QR Code Embellishment with Background Facial Image Embedding

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Problem
- Traditional QR code strictly complies with the international standard [1], and contains only machine readable regular black/white modules.
- Our project targets at embellishment of QR code.

QR Code Redundancy
- Blue: User input data to be encoded
- Green: Redundant data
- Yellow: Error correction data

Motivation
- Three existing ways for QR code decoration
  - Module colorization
  - Module/QR code shape variation
  - Image embedding
  Among these, image embedding conveys more information as well as beautification.
- Existing image embedding approaches
  - Embedding small image into the center of QR code
  - Not clear for zooming out/distance view
  - Half-tone technique
  - Limited visual effects

Our Approach
Our proposed method contains mainly three steps:
- Facial image saliency detection
  - Given a facial image as input, we detect its salient parts, e.g. eyes, nose, mouth, etc. (a)
  - We adopt a data-driven approach [3] for this saliency detection.
- Customized QR code generation
  - A standard QR code is generated with redundant data customized.
  - We fill the redundant part with customized bits according to saliency detection results that maximize the emerging of underlying image. (b and c)
- Embed the facial image into QR code as foreground

Results
We compare our result with some state-of-the-art methods (a) Unitag [4], (b) QArt [5], (c) Visualead [6], (d) Halftone QR Codes [7], and (e) our method. Our result gains both color and whole image embedding.

Discussion
For preliminary tests, we adopt a low-end smartphone, i.e. Apple iPhone 3GS with a 3MP rear camera. More advanced smartphone with higher resolution camera and faster auto-focusing lens will definitely shorten the scanning time. To scan QR codes, we choose two software:

References