Mathematical methods of signal and image processing

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Presence exercise sheet 2

Problem 1

Implement the isodata algorithm (cf. Example 1.13). To compute the histogram, you can reuse the histogram computation from the third problem of the first exercise sheet or use MATLAB's `histcounts` or `numpy`'s `histogram` . Test the algorithm on the image `tafel.png`.

Problem 2

Let $\varphi : [0,1] \to [0,1]$ be increasing (but not necessarily continuous). Show that φ has at least one fixed point, i.e. there is a $s \in [0,1]$ with $\varphi(s) = s$.

Hint: Consider the set $M := \{s \in [0,1] \,:\, s \leq \varphi(s)\}$.

Note: The statement is also true if φ is decreasing. This can be shown analogously using the set $M := \{s \in [0,1] \,:\, s \geq \varphi(s)\}$.