Feature Descriptors

There is a large list of ways to compute the descriptors, and represent them.

- HOG : Histogram of oriented gradients.
- SIFT : Scale invariant feature transform.
- SURF : Speeded up robust features.
- BRIEF : Binary robust independent elementary features.
- ORB : Oriented fast and rotated brief.
- Many more...

- SIFT.
  - scale invariant: descriptor that is invariant to translation, rotation and scale.
  - partially invariant to affine transformation, illumination changes and 3D projection.
  - suitable for detecting visual landmarks from different orientations, and distances, with different illuminations.

  - SIFT Feature $<p, s, r, f>$

  p - pixel location.

  s - scale. Extrema in scale space from DoG.

  r - orientation. Peak from a histogram of gradients in a local region.

  f - 128 dim, descriptor, computed from local image gradient.

  - As you can see p, s and r are view point dependent. And f is mainly independent of a view point.

  - SIFT is expansive to compute, and its patented.
  - SIFT is a golden standart, SURF is a faster variant.