

Compression in Virtual Microscopy: How low can you go?

D McCleary¹, J Diamond¹, D Crookes², H Grabsch³,
PW Hamilton¹

¹Bioimaging and Informatics Research Group. Centre for Cancer Research and Cell Biology, Queen's University Belfast,

²School of Electronics, Electrical Engineering and Computer Science, Queen's University Belfast,

³Section of Pathology and Tumour Biology, Leeds Institute of Molecular Medicine, University of Leeds

Virtual slides are high resolution images of tissue specimens and can result in images in excess of 20GB in size when stored uncompressed. There are a number of compression algorithms available to reduce image size however lossy compression also reduces image quality impacting on visual inspection. The aim of this study was to establish which compression technology is most effective at compressing virtual slides and to quantify how much they can be compressed without compromising image quality. Images were compressed using jpeg and jpeg2000 at a non-linear rate biased towards higher compression rates. Images were assessed by visual inspection by experienced scientists/pathologists who used a tool specifically designed by the author to display the original image and an image of an unknown compression on screen. The pathologist recorded the extent to which any differences could be seen between the compressed and uncompressed images on a linear scale from 1 – 4. Results show that jpeg2000 is a superior compression algorithm, compressing the images to a smaller file size with less obvious compression artefacts, however compression time is 3x slower than jpeg. Images can be compressed significantly, reducing file size by a factor of 40 without the majority of pathologists noticing any differences between the compressed image and the original. By compressing images not only do we free up valuable hard disk space but we also significantly speedup the online delivery of virtual slides, bringing virtual microscopy one step closer to routine use in clinical pathology.