We consider the generalization of Wide (geometric) Baseline Stereo to WxBs, a two-view image matching problem where two or more of the image formation and acquisition properties significantly change, i.e. they have a wide baseline.

The following single wide baseline stereo problems and their combinations are considered: illumination (WBS) – difference in position, direction, number, intensity and wavelength of light sources; geometry (WGBS) – difference in camera and object pose, scale and resolution - the “classical” WBS; sensor (WBS) – change in sensor type: visible, IR, MR; noise, image preprocessing algorithms inside the camera, etc; appearance (WABS) – difference in the object appearance because of time or seasonal changes, occlusions, turbulent air, etc.

We present a new public dataset (see Figure 1) with ground truth for Iter. a matcher for wide multiple baseline stereo

\begin{algorithm}
\caption{MODS-WxBS} 
\begin{algorithmic}
\Require $I_1, I_2$ – two images; $\theta_0$ – minimum required number of matches; $S_{max}$ – maximum number of iterations.
\Ensure a list of corresponding local features.
\While {\left( \frac{N_{matches}}{\theta_0} < 1 \right) \text{ and } (\text{Iter} < S_{max})}
\For {$I_1$ and $I_2$ separately}
\State 1. Generate synthetic views acc. to the scale-tilt-rotation-detector setup for Iter.
\State 2. Detect local features using adaptive threshold.
\State 3. Extract rotation invariant descriptors with: $3a$ rSIFT and $3b$ hrSIFT
\State 4. Reproject local features to $I_1$.
\EndFor
\State 5. Generate tentative correspondences based on the first geom.inconsistent rule for rSIFT and hrSIFT separately using KD-tree
\State 6. Filter duplicates
\State 7. Geometric verification of all TC with modified DEGENSAC estimating $F$ or $H$
\State 8. Check geom. consistency of the LAFs with est. $F$ or $H$
\EndWhile
\end{algorithmic}
\end{algorithm}

We propose a novel algorithm for two-view matching in challenging conditions – WxBS-MODS (Algorithm 1). It significantly outperforms the state-of-the-art matchers: ASIFT [2], Dual Bootstrap (DBstrap) [3] and MODS [1] on various WxBS problems without a significant loss of speed (Table 1).

![Examples of image pairs from the WxBS dataset](image.png)

Table 1: Comparison of MODS-WxBS, ASIFT and Dual Bootstrap on public datasets.

<table>
<thead>
<tr>
<th>Alg. / Dataset</th>
<th>EF # time</th>
<th>EVD # time</th>
<th>MMS # time</th>
<th>WGBS # time</th>
<th>WGBS # time</th>
<th>WGBS # time</th>
<th>WGBS # time</th>
<th>Past # time</th>
<th>OxAff # time</th>
<th>SymB # time</th>
<th>GDB # time</th>
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<td>18</td>
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<td>MODS</td>
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<td>11</td>
<td>11</td>
<td>2</td>
<td>41</td>
<td>31</td>
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<tr>
<td>DBstrap</td>
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<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>

The number of matched image pairs (left) and the average running time (right).