5005-C1-23 **P. W. Jones** (jones@math.yale.edu) and **T. M. Le*** (triet.le@yale.edu), 442 Dunham Lab., 10 Hillhouse Ave., New Haven, CT 06511. *Local Scales and Multiscale Image Decompositions.* Preliminary report.

This paper is devoted to the study of local scales or oscillations in images and use the knowledge of local scales for image decompositions. Denote by

$$K_t(x) = \left(e^{-2\pi t|\xi|^2}\right)^{\vee}(x) = (2t)^{-n/2}e^{-2\pi\frac{|x|^2}{4t}},\ t>0,$$

the Gaussian kernel. Motivated from the Triebel-Lizorkin function space $\dot{F}^{\alpha}_{p,\infty}$, we define a local scale of f at x to be $t(x) \geq 0$ such that

$$|Sf(x,t)| = \left|t^{1-\alpha/2}\frac{\mathrm{K}_t}{\mathrm{t}} * f(x)\right|$$

is a local maximum with respect to t for some $\alpha < 2$. The choice of α will be discussed. We also define a nontangential local scale (a smooth version of the previous local scale) of f at x to be $t^*(x)$ such that $S^*f(x,t^*)$ is a local maximum in t, where

$$S^*f(x,t) = \sup_{|x-y|<t}\left|Sf(y,t)e^{\frac{-|x-y|^2}{2t}}\right|.$$

We then decompose f into $u+v$, with u being piecewise-smooth and v being texture, via the minimization problem,

$$\inf_{u\in BV}\left\{\mathcal{K}(u) = |u|_{BV} + \lambda\|K_{\bar{t}(\cdot)} * (f-u)(\cdot)\|_{L^1}\right\},$$

where $\bar{t}(x)$ is some appropriate choice of a (nontangential) local scale to be captured in the oscillatory part v at x. (Received May 04, 2007)