1. **Quantization**
   1. As can be seen in the histogram, the distribution of the gray levels is not uniform.

Chart, histogram

Description automatically generated

Chart, line chart

Description automatically generated

Diagram

Description automatically generated

* 1. Implemented in code

Chart, line chart

Description automatically generated

A picture containing diagram

Description automatically generated

* + 1. As Expected, The Intervals that determined by the decision levels are not uniformly distributed. They are more concentrated where the pdf is denser. Therefore, the Max-Lloyd algorithm achieves a smaller MSE especially when the number of bits for representation is small. We can also see that the Max-Lloyd algorithm MSE is always lower since its decision levels are initialized uniformly and at each step the error can not get bigger.