QuadTrees

1. A hierarchical representation of an image.
2. Consider a black/white picture stored on an \(2^h \times 2^h\) grid.
3. Each node \(v\) corresponds to a region \(R(v)\) of the image.
4. A leaf is fully green or fully yellow.

\[
\begin{array}{c|c|c|c}
0 & 1 & 11 \\
2 & 3 &
\end{array}
\]

ConstructQT (input – a shape \(R(v)\). Output – a Quadtree corresponding to \(R\)).

- If \(R(v)\) is green, or \(R(v)\) is fully yellow – store \(v\) as a leaf labeled green/yellow
- Otherwise, divide the shape into 4 equal-size quadrants NW, NE, SW, SE
- Call ConstructQT recursively for each quadrant.
- Create an internal node \(v\) having 4 children, corresponding to the 4 quadrants.
R \(v\).

QuadTrees properties:
- Every node is represented as an array of 4 children, and a color field.
- No need to store coordinates at nodes (how?)
- Different leaves have different heights (I.e. – tree not balanced)
- Height of tree – at most \(h\).