CMSC 23710 Project 3: Derivatives and Isocontours

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0.1 Aspect ratios

0.2 Derivatives

Explain: *Knowing that the rings here are circular, how are you able to assess the correctness of your result?*

Since the rings are circular, the magnitude of the gradient should be radially symmetric and the plot of $\frac{\partial}{\partial x}$ should match that of $\frac{\partial}{\partial y}$ up to a 90° rotation. Just by visual inspection, my results seem to meet both conditions.

Explain: *In the CT foot data, what properties or features are made more visible by either of these derivative images?*

The gradient visualisation makes edges more visible. Since X-ray opacity roughly correlates with density, transitions between materials appear as sudden changes in opacity. Right at the transition, the gradient has large magnitude, so the foot and then the bones are outlined in white.

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no"?>
<svg xmlns="http://www.w3.org/2000/svg" version="1.1" x="teddy"
  xmlns:xlink="http://www.w3.org/1999/xlink"  >
  <g transform="scale(1,3.61)"  >
    <image xlink:href="../data/teddy.png" height="63" width="411" y="0" x="0" />
  </g>
</svg>
```

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no"?>
<svg xmlns="http://www.w3.org/2000/svg" version="1.1" x="feeth"
  xmlns:xlink="http://www.w3.org/1999/xlink"  >
  <g transform="scale(1,1.39)" >
    <image xlink:href="../data/feeth.png" height="256" width="350" y="0" x="0" />
  </g>
</svg>
```

Figure 0.1: SVG to correct the aspect ratios on `teddy.png` and `feeth.png`