

Algorithm 1 R-CAD(RGB Image)

Input: Original RGB Image, $f(x,y)$ of size $M \times N$ Output: Residual Image, $f'(x, y)$

Forward Transformation:

- 1: Read the RGB image and convert it to grayscale image $g(x,y)$.
- 2: Set $g(0, 0) \leftarrow$ pivot element
- 3: Generate pivot row difference of $f(x,y)$:
- 4: Initialize $i \leftarrow 1$
- 5: Repeat until $i \leq N - 1$
- 6: $R_{diff}(0,i) \leftarrow f(0,i) - f(0,i-1)$
- 7: $f(0,i) \leftarrow R_{diff}(0,i)$
- 8: Generate residual row image, $R_{diff} f(x, y)$ of $f(x,y)$ as follows:
- 9: Initialize $i \leftarrow 0$
- 10: Initialize $j \leftarrow 1$
- 11: Repeat until $i \leq N-1$ and $j \leq M-1$
- 12: $R_{diff}(i,j) \leftarrow f(i,j) - f(i-1,j)$
- 13: Generate pivot Column difference of $f(x,y)$:
- 14: Initialize $i \leftarrow 1$
- 15: Repeat until $i \leq M - 1$
- 16: $C_{diff}(i,0) \leftarrow f(i,0) - f(i-1,0)$
- 17: $f(i,0) \leftarrow C_{diff}(i,0)$
- 18: Generate residual column image, $C_{diff} f(x, y)$ of $f(x,y)$ as follows:
- 19: Initialize $i \leftarrow 0$
- 20: Initialize $j \leftarrow 1$
- 21: Repeat until $i \leq M-1$ and $j \leq N-1$
- 22: $C_{diff}(i,j) \leftarrow f(i,j) - f(i,j-1)$
- 23: Perform averaging operation to generate the residual image, $R_{res}(x,y)$ of $f(x,y)$ as follows:
- 24: Initialize $i \leftarrow 0$ and $j \leftarrow 0$
- 25: Repeat until $i \leq M-1$ and $j \leq N-1$
- 26: $f'(x,y) \leftarrow R_{diff}(i,j) + C_{diff}(i,j)$
- 27: Return $f'(x,y)$