

Density Histograms and the LLN

Convert counts to relative-frequency density using bin width, read probability from area, and interpret supplied repeated-sampling summaries as evidence of LLN concentration.

1. Repeated iid samples from a population with mean 18.9 produced sample means (add 8.9 to each listed value): n=10: 8.7,11.2,9.4,10.8; n=100: 9.8,10.2,10.1,9.9; n=1000: 10.02,9.98,10.01,9.99. Interpret using the LLN, and distinguish one original observation X from the average Xbar.

Assumptions: Bins are left-closed and right-open; each observation belongs to one bin.
Density equals relative frequency divided by bin width; probability is bar area. LLN summaries use iid samples.

2. Bins [0,1), [1,3), [3,6): widths 1,2,3; counts 10,16,15; total 41. Which bin has greatest density?

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3. Bins [0,1), [1,3), [3,6): widths 1,2,3; counts 9,12,18; total 39. Find each relative-frequency density.

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4. Bins [0,1), [1,3), [3,6): widths 1,2,3; counts 9,10,19; total 38. Find the relative frequency in [1,3) from bar area.

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5. Bins [0,1), [1,3), [3,6): widths 1,2,3; counts 9,11,13; total 33. Explain how count and density heights differ while encoding the same frequencies.

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Density equals relative frequency divided by bin width; probability is bar area. LLN summaries use iid samples.

6. Bins [0,1), [1,3), [3,6): widths 1,2,3; counts 12,13,14; total 39. Which bin has greatest density?

Assumptions: Bins are left-closed and right-open; each observation belongs to one bin.
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7. Bins [0,1), [1,3), [3,6): widths 1,2,3; counts 8,12,13; total 33. Explain how count and density heights differ while encoding the same frequencies.

Assumptions: Bins are left-closed and right-open; each observation belongs to one bin.
Density equals relative frequency divided by bin width; probability is bar area. LLN summaries use iid samples.

8. Bins [0,1), [1,3), [3,6): widths 1,2,3; counts 9,14,14; total 37. Find the relative frequency in [1,3) from bar area.

Assumptions: Bins are left-closed and right-open; each observation belongs to one bin.
Density equals relative frequency divided by bin width; probability is bar area. LLN summaries use iid samples.