A Morphological Approach for Interactive Segmentation with the Color Tree of Shapes

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At a Glance

\textbf{Motivation.}
→ The Tree of Shapes (ToS) provides a \textit{high-level representation of images}. It is the tree of inclusion of the level lines.
→ The novel Color Tree of Shapes (CToS) extends the ToS for color images.

\textbf{Objective.} Show the versatility, easy-to-use, efficiency of this new structure through an app.: the interactive segmentation.

\textbf{Contribution.} A method that:
• does not use any statistical learning,
• requires few user scribbles,
• uses \textit{simple} tree processing algorithms.

About the (Color) Tree of Shapes

\begin{itemize}
  \item Level lines representation
  \item Featuring
\end{itemize}

\begin{itemize}
  \item Connected components without hole
  \item (marginal) contrast change invariance
  \item (marginal) contrast inversion invariance
  \item Many other morphological invariances
\end{itemize}

Method description

1. Compute the CToS $T(u)$ of the image $u$,
2. Evaluate $T(u)$’s edges with the distance between nodes (distance between the average colors),
3. Transpose the user’s scribbles on $T(u)$, it gives two seed sets of node for the foreground ($F$) and the background ($B$),
4. Classify every non-seed node as $F$ or $B$ by computing its distance to the seed nodes using $T(u)$’s topology, and retrieving the label of the closest seed node,
5. Reconstruct the image from the labels of $T(u)$,
6. Cleanup: keep significant foreground connected components only.

Some results

Object picking with our method. Red and blue user scribbles define the background $B$ and the foreground $F$ respectively. The white line is the computed $F/B$ boundary.

References