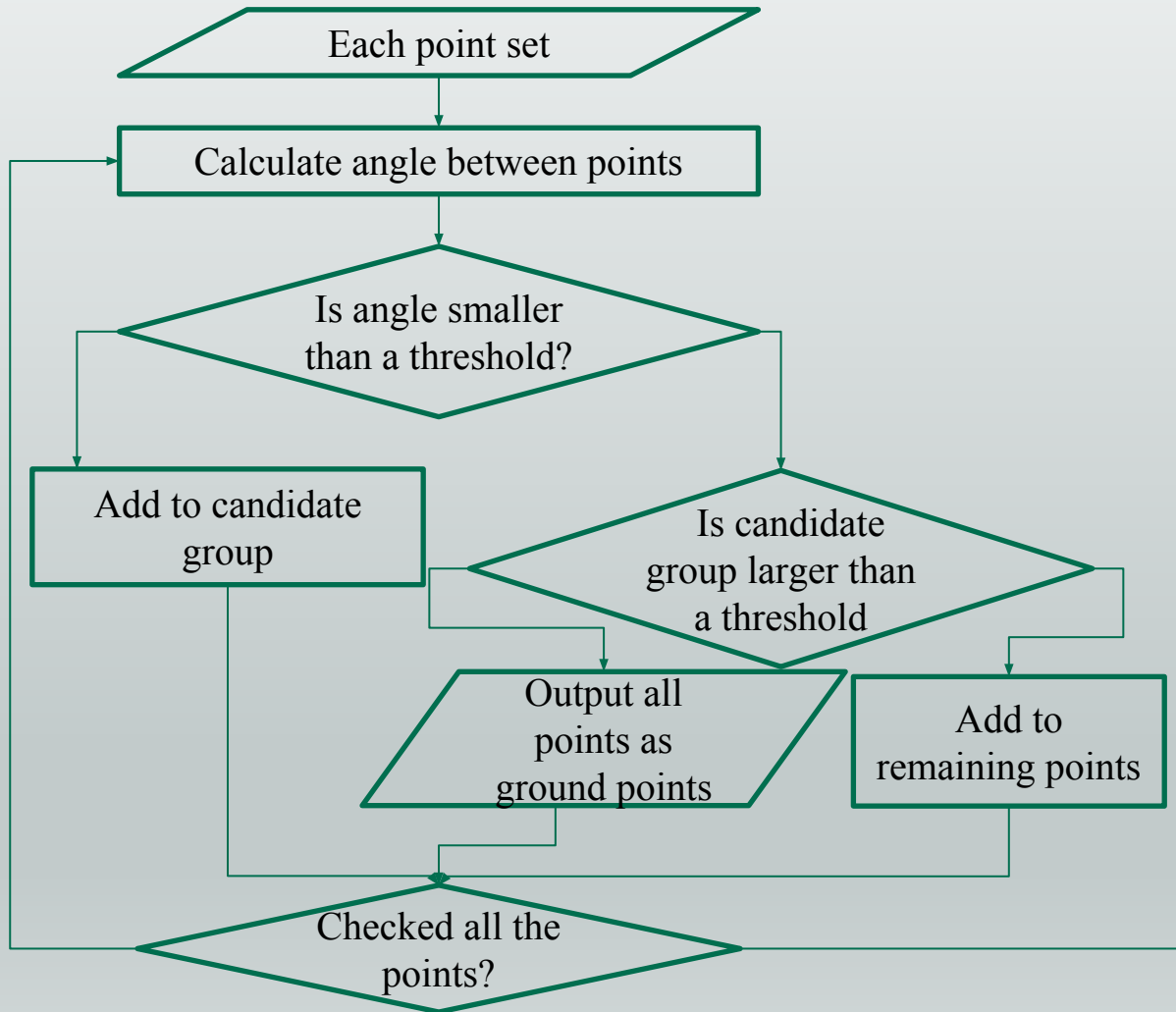
Proposed Method

Proposed Method

Pseudo code of proposed method

For *every points* **in** *the same point set*

    if *angle between the current point and adjacent point < an angle threshold*

        add current point to the *"candidate group"*

    else

        if *size of "candidate group" > a size threshold*

            mark all the points in *"candidate group"* as *ground points*

        else

            mark all the points in *"candidate group"* as *remaining points*

For *every points* **in** *remaining points*

    if *distance between the current point and adjacent point < a dynamic distance threshold*

        add current point to the *"candidate group"*

    else

        if *size of "candidate group" > a size threshold*

            mark all the points in *"candidate group"* as *ground points*

        else

            mark all the points in *"candidate group"* as *ground points*