What's really important is to simplify. The work of most photographers would be improved immensely if they could do one thing: get rid of the extraneous. If you strive for simplicity, you are more likely to reach the viewer.

William Albert Allard
ALGORITHM
Our algorithm is performed in three main steps:
1) decomposition
2) warping & subject dominance optimization
3) image compositing

Warping Energy
The warping energy consists of a scale transformation error (Jin et al. 2010),
\[ E_w = \sum_{t \in T} A_t (|J_t - G_{t,F}|^2) \]  
and a smoothness error,
\[ E_s = \sum_{s,t \in T} A_{st} (|G_t - G_{s,F}|^2) \]  
where \( A_{st} = (A_t + A_s) / 2. \)

Subject Dominance Energy
To maximize the luminance and color contrast in the Lab color space, we minimize the subject dominance energy \( E_D \), which is defined as
\[ E_D = E_L + E_C \]  
where \( E_L \) is the luminance contrast energy:
\[ E_L = \sum_{o \in T} \sum_{t \in T} s_t (|L_t - L_o| - \psi_L) \]  
and \( E_C \) is the color contrast energy:
\[ E_C = \sum_{o \in T} \sum_{t \in T} s_t (\sqrt{(a_t - a_o)^2 + (b_t - b_o)^2} - \psi_{ab}). \]  
The parameters \( \psi_L \) and \( \psi_{ab} \) indicate the target level of dominance, where
\[ \psi_L = \left( \frac{1}{|T|} \sum_{t \in T} |L_t - L_o| \right) + \mu \]  
and
\[ \psi_{ab} = \left( \frac{1}{|T|} \sum_{t \in T} \sqrt{(a_t - a_o)^2 + (b_t - b_o)^2} \right) + \mu \]  
We obtain the following value for \( \mu \), using a systematic graph fitting approach (see our paper):
\[ \mu = \left( \frac{S(F)B(F)}{\tau} - \frac{B(F)}{18 * S(F)} \right) \]  
For luminance (Eq 6), \( \tau = 9 \) and for color (Eq 7), \( \tau = 6. \)

Total Energy
To recompose an image, we combine the subject dominance energy with the warping energy:
\[ E = \alpha E_w + \beta E_s + \gamma E_D \]  
We set \( \alpha = 1, \beta = 0.5 \) and \( \gamma = 1. \)

EXPERIMENTAL RESULTS
- Online user experiment: For 30 pairs of images, participants were asked to choose between the input images and our results, for the one in which the subject stands out more against the background.
- 40 participants aged between 22 and 46.
- OUTCOME: For 83% of the image pairs, our results were chosen.

CONCLUSION
We demonstrated a successful semi-automatic recomposition method that employs tearable mage warping as the image operator and uses a simplified center-surround contrast measure to guide the warping to enhance the visual dominance of the photo subjects. Our results and user experiment have shown the effectiveness. Our method can be extended with more aesthetics features as shown in the results below.

Results: Subject dominance + rules-of-thirds + visual balance energies.