Name	Acronym	Type*	Input	Size**	Notes
Point Feature Histogram	PFH	Local (point)	Points + Normals + Search method + Radius	16 125 in PCL	- Considers angular relations between point pairs, and also takes into account neighbors'. - The PCL implementation does not use the distance as a feature (it was not discriminative).
Fast Point Feature Histogram	FPFH	Local (point)	Points + Normals + Search method + Radius	125 33 in PCL	- Simplifies PFH taking out the relations between neighbors (Simplified Point Feature Histogram). - To account for this, the SPFH of a point's neighbors are merged with its own.
Radius-Based Surface Descriptor	RSD	Local (point)	Points + Normals + Search method + Radius + Maximum radius	289 in PCL	- Estimates radial relationships between points (supposes each pair lies on a sphere surface).
3D Shape Context	3DSC	Local (point)	Points + Normals + Search method + Radius + Minimal radius + Point density radius	1980 in PCL (several descriptors)	- Extends the 2D descriptor. Uses a 3D spherical grid divided in sectors along each dimension. - No principal direction is defined, so several descriptors are created to deal with rotation.
Unique Shape Context	USC	Local (point)	Points + Radius + Minimal radius + Point density radius + Local radius	1960 in PCL	- Extends 3DSC by providing an unique orientation for each descriptor for rotation invariance. - The use of multiple descriptors is no longer required.
Signatures of Histograms of Orientations	SHOT	Local (point)	Points + Normals + Radius	352 in PCL	- Represents topological traits, takes points within a spherical support structure. - Invariant to rotation and translation, robust to noise and clutter.
Spin Image	SI	Local (point)	Points + Normals + Radius + Image resolution	153*** in PCL (no custom type)	- Uses a normal-aligned cylindrical support structure, divided in volumes. - Oldest descriptor available in PCL.
Rotation-Invariant Feature Transform	RIFT	Local (point)	Points + Color + Radius + Intensity gradients	32*** (no custom type)	- Extends 2D SIFT, makes use of the texture (color) information. Uses a circular patch. - Vulnerable against flipping.
Normal Aligned Radial Feature	NARF	Local (point)	Range image + Key points + Support size	36	- Extends 2D SIFT. Keypoints are usually near corners. NARF encodes the curvature around. - Works with range images, not clouds. Border extraction must be performed to find keypoints.
Rotational Projection Statistics	RoPS	Local (point)	Points + Triangles + Support radius + Number of rotations and bins	135*** (no custom type)	- Requires a previous triangulation step, as it works with a triangle mesh instead of the cloud. - Collects statistical information about the distribution of points around, projected on axes.
Viewpoint Feature Histogram	VFH	Global (object)	Points + Normals + Search method	263 308 in PCL	- Studies the angle between the normal of the point and the one of the cloud's centroid. - Derives from FPFH, uses a simplified SPFH plus a viewpoint-dependent component.
Clustered Viewpoint Feature Histogram	CVFH	Global (object)	Points + Normals + Search method + Angle threshold + Curvature threshold	308 in PCL (several descriptors, uses VFH type)	- Divides the object in *N* disjoint smooth regions, and computes the VFH of each one. - Robust to occlusion as long as one region is visible. Optionally, can be scale dependent.
Oriented, Unique and Repeatable Clustered Viewpoint Feature Histogram	OUR-CVFH	Global (object)	Points + Normals + Search method + Angle threshold + Curvature threshold	308 in PCL (several descriptors, uses VFH type)	- Improves CVFH with the computation of an unique reference frame to make it more robust. - Also, improves region segmentation.
Ensemble of Shape Functions	ESF	Global (object)	Points	640 in PCL	- Describes the cloud (distances, angles, areas). Robust to errors like outliers, noise, holes...
Global Fast Point Feature Histogram	GFPFH	Global (object)	Points + Labels + Number of classes + Leaf size	16 in PCL	- Global version of FPFH. - Uses a previous surface categorization step, that labels points as belonging to one of the classes.
Global Radius-Based Surface Descriptor	GRSD	Global (object)	Points + Normals + Search method	21 in PCL	- Global version of RSD. Like GFPFH, uses surface categorization, and a voxel grid.

* Local features are estimated for any point in the cloud (usually a set of downsampled key points). Global features are estimated for a cluster of points that is believed to be an object, requiring a preprocessing step (segmentation).
** The dimensionality of the descriptor's signature (the size of the histogram) is presented. If available, the size used in the original publication is also included.
*** The size of this descriptor varies according to the chosen parameters, and the value given is valid when using certain defaults.