Data: 3D laserscanner data (x,y,z in euclidean space)
Result: histogram describing the surface around every data point

initialization and use of kd-tree for efficient point access;
define radius for calculation of normals r_N;
define radius for histogram calculation r_H;
for *all points p in the point cloud* **do**
  calculate normal by using principal component analysis of points within radius r_N;
end
for *all points p in the point cloud* **do**
  read coordinates of current point p (x,y,z);
  find neighbor points p_n within radius r_H;
  for *all neighbor points p_n* **do**
    calculate features between p and p_n;
    f_0 as an representation of the azimuthal angle the two point normals;
    f_1 as an representation of the cosine of a polar angle between these point normals;
    f_2 as a measure for the direction of the translation between the two points;
  end
  divide features using $\sum_{i=0}^{i \leq 2} \left(\frac{f_i \cdot b}{f_{i_{max}} - f_{i_{min}}} \right) \cdot b^i$ and build up a single point histogram ($hist_{sp}$);
  where b represents a division factor encoding the size of the histogram
end
now every point owns a histogram ($hist_{sp}$) encoding the local geometry within radius r_H;
for *all points p in the point cloud* **do**
  read $hist_{sp}$ of the neighbor points within distance r_H;
  calculate weighted histogram ($hist_{surface}$) out of the neighbors single point histograms ($hist_{sp}$);
  $hist_{surface}(p) = \frac{1}{\#neighbors} \sum_{k=1}^{k \leq \#neighbors} wb(k) \cdot hist_{sp}(p_k) + (1 - wb(k)) \cdot hist_{sp}(p)$;
  where $wb = 1 - (0.5 + \frac{d}{r_H} \cdot 0.5)$ encodes a distance depending weight;
  and d representing the distance of the target point to the source point;
end