

1. Summary of problem:

Task: Determine the numbers of randomly thrown dices into three types which were classified by increasing dimensions: small, medium and large (defined in Competition Section).

Notice: Digital camera and PC will be allowed to use when competing.

2. Analysis:

A face of cubic dice has almost square shape.

Normal dots (on 2, 3, 4, 5, 6 - dot face) are black and special dots (on only-1-dot face) are red.

Competing arena is circular with radius which was described in Competition Section.

Shooting angle is approximately 30-45 degree.

3. Processing idea:

Because of low shooting angle, we can determine a dice by its up-most face.

Geometrical characteristics of the up-most face can help us distinguish this to other faces.

4. Algorithm steps:

Take some photographs and choose a best quality image to process.

Pre-image-processing: Eliminating noises, smoothing image, extracting edge, etc...

Determine up-most faces. Erase bottom faces and beside faces.

Count dices basing on the recognized faces. Then, classify them into three types.

Use probability to determine the dices that cannot be seen by difference of weight.

5. Language programing

Our algorithm analyses geometrical features and special characteristics of dice to recognize them. Our team also uses Visual C++ and Java programming languages with openCV library to design the project.