Modeling Photo Composition and Its Application to Photo Re-arrangement

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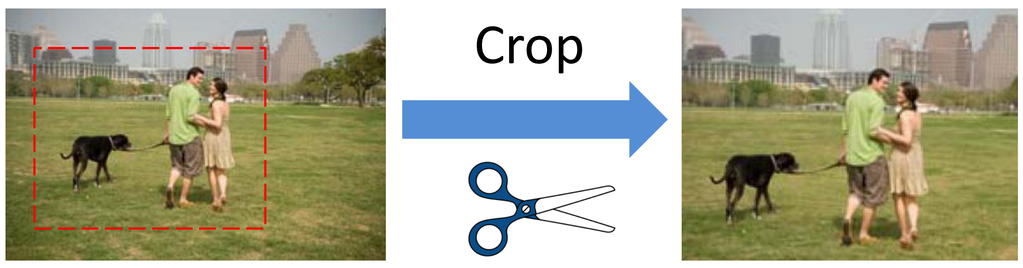
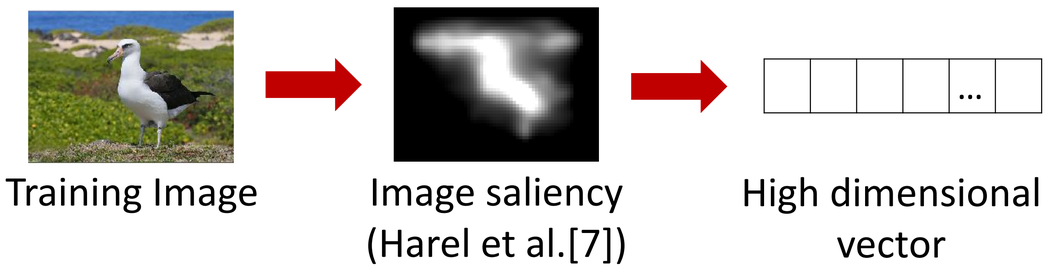
1. MOTIVATION



- Why **image composition** is important?
  Answer : For better image aesthetics [1,2]
- So far, previous arts focus on custom measures for evaluation of image composition [3,4,6]
- However, **spatial distribution of image saliency** plays dominant role for image aesthetics [2]!
- Learning spatial distribution of saliency instead of hand-tuned measurements.

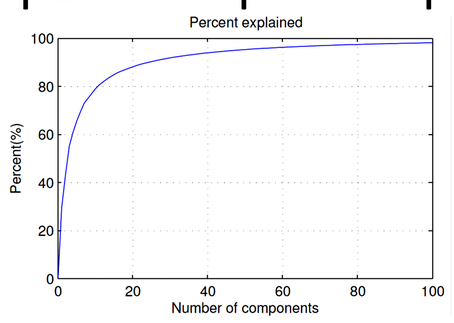
2. MODELING PHOTO COMPOSITION

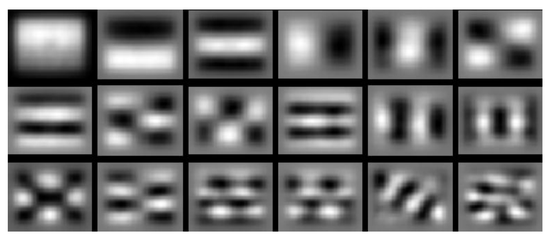
Step1. Saliency extraction and vectorization



Training Image → Image saliency (Harel et al.[7]) → High dimensional vector

Step2. Principal component analysis





The 18 principal components

Step3. EM based Gaussian mixture modeling

3. PHOTO RE-ARRANGEMENT

Find cropping parameter τ for saliency $S \in \mathbf{R}^2$

$$\tau_{MAP} = \underset{\tau}{\operatorname{argmax}}\, P(S_\tau|\mathcal{N},\mathcal{B}) = P(\mathcal{N}|S_\tau)P(\mathcal{B}|S_\tau)P(S_\tau)$$

where

$$P(\mathcal{N}|S_\tau) = \sum_{k=1}^{K} w_k \mathcal{N}(S_\tau|\mu_k,\Sigma_k)$$

How much S_τ fits to model

$$P(\mathcal{B}|S_\tau) = \frac{\sum_{\mathbf{x}\in C(S_\tau)} S(\mathbf{x})}{\sum_{x\in\mathbb{I}} S(\mathbf{x})}$$

How much saliency distributes in central region of S_τ [5]

4.1 PHOTO COMPOSITION

4.2 CONVERT PHOTOGRAPH STYLE

5. CONCLUSION AND FUTURE WORK

- An implicit method for photo composition evaluation
- Application to photo re-arrangement
- Developing a general system that converts an arbitrary image into a specific photographic style.

6. ACKNOWLEDGEMENT

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7. REFERENCES

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