SIFT descriptor to set landmark on biological images

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Context

- Morphometry analysis is a way to characterize the shape variations of the organisms,
- Morphometric characteristics have been used to evaluate the evolution of an organism or classification.
- ...

Segmentation

- Converting the image to binary by applying binary threshold. The threshold value is determined by analysing histogram[?].
- Contours points are extracted by Canny algorithm[?].
- The threshold ratio in Canny: $T_{lower} = (1/3) \times T_{upper}$

Manual landmarks

- Morphometric landmarks are points that are a kind of points of interest,
- Landmarks are along an image outline and contain a lot of important information,
- They are defined by the biologists.

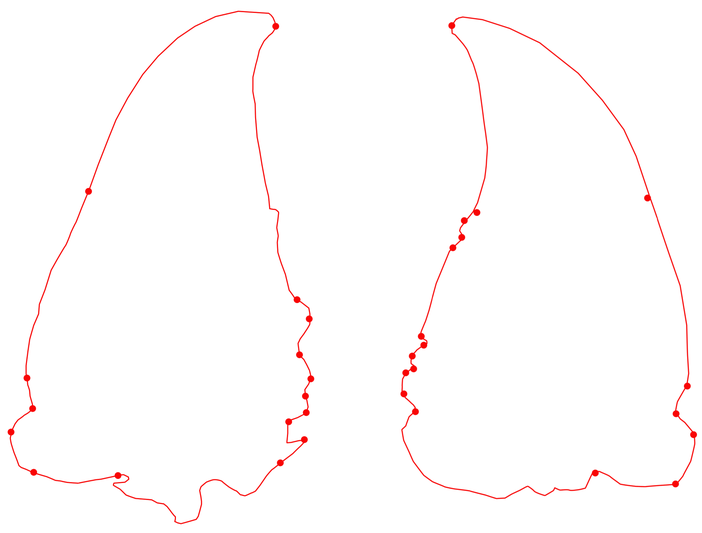


Fig. 2: The mandibles with manual landmarks

How to locate the landmarks automatically?

Registration

There are three types of colored boxes/blocks that you can use inside block nodes to highlight information.

Theorem
Statement

```
\innerblock{Theorem}{Statement}
```

Text

```
\innerblockplain[colorone!80!]{Text}
```

Text

```
\coloredbox{colorthree!50!}{Text}
```

The default figure environment does not work within a tikzpicture. I created a new figure environment that can be used instead, based on the code sent by Stephan Thober.

```
\begin{tikzfigure}[Caption]
...
\end{tikzfigure}
```

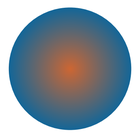
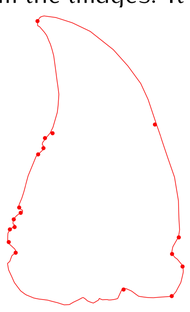


Fig. 6: A shaded circle

SIFT and landmarks

SIFT[?] is used to extract distinctive features from the images. It includes four steps:

- Scale-space extrema detection
- Keypoints localization
- Orientation assigment
- Keypoint descriptor



The original SIFT outputs many candidates for landmarks.
Solution: Limiting the searching space before computing the SIFT descriptors.

Result

It is possible to adjust the layout of the poster. To impose your own setting, you can use these macros:

- Macros for changing sizes

  \setmargin{4}, \setheaddrawingheight{14}, \setinstituteshift{10}, \setblockspacing{2}, \setblocktitleheight{3}

- Other structural macros

  \setcolumnnumber{3}, \usetemplate{6}, \usecolortemplate{4}, \usebackgroundtemplate{5}, \usetitletemplate{2}, \useblocknodetemplate{5}, \useinnerblocktemplate{3}, \useplainblocktemplate{4}

- Macro for adding logos to the title block

  \addlogo[south west]{(0,0)}{6cm}{filename}

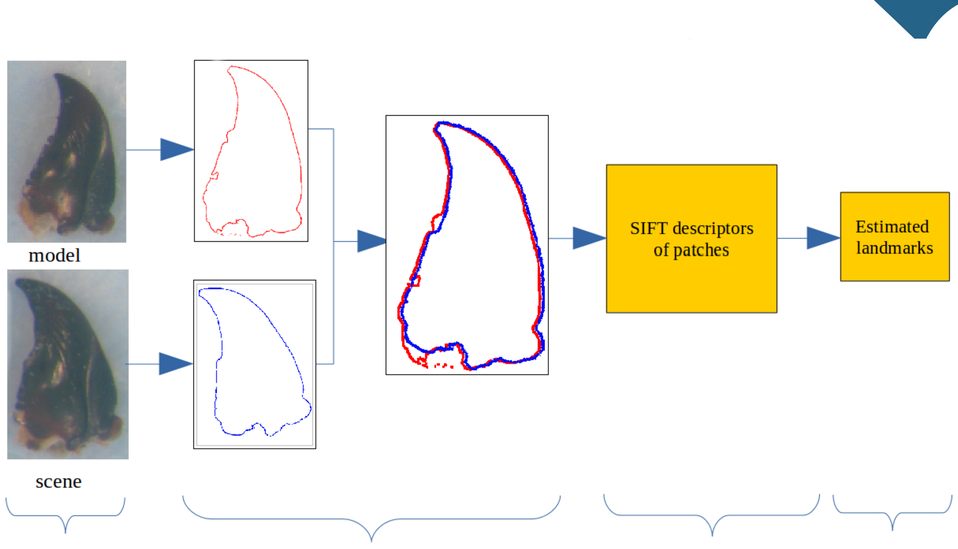
- Macros for the basic colors

  \setfirstcolor{green!70!}, \setsecondcolor{gray!80!}, \setthirdcolor{red!80!black}

- Macros for specific colors:

  \setbackgrounddarkcolor{colorone!70!black}, \setbackgroundlightcolor{colorone!70!}, \settitletextcolor{textcolor}, \settitlefillcolor{white}, \settitledrawcolor{colortwo}, \setblocktextcolor{textcolor}, \setblockfillcolor{white}, \setblocktitletextcolor{colorone}, \setblocktitlefillcolor{colortwo}, \setplainblocktextcolor{textcolor}, \setplainblockfillcolor{colorthree!40}, \setplainblocktitletextcolor{textcolor}, \setplainblocktitlefillcolor{colorthree!60}, \setinnerblocktextcolor{textcolor}, \setinnerblockfillcolor{white}, \setinnerblocktitletextcolor{white}, \setinnerblocktitlefillcolor{colorthree},

Proposed method



Bibliography

To start the second column or the third column use commands

\startsecondcolumn, and \startthirdcolumn.

If the number of columns is 2, then the last command will not have effect.

You can also start a new column with an arbitrary x-coordinate by specifying explicitly the coordinate of the new block node as follows:

```
\blocknode[($(firstrow)-(yshift)+(x,0)$)]{Block Title}{Block Content}
```