

# CUBIST-STYLE IMAGE EFFECTS WITH OBLIQUE DECISION TREES

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<https://edric-chan.github.io/cubist-TAO/>

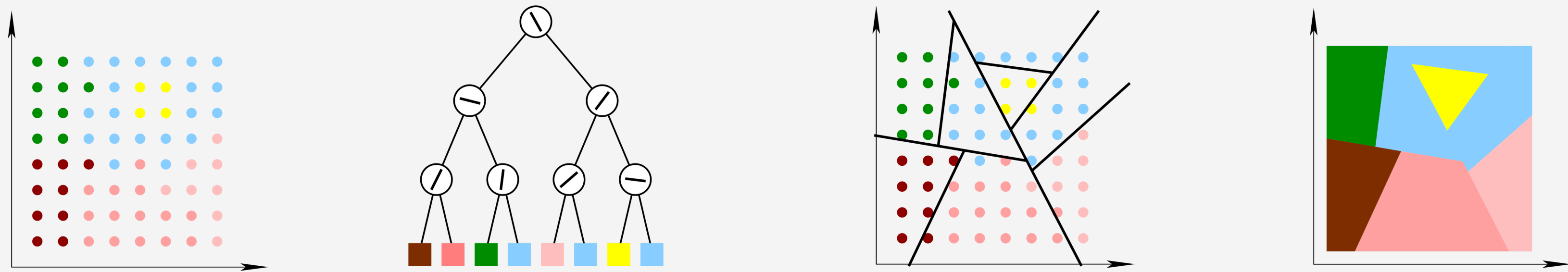


Figure 1: Learning an oblique regression tree using the Tree Alternating Optimization (TAO) algorithm to represent an image (in general, we can use  $T$  trees). *Plot 1*: an input image, as a grid of points  $x_n \in \mathbb{R}^2$  (input features) each with a color  $y_n \in \mathbb{R}^3$  (output labels). *Plot 2*: an oblique regression tree of depth 3 learned on this dataset. *Plot 3*: the partition of the 2D space induced by the tree. *Plot 4*: the partition with each leaf polygon colored by the leaf label.



Figure 2: *Images 1, 2*: actual paintings. *Rest*: tree outputs for image 1.

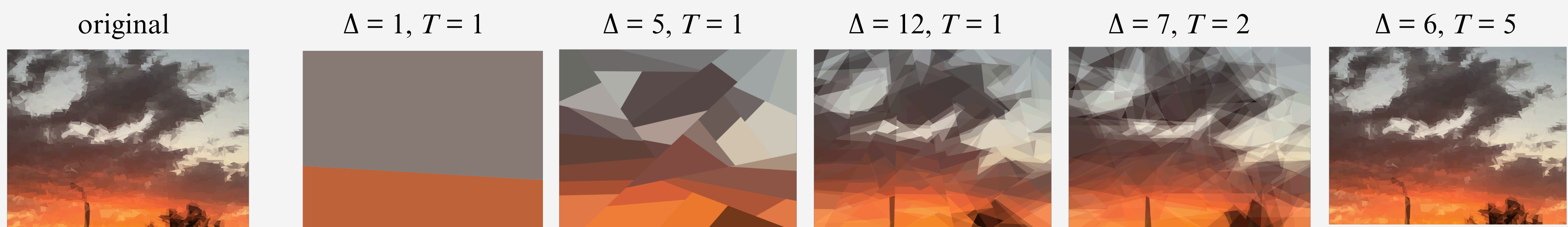


Figure 3: *Left*: photograph. *Rest*: tree outputs using different depths  $\Delta$  and number of trees  $T$ .

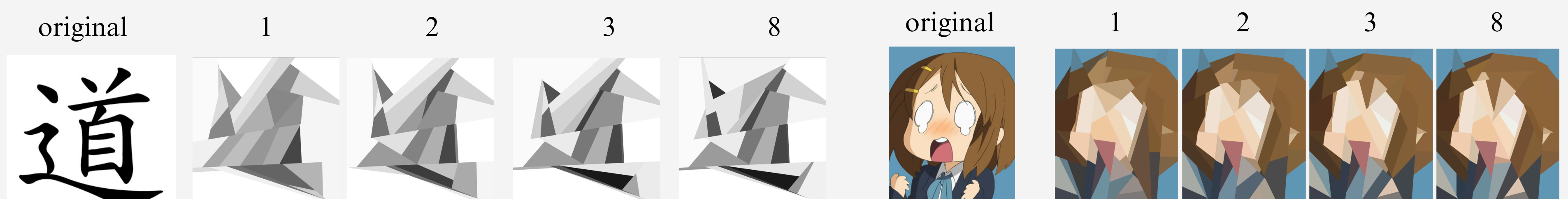


Figure 4: Tree outputs over training TAO iteration (*left*:  $\Delta = 5, T = 1$ ; *right*:  $\Delta = 6, T = 1$ ).

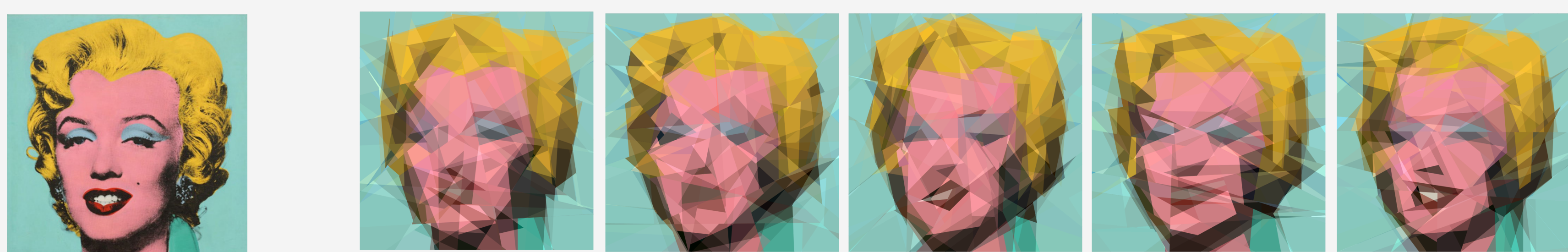


Figure 5: *Left*: original image. *Rest*: tree outputs using different seeds (for  $\Delta = 6, T = 3$ ). Combining these images into a video produces a jittery effect reminiscent of rotoscopic animation. See [https://youtube.be/TXPm0mw4a\\_A](https://youtube.be/TXPm0mw4a_A)

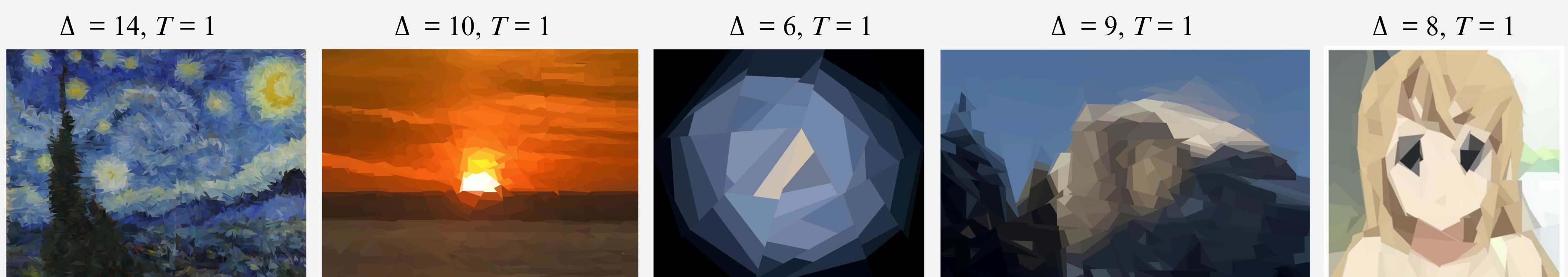


Figure 6: Can you guess the original paintings, drawings or photographs?