

SN-AM Dataset: White Blood cancer dataset of B-ALL and MM for stain normalization

Summary

Microscopic images were captured from bone marrow aspirate slides of patients diagnosed with B-lineage Acute Lymphoid Leukemia (B-ALL) and Multiple Myeloma (MM) as per the standard guidelines. Slides were stained using Jenner-Giemsa stain. Images were captured at 1000x magnification using Nikon Eclipse-200 microscope equipped with a digital camera. Images were captured in raw BMP format with a size of 2560x1920 pixels. In all, this dataset consists of 90 images of B-ALL and 100 images of MM. Both MM and B-ALL images have sufficient variability from one image to another image to rigorously test any stain normalization methodology developed. More information about each subset are provided on the Detailed Description tab below.


Additional Publications using this dataset:

- Ritu Gupta, Prमित Mallick, Rahul Duggal, Anubha Gupta, and Ojaswa Sharma, "Stain Color Normalization and Segmentation of Plasma Cells in Microscopic Images as a Prelude to Development of Computer Assisted Automated Disease Diagnostic Tool in Multiple Myeloma," 16th International Myeloma Workshop (IMW), India, March 2017.
- Rahul Duggal, Anubha Gupta, Ritu Gupta, and Prमित Mallick, "SD-Layer: Stain Deconvolutional Layer for CNNs in Medical Microscopic Imaging," In: Descoteaux M., Maier-Hein L., Franz A., Jannin P., Collins D., Duchesne S. (eds) Medical Image Computing and Computer-Assisted Intervention MICCAI 2017, MICCAI 2017. Lecture Notes in Computer Science, Part III, LNCS 10435, pp. 435–443. Springer, Cham. DOI: https://doi.org/10.1007/978-3-319-66179-7_50.
- Rahul Duggal, Anubha Gupta, Ritu Gupta, Manya Wadhwa, and Chirag Ahuja, "Overlapping Cell Nuclei Segmentation in Microscopic Images Using Deep Belief Networks," Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP), India, December 2016.

Data Access

Data Access

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Data Type	Download all or Query/Filter
Images (BMP, TIFF, 2.9 GB)	

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Detailed Description

Detailed Description

Image Statistics	
Modalities	Pathology
Number of Participants	16
Number of Studies	60
Number of Images	190

Images Size (GB)	2.9
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Data subset-1: ALL images

Microscopic images were captured from bone marrow aspirate slides of patients diagnosed with B-lineage Acute Lymphoblastic Leukemia (B-ALL). Slides were stained using Jenner-Giemsa stain and lymphoblasts, that are cells of interest, have been evaluated. Images were captured in raw BMP format with a size of 2560x1920 pixels using Nikon Eclipse-200 microscope equipped with a digital camera at 1000x magnification. In all, this dataset consists of 30 images, wherein one image has been used as the reference image and the proposed stain normalization method has been tested on 29 images. For each of these 30 images, we have also provided two additional images that contain the nucleus mask and the background mask, respectively, for that particular image. For example, if the original file is saved with the name “ALL_1.bmp”, the corresponding image with mask on the nuclei is saved as “ALL_1_nucleus_mask.bmp”, and the corresponding image with mask on the background is saved as “ALL_1_background_mask.bmp. Thus, in all, we have 90 images for this dataset.

Data subset-2: MM images

The third data subset contains microscopic images captured from slides prepared from bone marrow aspirate collected from patients with Multiple Myeloma (MM). Slides are stained using Jenner-Giemsa stain and plasma cells, that are cells of interest, have been evaluated. A total of 30 images have been considered, wherein one image has been used as the reference image to which 29 images have been stain normalized. For each of these 30 images, we have also provided two additional images that contain the nucleus mask and the background mask, respectively, for that particular image. For example, if the original file is saved with the name “MM_1.bmp”, the corresponding image with mask on the nuclei is saved as “MM_1_nucleus_mask.bmp”, and the corresponding image with mask on the background is saved as “MM_1_background_mask.bmp. In addition, for 17 images, the mask images are also provided for the cytoplasm of the plasma cells, namely, “MM_1_cyto_mask.bmp. Thus, in all, we have 100 images for this dataset.

Citations & Data Usage Policy

Citations & Data Usage Policy

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Data Citation

Gupta, A., & Gupta, R. (2019). **SN-AM Dataset: White Blood Cancer Dataset of B-ALL and MM for Stain Normalization [Data set]**. The Cancer Imaging Archive. <https://doi.org/10.7937/tcia.2019.of2w8lxr>

Publication Citation

- Anubha Gupta, Rahul Duggal, Shiv Gehlot, Ritu Gupta, Anvit Mangal, Lalit Kumar, Nisarg Thakkar, and Devprakash Satpathy, "GCTI-SN: Geometry-Inspired Chemical and Tissue Invariant Stain Normalization of Microscopic Medical Images," *Medical Image Analysis*, vol. 65, Oct 2020. DOI: <https://doi.org/10.1016/j.media.2020.101788>.
- Anubha Gupta, Pramit Mallick, Ojaswa Sharma, Ritu Gupta, and Rahul Duggal, "PCSeg: Color model driven probabilistic multiphase level set based tool for plasma cell segmentation in multiple myeloma," *PLoS ONE* 13(12): e0207908, Dec 2018, DOI: <https://doi.org/10.1371/journal.pone.0207908>.

TCIA Citation

Clark K, Vendt B, Smith K, Freymann J, Kirby J, Koppel P, Moore S, Phillips S, Maffitt D, Pringle M, Tarbox L, Prior F. **The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository**, *Journal of Digital Imaging*, Volume 26, Number 6, December, 2013, pp 1045-1057. DOI: [10.1007/s10278-013-9622-7](https://doi.org/10.1007/s10278-013-9622-7)

Other Publications Using This Data

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Versions

Version 1 (Current): Updated 2019/03/26

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