Preparation of whole slide images for usage in neural networks

A Thesis

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Deep Zoom Image Format

The Deep Zoom Image Format (.dzi) is an xml-based file format maintained by Microsoft[1] to improve performance and quality in the handling of large image files. Therefore an image will be represented in a tiled pyramid scheme (see fig. 2.1).

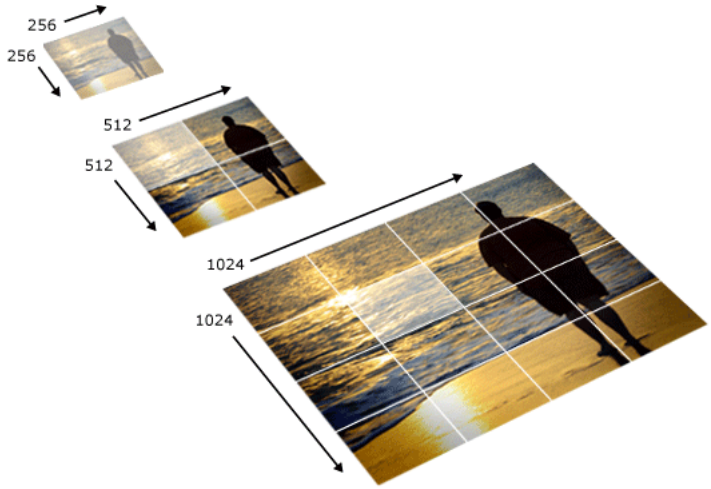

Figure 2.1: example of the dzi pyramid image representation (source: https://i-msdn.sec.s-msft.com/dynimg/IC141135.png)

[1] See https://msdn.microsoft.com/en-us/library/cc645077(v=vs.95).aspx for further details.

As seen in fig. 2.1 there are multiple versions of a single image in different resolutions. The idea behind this is, that if a user wants to see a whole picture zoomed out or as a small thumbnail, it is not necessary to load the image file in its highest resolution. To save bandwidth a version with a smaller resolution is loaded. If the user wishes to zoom in on a specific area of the image, a version with a higher resolution is loaded. Once again, however, it is not necessary to load the whole image, since only a fraction of it will be visible. For this reason there are tiles of the image which are loaded instead (see highlited tiles in fig. 2.1).

Each resolution in the pyramid is called a *level*. At each level the image is scaled down by the factor 4 (2 in each dimension). In other words, a level can be defined as an image with the resolution 2*level for height and width, resulting in a resolution of (2*level)*(2*level). Levels are counted from level 0 (1*1 Pixel). E.g. the levels shown in fig. 2.1 are:

- level 8 ($2^8 = 256$) for the 256^2 pixel image
- level 9 ($2^9 = 512$) for the 512^2 pixel image
- level 10 ($2^10 = 1024$) for the 1024^2 pixel image

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