Through years of experience, expert image analysts acquire knowledge which allows them to perform an in-depth analysis of images quickly and efficiently. This research aims to build a human-like framework and cognitive model of visual analysis based on the tacit visual knowledge of expert image analysts in medicine. Gaze tracking is used to discover the cognitive processes of radiologic technologists during their evaluation of x-ray scans. The resulting gaze patterns can be used to create visual routines which extract meaningful information from low-level image features and make them available to high-level cognitive processes. This method achieves a functional prototype of visual analysis within the biological, computational and memory limitations of the human visual system. The routines from this framework can be used to understand expert cognition, train new analysts, perform automated analysis, and potentially provide an informatics tool for medical error prevention.