Algorithm $PC = OCPG(\alpha, \mu, K, C)$

**Precondition:** Given a set of CRMBs, $C$, Given iterations $K$.

**Post condition:** A pattern codebook $PC = \{P_1,...,P_\alpha\}$ of $\mu$-pixel content-based patterns;

1. $k = 0$; $\tau = 0$; $\psi_{avg} = \infty$; Replace = 0;
2. WHILE ($k < K$)
3. Randomly generate $\alpha$ number of patterns, $P_1,...,P_\alpha$ of $\mu$-pixel
4. Divide $C$ into $\alpha$ clusters based on the equation (5) using PC or any clustering algorithm.
5. $t = 0$; $\tau = 0$; Calculate $\psi_{avg}^P$ using current PC for all MR.
6. WHILE ($\tau < 100$)
7. For $i=1,...,\alpha$
8.     For $x = 0,...,15$
9.         For $y = 0,...,15$
10.        $P_i(x,y) = 0$;
11.    $T_i(16x + y) = f_i(x,y) = \sum_{j=1}^{256} M_{i,j}(x,y)$ where $M_{i,j}$ is the MR of the $j^{th}$ CRMB in $C_i$;
12. $\{l_1,...,l_{256}\}$ = ranked indices of $T_i$ such that $T_i(l_j) \geq T_i(l_{j+1})$ for $0 \leq j < 255$;
13. For $j=0,...,\mu-1$
14.    $P_i(\lfloor j/16 \rfloor, j \text{ mod } 16) = 1$;
15. Divide $C$ into $\alpha$ clusters based on the equation (5) using new PC and calculate $\tau$ and $\psi_{avg}^C$ for all $M$.
16. IF ($\psi_{avg}^C > \psi_{avg}^P$) exit; ELSE $\psi_{avg}^P = \psi_{avg}^C$ ;
17. $t = t + 1$;
18. IF $\psi_{avg}^P > \psi_{avg}^C$ THEN
19.    $\psi_{avg}^P = \psi_{avg}^C$; $PC = \{P_1,...,P_\alpha\}$
20. $k = k + 1$;