

University of Edinburgh, School of Mathematics

Statistical Research Skills

Assignment 3 - Simulation Report

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1. Introduction

In this report, we aim to compute the performance of density function, `density()` also known as the kernel density estimator. In addition to that, we will compare with its other competitors such as Gaussian, uniform and Epanechnikov kernel

2. Generating Data

3. Preliminary Experiment

Let $X_1, \dots, X_n \stackrel{\text{iid}}{\sim} f$. The kernel estimator of f is defined as

$$\hat{f}(x) = \frac{1}{n} \sum_{i=1}^n K_h(x - X_i)$$

4. Monte Carlo Simulation Study

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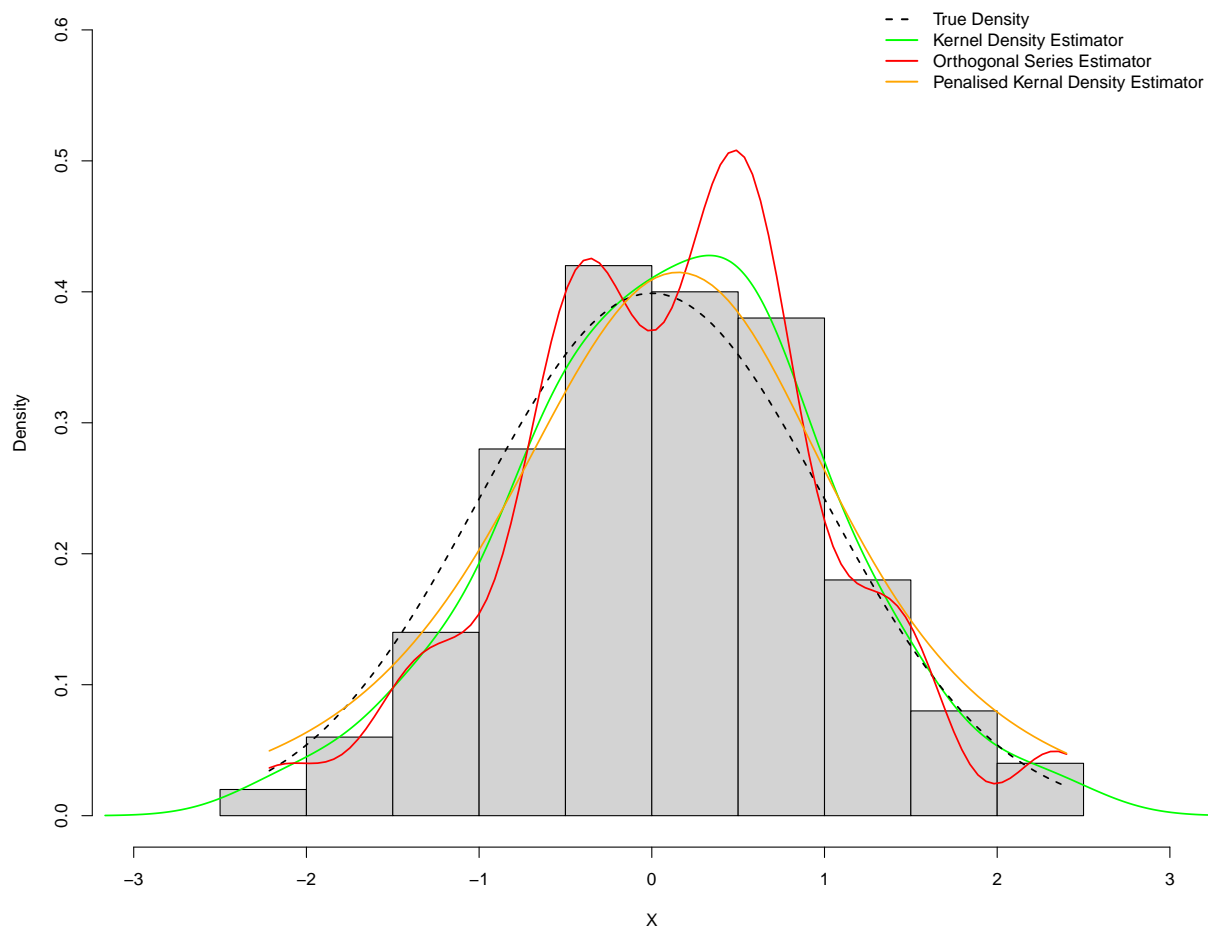


Figure 1: One-shot Experiment on Normal distribution

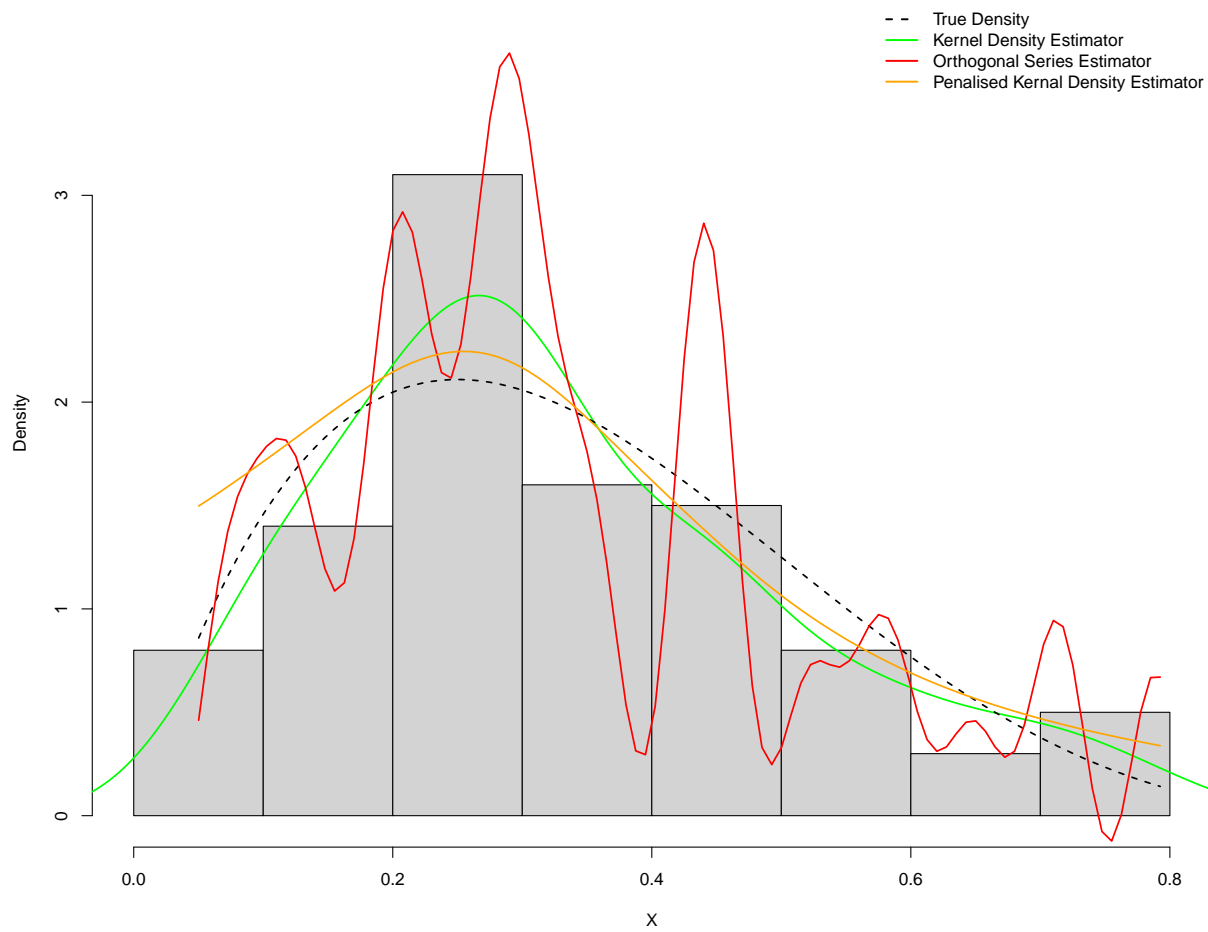


Figure 2: One-shot Experiment on Beta distribution

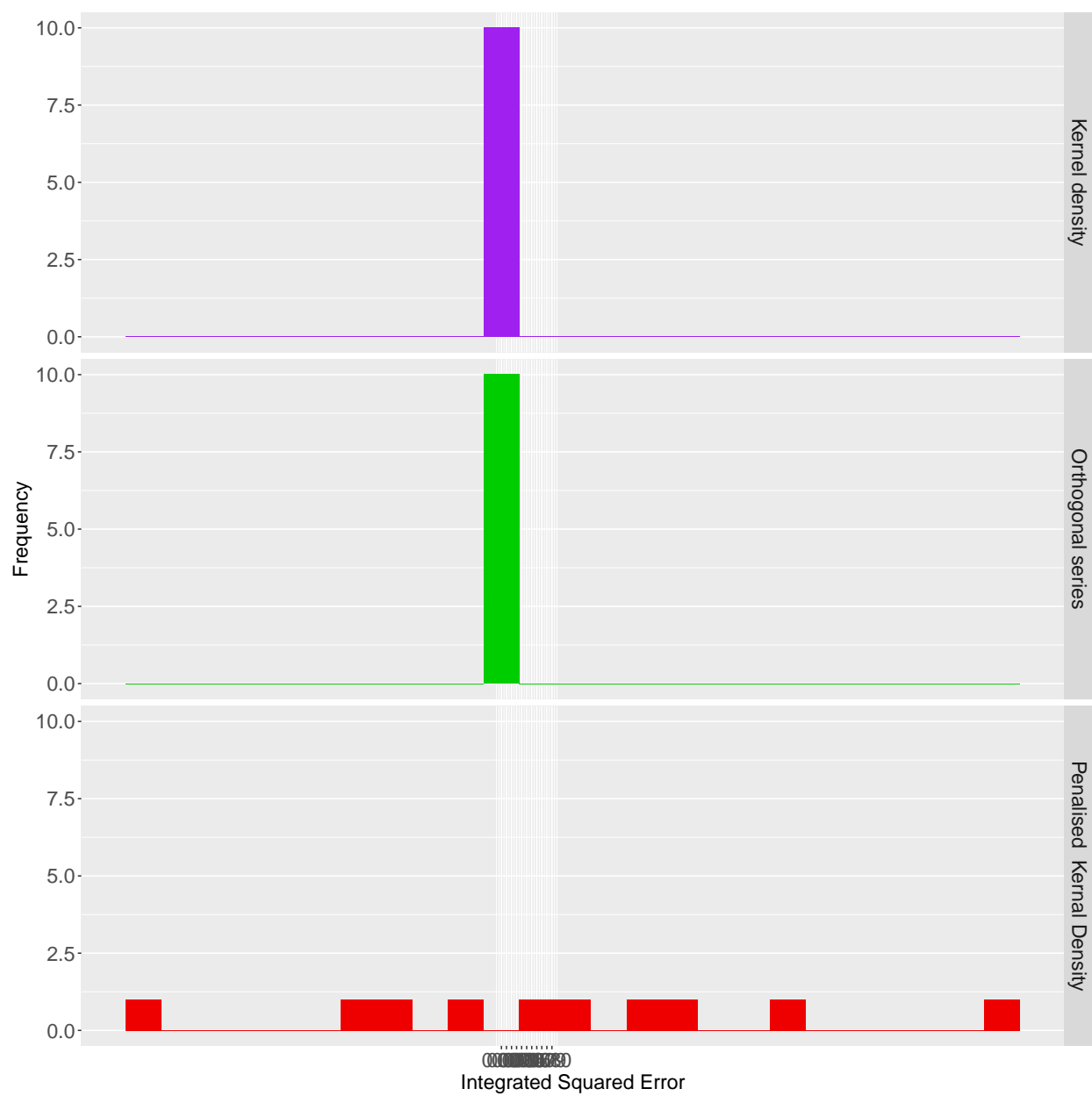


Figure 3: Integrated squared errors with size $n = 250$

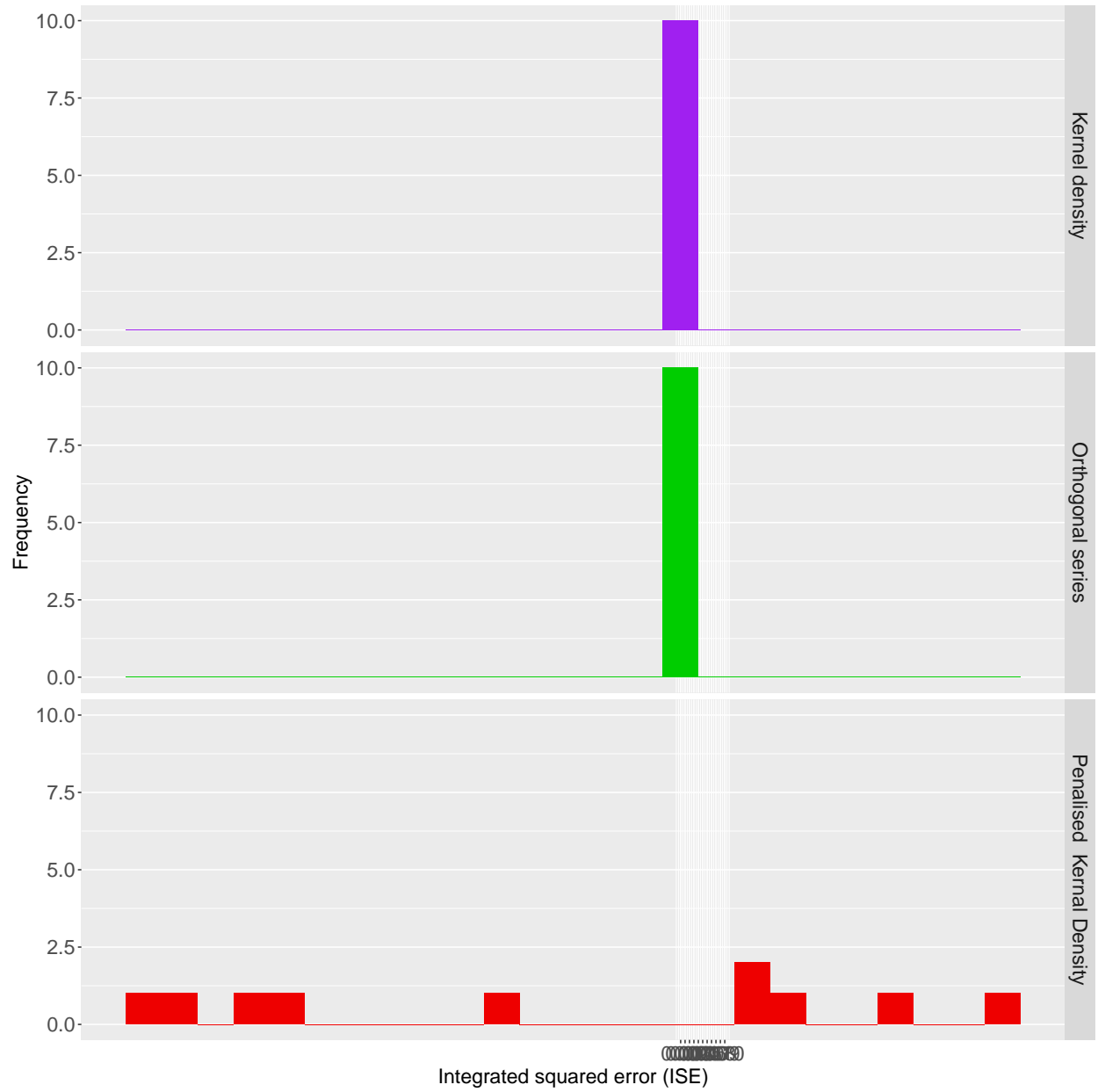


Figure 4: Integrated Squared Errors with size $n = 500$

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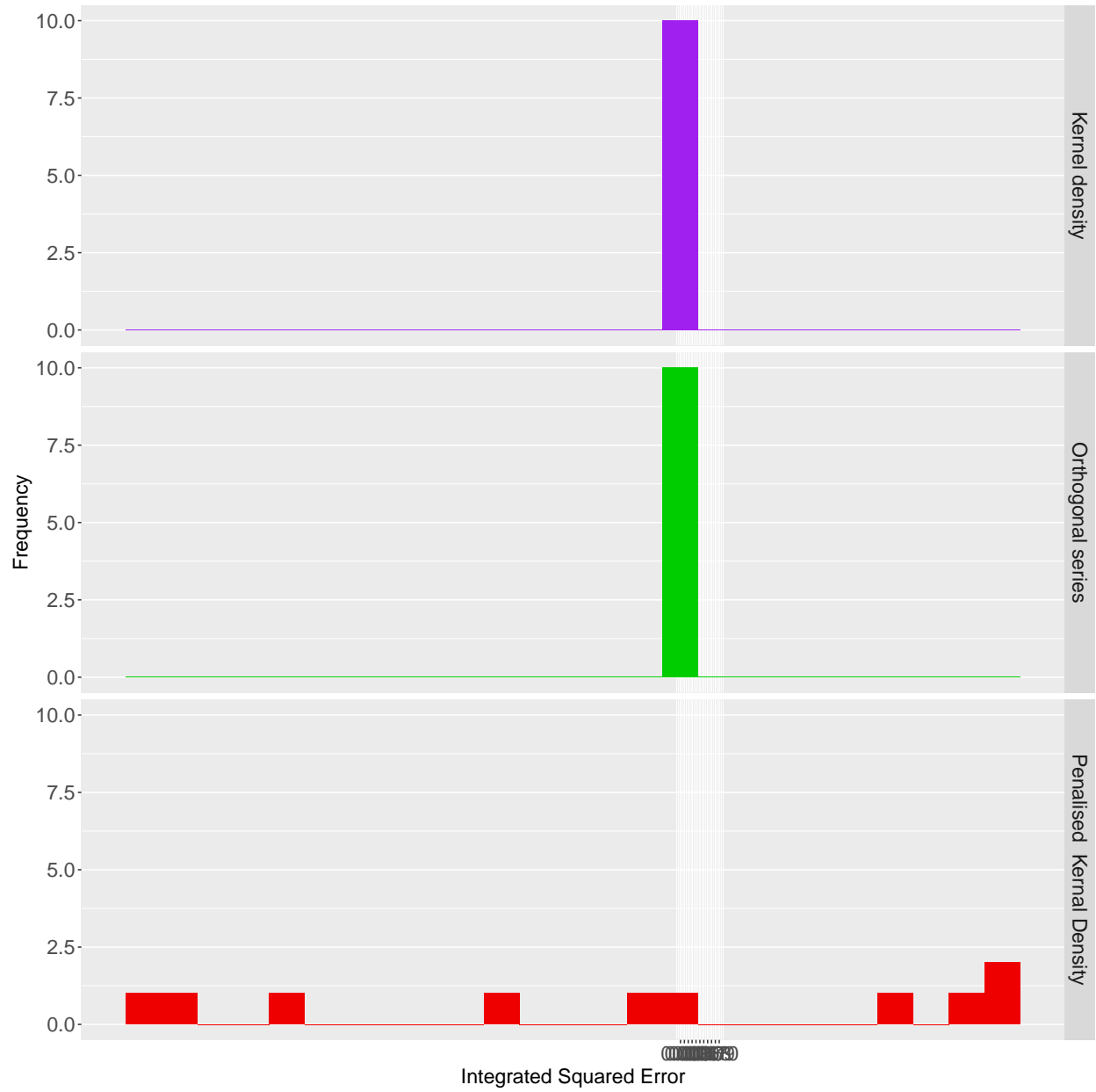


Figure 5: Integrated Squared Errors with size $n = 1000$

5. Conclusion