Algorithm: Stage 1 - Segmenting Visual Content

Input : list of strokes, S = $\{s_0, \ldots, s_n\}$

Output: optimal set of visual entities, V_n

for *each* $s_i \in S$ **do**

    //Compute V_i: optimal set of visual entities for all strokes up to s_i

    $E_i = +\infty$ //minimum segmentation score up to s_i

    for *each* $j < i$ **do**

        $S_{ji} = \{s_{j+1}, \ldots s_i\}$

        //Compute V_{ji}: optimal set of visual entities from grouping S_{ji} with V_j

        //(1) Consider merging with previous entity in V_j

        $E_{merge,j} = +\infty$ //minimum score to merge to S_{ji} to V_j

        e_j //best entity in V_j to merge S_{ji}

        for *each visual entity* $e \in V_j$ **do**

            $E_{merge,j,e} \leftarrow$ score to merge S_{ji} with e

            if $E_{merge,j,e} < E_{merge,j}$ **then**

                $E_{merge,j} = E_{merge,j,e}$

                $e_j = e$

        //(2) or forming a new entity in addition to V_j

        $E_{new,j} \leftarrow$ score to form new entity S_{ji}

        //take minimum of (1) and (2)

        if $E_{merge,j,} < E_{new,j}$ **then**

            $E_{ji} = E_{merge,j}$

            $V_{ji} \leftarrow$ merge S_{ji} with $e_j \in V_j$

        else

            $E_{ji} = E_{new,j}$

            $V_{ji} \leftarrow$ add new entity S_{ji} to V_j

        //take minimum over all $j<i$

        if $E_{ji} < E_i$ **then**

            $E_i = E_{ji}$

            $V_i = V_{ji}$