Cell record

Cell:

- id: Int. Unique cell identifier.
- lineage: String. The branch of the cell in the quadtree. It provides position and depth of the cell.
- envelope: Polygon. Geometric representation of the cell.

Lineage example

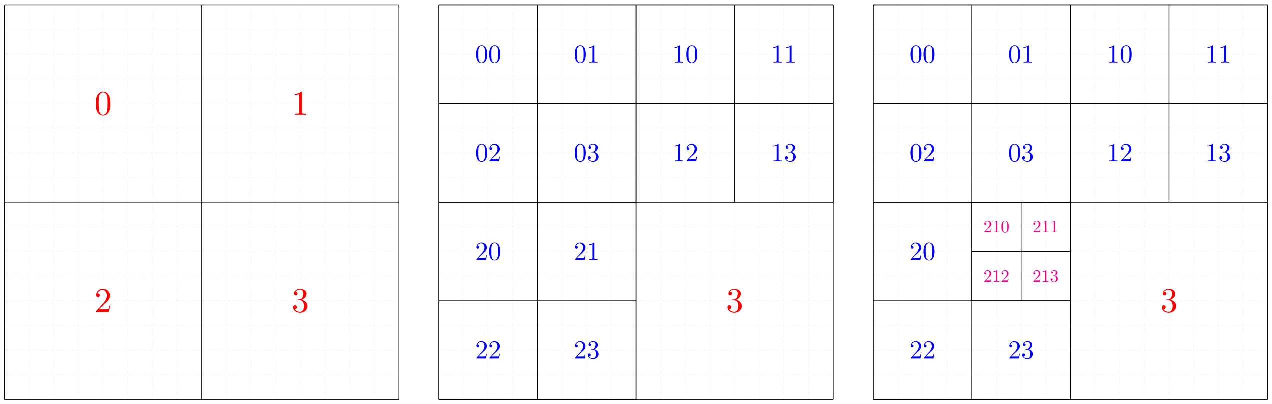

Figure 1: Lineage can provide the cell's position (string's last character) and its depth (string's length).

Algorithms

Algorithm 1 GETNEXTCELLWITHEDGES algorithm

Require: a quadtree with cell envelopes $\mathcal{Q}$ and map of cells and their edge count $\mathcal{M}$.

```
function GETNEXTCELLWITHEDGES ( $\mathcal{Q}$, $\mathcal{M}$ )
    $\mathcal{C} \leftarrow$ list of empty cells in $\mathcal{M}$
    for each $emptyCell$ in $\mathcal{C}$ do
        initialize $cellList$ with $emptyCell$
        $done \leftarrow false$
        repeat
            $c \leftarrow$ last cell in $cellList$
            $cells, corner \leftarrow$ GETCELLSINCORNER($\mathcal{Q}, c$)    ▷ return 3 cells and the reference corner
            for each $cell$ in $cells$ do
                check $cell$ in $\mathcal{M}$    ▷ using $cell.id$
                if $cell$ has edges then
                    output ($cellList$, $cell$, $corner$)
                    $done \leftarrow true$
                end if
            end for
            if not $done$ then
                $nextCell \leftarrow$ the deepest $cell$ in $cells$    ▷ using $cell.lineage$
                add $nextCell$ to $cellList$
            end if
        until $done$
    end for
end function
```

Algorithm 2 GETCELLSINCORNER algorithm

```
Require: a quadtree with cell envelopes $\mathcal{Q}$ and a cell $c$.
function GETCELLSINCORNER ( $\mathcal{Q}$, $c$ )
    $region \leftarrow$ last character in $c.lineage$
    switch $region$ do
        case '0'
            $corner \leftarrow$ left bottom corner of $c.envelope$
        case '1'
            $corner \leftarrow$ right bottom corner of $c.envelope$
        case '2'
            $corner \leftarrow$ left upper corner of $c.envelope$
        case '3'
            $corner \leftarrow$ right upper corner of $c.envelope$
    $cells \leftarrow$ cells which intersect $corner$ in $\mathcal{Q}$
    $cells \leftarrow cells - c$                ▷ Remove the current cell from the intersected cells
    return ($cells$, $corner$)
end function
```

Algorithms example