0.5 gigapixel microscopy using a flatbed scanner: erratum

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Abstract: When one uses USAF target to calibrate the resolution of an imaging system, the periodicity of the smallest resolvable line should be used to define the limit. However, in the original paper, the line width of the resolution target was used to characterize the resolution of our microscope system, resulting in an overestimation of the performance of the imaging system. In this erratum, we correct the parts that state incorrect resolution and also re-evaluate the performance of our micoscope.

OCIS codes: (120.4820) Optical systems; (170.0180) Microscopy; (170.4730) Optical pathology.

References and links

1. G. Zheng, X. Ou, and C. Yang, "0.5 gigapixel microscopy using a flatbed scanner," Biomed. Opt. Express **5**(1), 1–8 (2014).

In section 4 of the original paper [1], we characterized the resolution of our imaging system using a USAF target. In the experiment, group 9 element 3 (0.78 µm line width) of the resolution target was resolved, and we stated that *'This establishes the resolution of our prototype system under the quasi-monochromatic 530 nm illumination, as 0.78 µm over the entire FOV.'* Here, we correct the statement as follows: This establishes the resolution of our prototype system under the quasi-monochromatic 530 nm illumination as 1.56 µm over the entire FOV. We also stated that *'the effective pixel size at the object plane should be less than 0.39 µm (0.78 µm divided by 2).'* We correct the statement as: the effective pixel size at the object plane should be less than 0.78 µm (1.56 µm divided by 2).

Because of the change of the resolution, the space-bandwidth product (SBP) of the imaging system needs to be recalculated. The imaging system has a field-of-view (FOV) of 10 mm × 7.5 mm, with effective pixel size of 0.78 µm x 0.78 µm, resulting in an SBP of 0.12 gigapixel. We hereby state that the previous estimation of a 0.5 gigapixel microscopy is incorrect. Instead, we got a microscope system with 0.12 gigapixel. In the following paragraphs, we listed all the incorrect statements and correct them accordingly.

In the abstract, we stated that: *'We show that such an imaging system is capable of capturing a 10 mm × 7.5 mm FOV image with 0.78 µm resolution, resulting in more than 0.5 billion pixels across the entire image... To demonstrate its application, 0.5 gigapixel images of histology slides were acquired using this system.'* We correct the statement as: We show that such an imaging system is capable of capturing a 10 mm × 7.5 mm FOV image with 1.56 µm resolution, resulting in more than 0.12 billion pixels across the entire image... To demonstrate its application, 0.12 gigapixel images of histology slides were acquired using this system.

In the second last paragraph of section 1, we stated that: *'We show that such a system is capable of capturing a 0.5-gigapixel pixel image with a FOV of 75 mm^2 and a resolution of 0.78 µm. Remarkably, the CCTV lens has a SBP of at least 0.5 gigapixel (10^{9}pixels), two orders of magnitude larger than conventional microscope objectives.'* We correct the statement as: We show that such a system is capable of capturing a 0.12-gigapixel pixel image with an FOV of 75 mm^2 and a resolution of 1.56 µm. Remarkably, the CCTV lens has

#257387 Received 13 Jan 2016; published 21 Jan 2016

an SBP of at least 0.12 gigapixel (10^9pixels), one order of magnitude larger than conventional microscope objectives.

The title of section 2 was: *'The prototype setup of the 0.5 gigapixel microscopy imaging system'*, but it should be 'The prototype setup of the 0.12 gigapixel microscopy imaging system'.

In section 6, we stated that *'In summary, we report a wide-FOV (10 mm × 7.5 mm) microscopy system which can generate a 0.5 gigapixel image with 0.78 µm resolution across the entire FOV.'* We correct the statement as: In summary, we report a wide-FOV (10 mm × 7.5 mm) microscopy system which can generate a 0.12 gigapixel image with 1.56 µm resolution across the entire FOV. We stated that: *'Compared to typical 10 × and 4 × objectives, our system has both superior SBP and resolution.'* We correct the statement as: Compared to typical 4 × objectives, our system has both superior SBP and resolution.

We also need to relabel the position of our CCTV lens in the space-bandwidth product plot shown in Fig. 7. The relabeled coordinate is shown as follows:

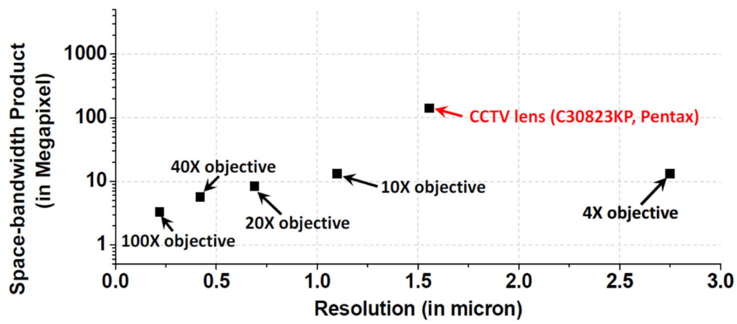

Fig. 7. The SBP-resolution summary for microscope objectives and our current CCTV lensbased system.

#257387 Received 13 Jan 2016; published 21 Jan 2016
