Supplement

Reminder

It will cost lots of time to finish this homework

Note in Part1

- Part1 A: 50 random initial guesses

→ 50 errors, you have to choose the minimum error for the final result

- Part1 C
  - RGB image first convert to LUV
  - Run kmeans as part1 A&B (you may modify the threshold)
  - LUV image convert to RGB image

Kmeans RGB results

ORIGINAL

K=3

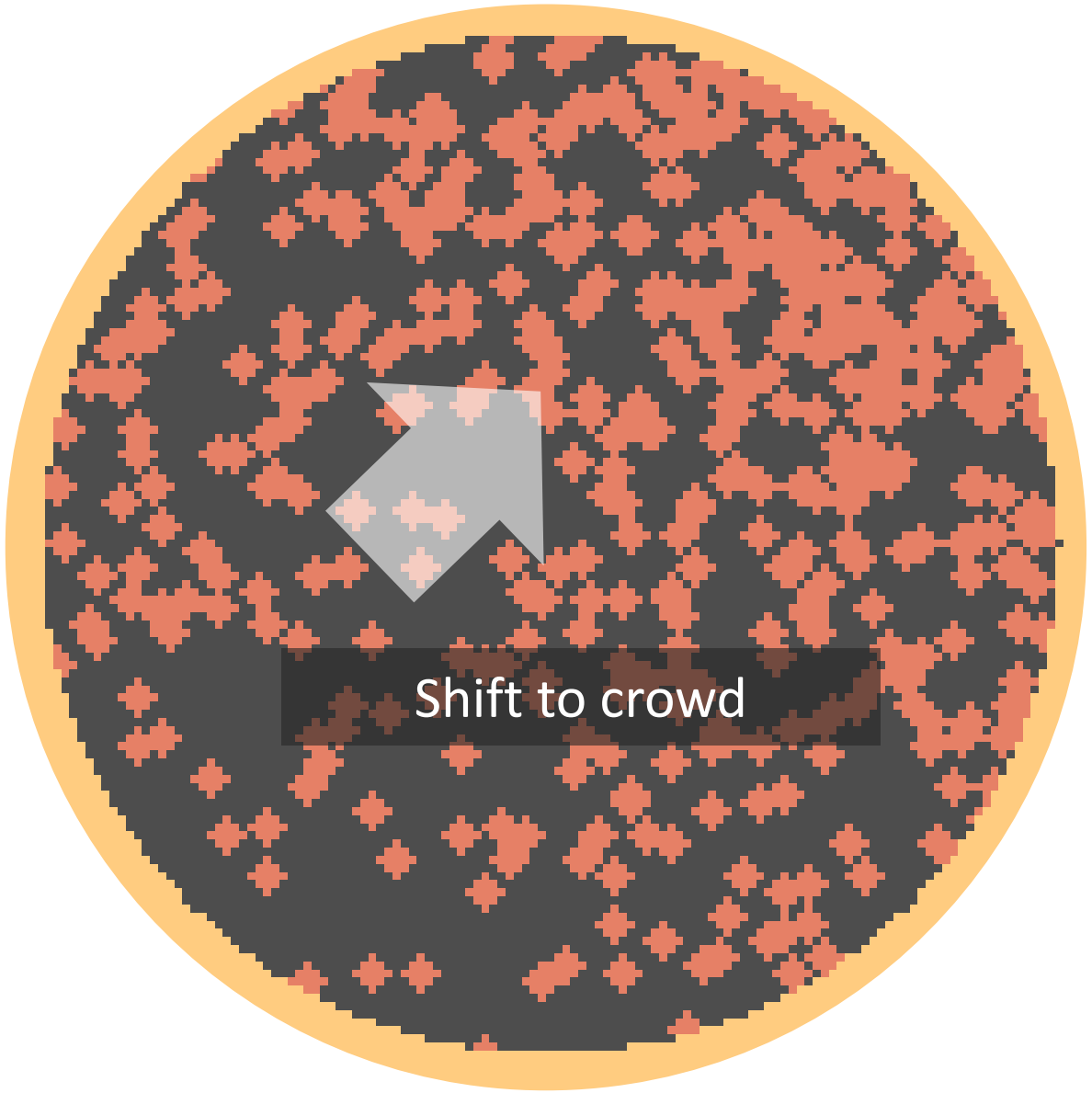
K=7

K=11

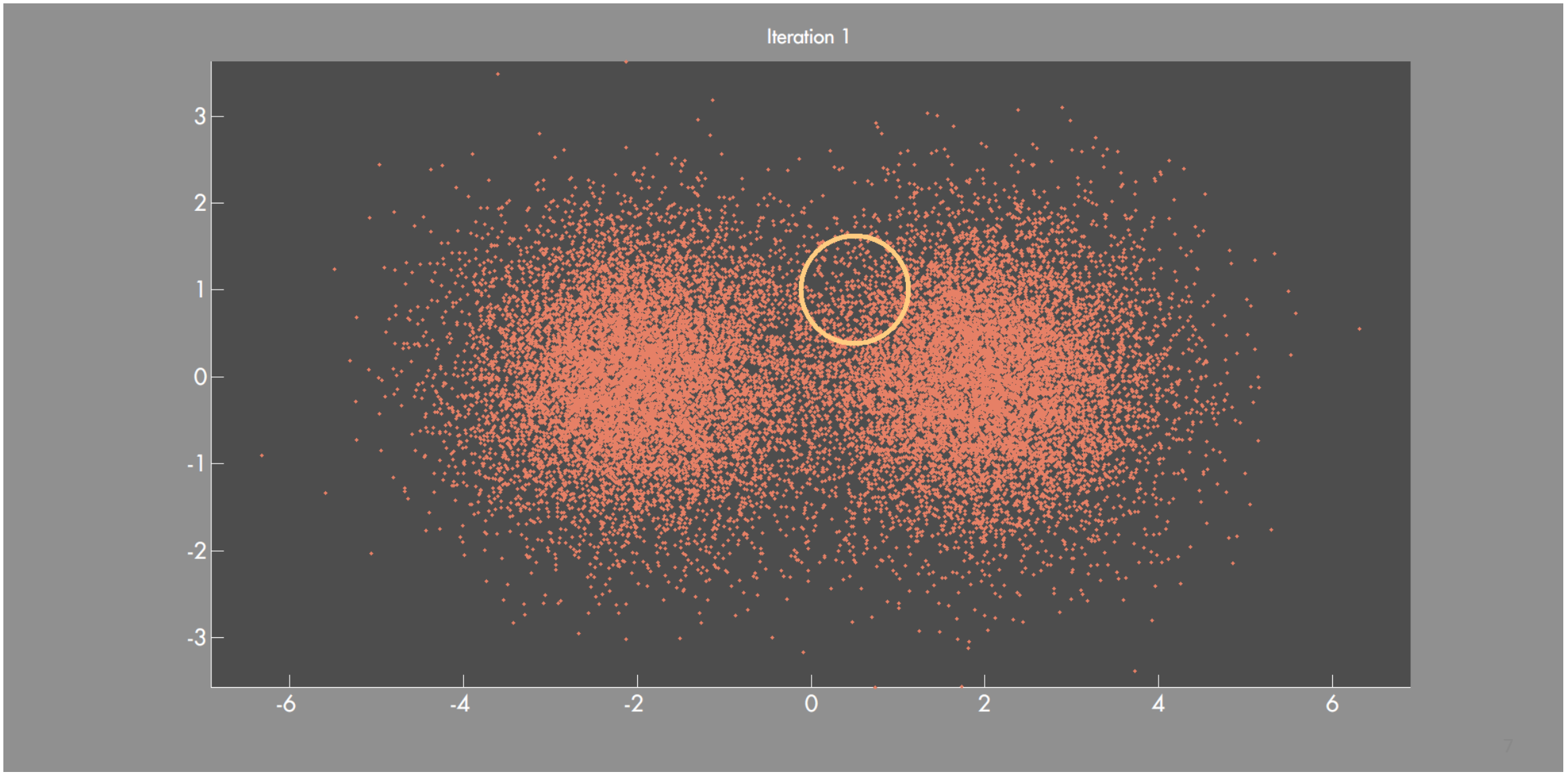
Mean-shift

- Start with each point x
- See where it shifts
  - $K(x_i - x)$ is kernel function, $N(x)$ is the neighborhood of x
  - $$m(x) = \frac{\sum_{x_i \in N(x)} K(x_i - x) x_i}{\sum_{x_i \in N(x)} K(x_i - x)}$$
  - The difference $m(x) - x$ is called mean shift

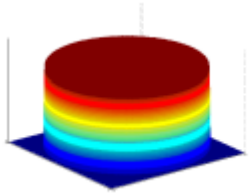
$unniform\ kernel$: $x_i - x <=$ bandwidth $\rightarrow$ x_i is the neighbor of x


Shift to crowd

Mean-shift



Uniform kernel



Part3 A. RGB color space: 3 dim for RGB

- Set bandwidth for RGB

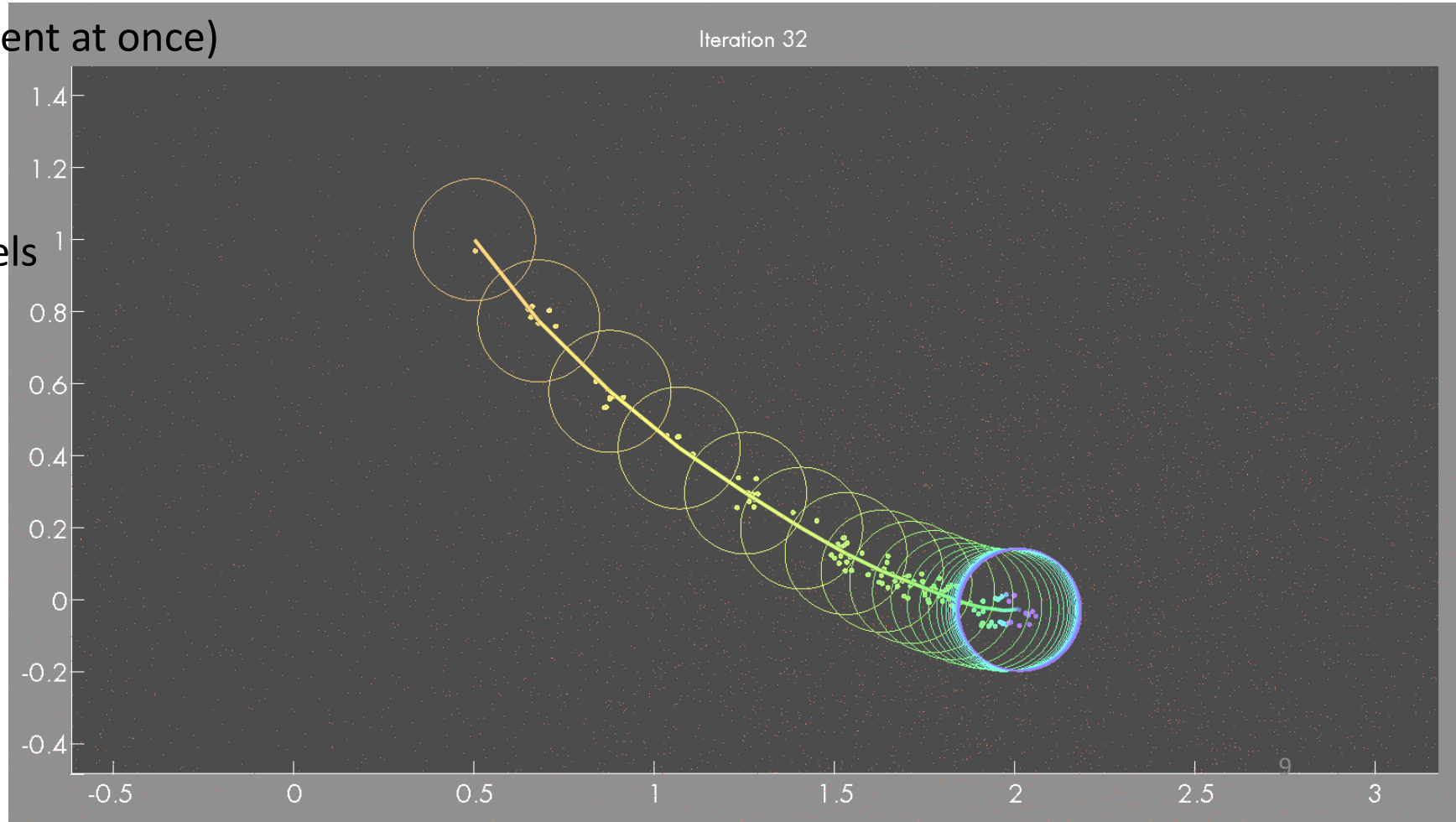
Part3 B. Color and spatial: 5 dim for RGB and XY

- Set bandwidth for RGB and another bandwidth for XY

Acceleration: The Momotaro Trick

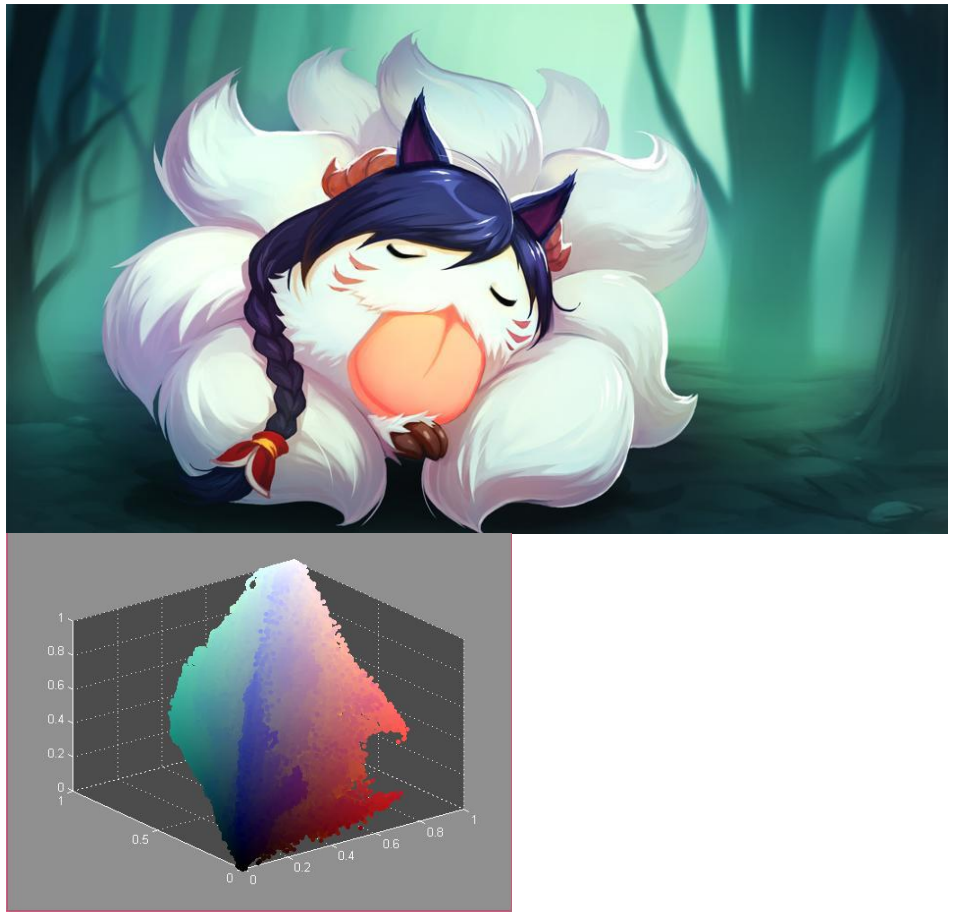
when being close to convergence:
Bring more pixels with the same attributes
(bring more pixels to the same segment at once)

One thing you have to remember:
Is this pixel visited ?
→ a matrix to record the visited pixels

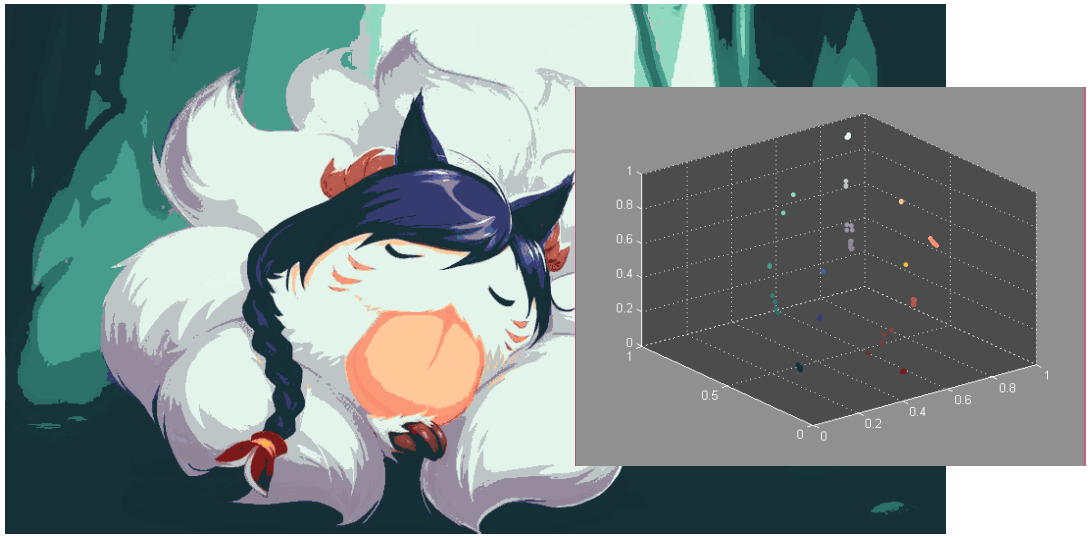


Mean-shift RGB results

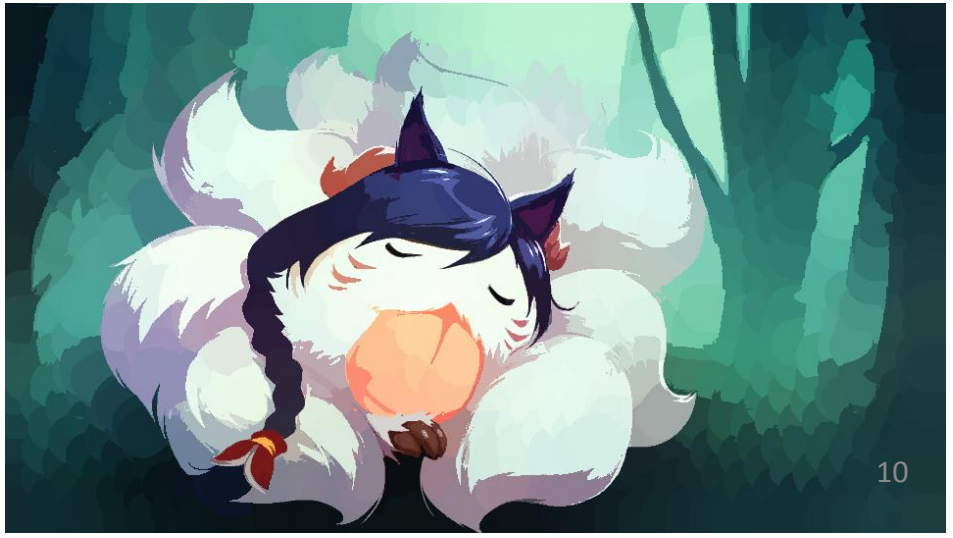
ORIGINAL



RGB



RGB+XY

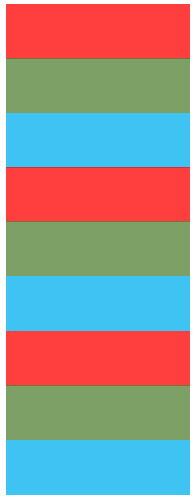


Tips

- MATLAB functions
  - reshape
  - repmat
  - Unique
  - [val, ind] = min(X) : Find minimum value and index of ***X***

X

repmat (***X***, [3 1])



X

reshape (***X***, 1*1,3)

1

3