Section 2.4 (Approximate integration of the lifted likelihood)

Algorithm for finding the integration boundaries

**Algorithm 1** Find integration boundaries \([a, b]\)

1: \(\Delta x \leftarrow \frac{b_0 - a_0}{m-1}\)
2: \(y \leftarrow (a_0, a_0 + \Delta x, a_0 + 2 \cdot \Delta x, \ldots, a_0 + m \cdot \Delta x)\)
3: \(f \leftarrow \log l_i(x^i \rightarrow y) = (\log l_i(x^i \rightarrow y_1), \ldots, \log l_i(x^i \rightarrow y_m))\)
4: \(\text{EXPAND} \leftarrow \text{TRUE}\)
5: \(\text{while} \ \text{EXPAND} \ \text{do}\)
6: \(\text{if} \ \ y_1 - \Delta x > a_{\text{min}} \ \text{AND} \ f_1 \geq \max(f) - \text{drop} \ \text{then}\)
7: \(\ y_\text{new} \leftarrow (y_1 - m \cdot \Delta x, y_1 - (m - 1) \cdot \Delta x, \ldots, y_1 - \Delta x)\)
8: \(\ y_{\text{new}} \leftarrow y_{\text{new}}[y_{\text{new}} > a_{\text{min}}]\)
9: \(\ f \leftarrow (\log l_i(x^i \rightarrow y_{\text{new}}), f)\)
10: \(\ y \leftarrow (y_{\text{new}}, y)\)
11: \(\text{else if} \ y_m + \Delta x < b_{\text{max}} \ \text{AND} \ f_m \geq \max(f) - \text{drop} \ \text{then}\)
12: \(\ y_{\text{new}} \leftarrow (y_m + \Delta x, y_m + 2 \cdot \Delta x, \ldots, y_m + m \cdot \Delta x)\)
13: \(\ y_{\text{new}} \leftarrow y_{\text{new}}[y_{\text{new}} < b_{\text{max}}]\)
14: \(\ f \leftarrow (f, \log l_i(x^i \rightarrow y_{\text{new}}))\)
15: \(\ y \leftarrow (y, y_{\text{new}})\)
16: \(\text{else}\)
17: \(\text{EXPAND} \leftarrow \text{FALSE}\)
18: \(\text{end if}\)
19: \(\ m \leftarrow \text{length}(y)\)
20: \(\text{end while}\)
21: \(\ a \leftarrow y_1, b \leftarrow y_m\)