Plane rectification in real time on an Android device

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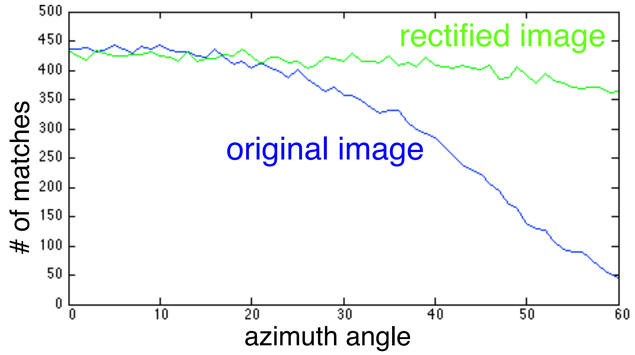
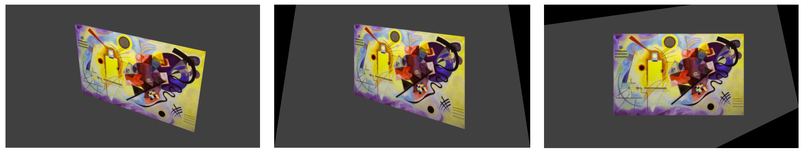
Motivation: Many very reliable feature detectors/descriptors like SIFT are not viewpoint invariant. This performance drop could be avoided by rectifying the image as a preprocessing step. In this project, we are trying to run this step in real time using the sensors of our device.



Underlying idea



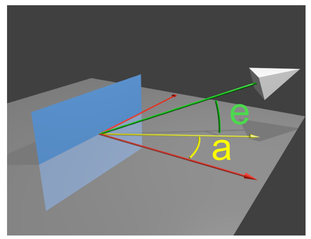
Original view
a = 30°
e = 20°

Partially rectified
a = 30°
e = 0°

Fully rectified
a = 0°
e = 0°

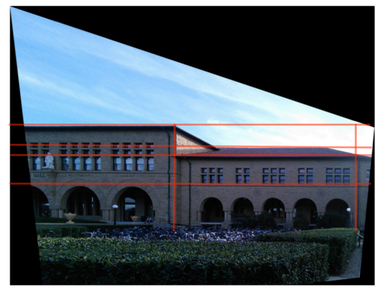
gravity direction

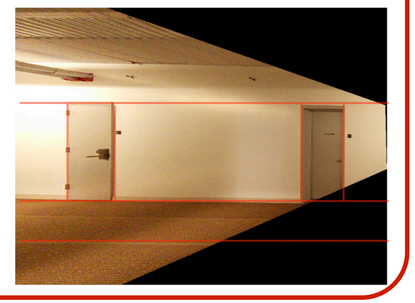
1D vanishing point search



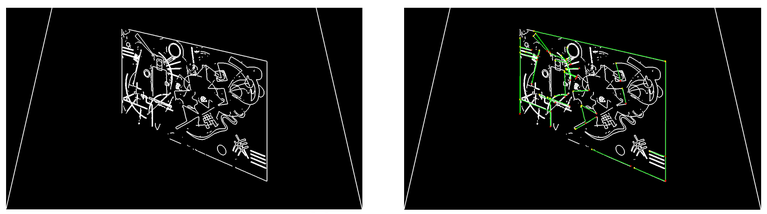
The gravity direction constrains our problem to a line search of the vanishing point.

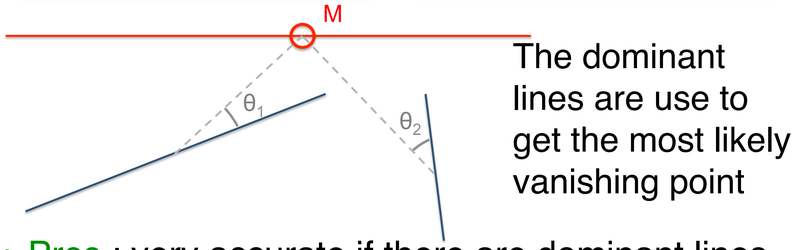
Some results on real data





Line based approach

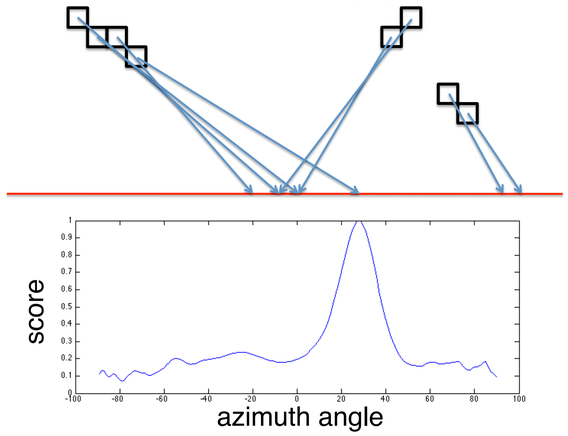




The dominant lines are use to get the most likely vanishing point

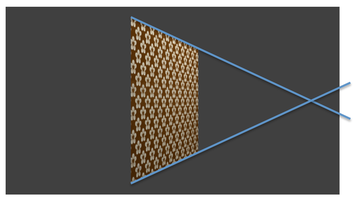
- Pros : very accurate if there are dominant lines
- Cons : a bit slow in real time

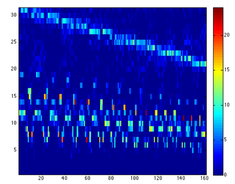
Pixel based approach



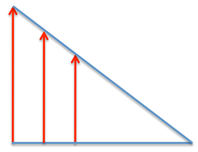
- Pros : much faster than the previous approach
- Cons : less accurate and robust

Texture based approach





Typical scale of the signal on a column



Wavelet analysis allows us to get the typical scales on each column

- Pros : can work in very exotic cases
- Cons : does not work for all textures, not practical in real time