AbstractID: 2519 Title: A Novel Algorithm for Spatial Noise Compensation in IBM"s 9.2-MP LCD: A Fuzzy Classification Approach

**Purpose:** This paper presents a new fuzzy-pixel classification algorithm to compensate spatial noise in LCD displays.

**Method:** Our noise compensation technique was tested on 30 images acquired using the CCD camera. We measured the MTF and NPS parameters before and after the compensation. The compensation protocol is as follows: displaying a uniform test pattern with known digital value on the LCD display; acquiring the image (640 x 480 pixel size) of the displayed pattern using CCD camera; bi-cubic down-sampling the image to 64 x 48 pixel size; use the optimized fuzzy-pixel classification algorithm to detect the noisy pixels and obtain a mask of the noisy pixels; applying noise compensation on the raw image using the noisy mask; applying Gaussian smoothing on compensated image; display the compensated image on the LCD display for MTF and NPS measurements.

**Results:** The results demonstrate that overall mean of the *vertical MTF* is <u>higher</u> than that obtained using the conventional method. Also the overall mean of the *vertical NPS* is <u>lower</u> using the fuzzy compensation technique. The peaks in the *horizontal NPS* are <u>lower and less wide</u> compared to the non-compensated NPS. The vertical MTF and NPS have improved using the noise compensation technique, and horizontal NPS is almost comparable in compensated and non-compensated images.

**Conclusions:** We developed and demonstrated a new fuzzy-pixel classification algorithm for noise compensation in LCD displays. The compensated algorithm shows an MTF <u>improvement</u> of **5.6%** when compared with non-compensated case. A very similar trend was observed in the horizontal and vertical NPS plots. We can conclude from the above-presented results that the fuzzy-pixel classification algorithm is effective in detecting the pixels contributing towards the noise of the image. In future, if images are processed before display to compensate for spatial noise of the LCDs, diagnosis efficiency can be increased.