

# **1 Comparison of bubble detectors and size distribution estimators**

Bubble(circular objects) detection algorithms can be divided into two approaches, geometry-based and appearance-based.

Geometry-based approaches detect parameterized circular objects in the image edge map.

Drawbacks: Sensitive to noise, high false positive rate.

Appearance-based approaches use sliding window combining with a classifier like boosting based, Hog based and CNN classifier

Drawbacks: need large amount of training data.