Salience Measurement For Mammograms and Temporal Sequence Medical Video Clips

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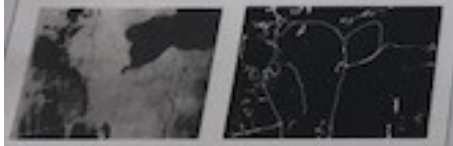
Introduce

Perceptual image quality is difficult to quantify using traditional signal processing metrics, such as signal to noise ratio or entropy, which do not correlate well with human observer perception. Previous work shows that salience measurement gives a positive result for assessing the quality of mammograms.

Our work focuses on re-creating the salience measurement system for mammograms, and, considering that salience could vary in a temporal sequence, we would like to expand the system to temporal salience measurement for MRI video clips.

Salience and the Human Visual System

Salience or conspicuity means the region that "pops-out" to human eyes when we are looking at one image, which also defined as the ratio of lesion contrast to background complexity.



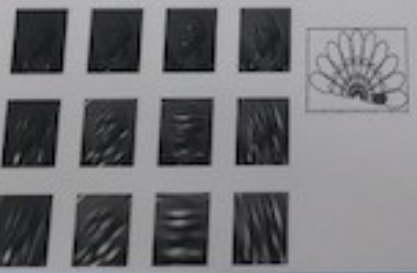
…man Visual Search System

…ttom-up model uses low-level image …es to guide visual attention to the salient …

…wn model is based on an observer's …st experience, or explicit …s.

Initial Work

Salience measurement mainly uses low level features: the contrast, to build up a salience map consisting of locations of the most salient features. The important part in this system is the Gabor filter, which could filter features from the image at different orientations and scales.

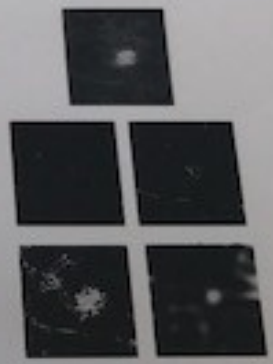


Salience in Mammograms

Previous work used this salience measure to perform subband image analysis of mammogram ROIs that were generated by a task-based visual search. We plan to build on that earlier work.

And, using the analysis of variance (ANOVA) model from earlier work, we could assess whether our re-creation of the system achieves the same goal as the previous work.

Mammogram showing all clusters > 0.8 s from two readers (in white). Ground truth for TP is shown in black. Arrows indicate FP clusters identified by one reader.



True positive ROI (top) and four of its salience maps. Left column top row, 22.3 cycles/deg; right column, top row, 13.2 cycles/deg; left column, bottom row, 4.6 cycles/deg; right column, bottom row, 1.0 cycles/deg.

Temporal Salience

Salience could vary in a temporal sequence, and this difference may come from a change of contrast, color, or motion between two frames. Fusion of the salience map for each frame on a time scale could help us to find an objective measurement for video clips.

Application

Some work by others has been done … dynamic salience detection with stat… video clips. We plan to apply our ne… temporal salience measurement to … video such as dynamic MRI and ul… This could have applications in di… therapy, and training.

Reference

P. Perconti and M. H. Loew… measure for assessing sca… features of mammogram… Vol. 24, No. 12, Decembe…