

## BIBLIOGRAPHIES

- Adnan, M., Kalra, S., & Tizhoosh, H. R. (2020). Representation learning of histopathology images using graph neural networks. *IEEE Computer Society Conference on Computer Vision and Pattern Recognition Workshops*, 2020-June, 4254–4261. <https://doi.org/10.1109/CVPRW50498.2020.00502>
- Amores, J. (2013). Multiple instance classification: Review, taxonomy and comparative study. *Artificial Intelligence*, 201, 81–105. <https://doi.org/10.1016/j.artint.2013.06.003>
- Bejnordi, B. E., Veta, M., Van Diest, P. J., Van Ginneken, B., Karssemeijer, N., Litjens, G., Van Der Laak, J. A. W. M., Hermesen, M., Manson, Q. F., & Balkenhol, M. (2017). Diagnostic assessment of deep learning algorithms for detection of lymph node metastases in women with breast cancer. *Jama*, 318(22), 2199–2210.
- Bengio, Y., Mesnil, G., Dauphin, Y., & Rifai, S. (2013). Better mixing via deep representations. *International Conference on Machine Learning*, 552–560.
- Bholowalia, P., & Kumar, A. (2014). EBK-means: A clustering technique based on elbow method and k-means in WSN. *International Journal of Computer Applications*, 105(9).
- Bishop, C. M. (1995). *Neural networks for pattern recognition*. Oxford university press.
- Campanella, G., Hanna, M. G., Geneslaw, L., Miraflor, A., Silva, W. K., Busam, K. J., Brogi, E., Reuter, V. E., Klimstra, D. S., & Fuchs, T. J. (2020). *Clinical-grade computational pathology using weakly supervised deep learning on whole slide images*. 25(8), 1301–1309. <https://doi.org/10.1038/s41591-019-0508-1>.Clinical-grade
- Carbonneau, M. A., Cheplygina, V., Granger, E., & Gagnon, G. (2018). Multiple instance learning: A survey of problem characteristics and applications. *Pattern Recognition*, 77, 329–353. <https://doi.org/10.1016/j.patcog.2017.10.009>
- Caron, M., Touvron, H., Misra, I., Jégou, H., Mairal, J., Bojanowski, P., & Joulin, A. (2021). Emerging properties in self-supervised vision transformers. *Proceedings of the IEEE/CVF International Conference on Computer Vision*, 9650–9660.
- Chang, K., Creighton, C. J., Davis, C., Donehower, L., Drummond, J., Wheeler, D., Ally, A., Balasundaram, M., Birol, I., Butterfield, Y. S. N., Chu, A., Chuah, E., Chun, H.-J. E., Dhalla, N., Guin, R., Hirst, M., Hirst, C., Holt, R. A., Jones, S. J. M., ... Center, B. C. R.

- (2013). The Cancer Genome Atlas Pan-Cancer analysis project. *Nature Genetics*, 45(10), 1113–1120. <https://doi.org/10.1038/ng.2764>
- Chao, S., & Belanger, D. (2021). Generalizing Few-Shot Classification of Whole-Genome Doubling Across Cancer Types. *Proceedings of the IEEE/CVF International Conference on Computer Vision*, 3382–3392.
- Chen, H., Han, X., Fan, X., Lou, X., Liu, H., Huang, J., & Yao, J. (2019). Rectified cross-entropy and upper transition loss for weakly supervised whole slide image classifier. *Medical Image Computing and Computer Assisted Intervention–MICCAI 2019: 22nd International Conference, Shenzhen, China, October 13–17, 2019, Proceedings, Part I 22*, 351–359.
- Chen, P.-H. C., Gadepalli, K., MacDonald, R., Liu, Y., Kadowaki, S., Nagpal, K., Kohlberger, T., Dean, J., Corrado, G. S., Hipp, J. D., Mermel, C. H., & Stumpe, M. C. (2019). An augmented reality microscope with real-time artificial intelligence integration for cancer diagnosis. *Nature Medicine*, 25(9), 1453–1457. <https://doi.org/10.1038/s41591-019-0539-7>
- Chen, T., Kornblith, S., Norouzi, M., & Hinton, G. (2020). A simple framework for contrastive learning of visual representations. *International Conference on Machine Learning*, 1597–1607.
- Cheung, T.-H., & Yeung, D.-Y. (2021). Modals: Modality-agnostic automated data augmentation in the latent space. *International Conference on Learning Representations*.
- Ciga, O., Xu, T., Nofech-Mozes, S., Noy, S., Lu, F. I., & Martel, A. L. (2021). Overcoming the limitations of patch-based learning to detect cancer in whole slide images. *Scientific Reports*, 11(1), 8894. <https://doi.org/10.1038/s41598-021-88494-z>
- Deng, J., Dong, W., Socher, R., Li, L.-J., Li, K., & Fei-Fei, L. (2009). Imagenet: A large-scale hierarchical image database. *2009 IEEE Conference on Computer Vision and Pattern Recognition*, 248–255.
- Dietterich, T. G., Lathrop, R. H., & Lozano-Pérez, T. (1997). Solving the multiple instance problem with axis-parallel rectangles. *Artificial Intelligence*, 89(1–2), 31–71. [https://doi.org/10.1016/s0004-3702\(96\)00034-3](https://doi.org/10.1016/s0004-3702(96)00034-3)
- Duran-Lopez, L., Dominguez-Morales, J. P., Conde-Martin, A. F., Vicente-Diaz, S., & Linares-

- Barranco, A. (2020). PROMETEO: A CNN-Based Computer-Aided Diagnosis System for WSI Prostate Cancer Detection. *IEEE Access*, 8, 128613–128628. <https://doi.org/10.1109/ACCESS.2020.3008868>
- Fagerblom, F., Stacke, K., & Molin, J. (2021). Combatting out-of-distribution errors using model-agnostic meta-learning for digital pathology. *Medical Imaging 2021: Digital Pathology*, 11603, 186–192.
- Farahani, N., Parwani, A. V., & Pantanowitz, L. (2015). Whole slide imaging in pathology: advantages, limitations, and emerging perspectives. *Pathol Lab Med Int*, 7(23–33), 4321.
- Fazal, M. I., Patel, M. E., Tye, J., & Gupta, Y. (2018). The past, present and future role of artificial intelligence in imaging. *European Journal of Radiology*, 105, 246–250. <https://doi.org/10.1016/j.ejrad.2018.06.020>
- Finn, C., Abbeel, P., & Levine, S. (2017). Model-agnostic meta-learning for fast adaptation of deep networks. *International Conference on Machine Learning*, 1126–1135.
- Gamper, J., Chan, B., Tsang, Y. W., Snead, D., & Rajpoot, N. (2020). Meta-svdd: Probabilistic meta-learning for one-class classification in cancer histology images. *ArXiv Preprint ArXiv:2003.03109*.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning*. MIT Press.
- Guan, Y., Zhang, J., Tian, K., Yang, S., Dong, P., Xiang, J., Yang, W., Huang, J., Zhang, Y., & Han, X. (2022). *Node-aligned Graph Convolutional Network for Whole-slide Image Representation and Classification*. 18791–18801. <https://doi.org/10.1109/cvpr52688.2022.01825>
- Guo, Z., Liu, H., Ni, H., Wang, X., Su, M., Guo, W., Wang, K., Jiang, T., & Qian, Y. (2019). A Fast and Refined Cancer Regions Segmentation Framework in Whole-slide Breast Pathological Images. *Scientific Reports*, 9(1), 1–10. <https://doi.org/10.1038/s41598-018-37492-9>
- Hartigan, J. A. ., & Wong, M. . A. . (1979). Algorithm AS 136: A K-Means Clustering Algorithm. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, 28(1), 100–108.
- Hashimoto, N., Fukushima, D., Koga, R., Takagi, Y., Ko, K., Kohno, K., Nakaguro, M., Nakamura, S., Hontani, H., & Takeuchi, I. (2020). Multi-scale Domain-Adversarial

Multiple-instance CNN for Cancer Subtype Classification with Unannotated Histopathological Images. *Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition*, 3851–3860. <https://doi.org/10.1109/CVPR42600.2020.00391>

He, K., Zhang, X., Ren, S., & Sun, J. (2016). Deep residual learning for image recognition. *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, 770–778.

Ho, D. J., Yarlagadda, D. V. K., D’Alfonso, T. M., Hanna, M. G., Grabenstetter, A., Ntiamoah, P., Brogi, E., Tan, L. K., & Fuchs, T. J. (2021). Deep Multi-Magnification Networks for multi-class breast cancer image segmentation. *Computerized Medical Imaging and Graphics*, 88, 1–35. <https://doi.org/10.1016/j.compmedimag.2021.101866>

Hossin, M., & Sulaiman, M. N. (2015). A Review On Evaluation Metrics For Data Classification Evaluations. *International Journal of Data Mining & Knowledge Management Process (IJDKP)*, 0(March), 4–5.

Huang, W., Chung, P.-C., Tsai, H.-W., Chow, N.-H., Juang, Y.-Z., Tsai, H.-H., Lin, S.-H., & Wang, C.-H. (2019). Automatic HCC Detection Using Convolutional Network with Multi-Magnification Input Images. *2019 IEEE International Conference on Artificial Intelligence Circuits and Systems (AICAS)*, 194–198.

Ianni, J. D., Soans, R. E., Sankarapandian, S., Chamarthi, R. V., Ayyagari, D., Olsen, T. G., Bonham, M. J., Stavish, C. C., Motaparathi, K., Cockerell, C. J., Feeser, T. A., & Lee, J. B. (2020). Tailored for Real-World: A Whole Slide Image Classification System Validated on Uncurated Multi-Site Data Emulating the Prospective Pathology Workload. *Scientific Reports*, 10(1), 3217. <https://doi.org/10.1038/s41598-020-59985-2>

Ilse, M., Tomczak, J. M., & Welling, M. (2018). Attention-based deep multiple instance learning. *35th International Conference on Machine Learning, ICML 2018*, 5(Mil), 3376–3391.

Ke, J., Shen, Y., Wright, J. D., Jing, N., Liang, X., & Shen, D. (2020). Identifying patch-level MSI from histological images of Colorectal Cancer by a Knowledge Distillation Model. *Proceedings - 2020 IEEE International Conference on Bioinformatics and Biomedicine, BIBM 2020*, 1043–1046. <https://doi.org/10.1109/BIBM49941.2020.9313141>

Kingma, D. P., & Ba, J. (2014). Adam: A method for stochastic optimization. *ArXiv Preprint ArXiv:1412.6980*.

Klambauer, G., Unterthiner, T., Mayr, A., & Hochreiter, S. (2017). Self-normalizing neural networks. *Advances in Neural Information Processing Systems*, 30.

LeCun, Y., & Bengio, Y. (1995). Convolutional networks for images, speech, and time series. *The Handbook of Brain Theory and Neural Networks*, 3361(10), 1995.

LeCun, Y., Bottou, L., Bengio, Y., & Haffner, P. (1998). Gradient-based learning applied to document recognition. *Proceedings of the IEEE*, 86(11), 2278–2323. <https://doi.org/10.1109/5.726791>

Li, B., Li, Y., & Eliceiri, K. W. (2021). Dual-stream Multiple Instance Learning Network for Whole Slide Image Classification with Self-supervised Contrastive Learning. *Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition*, 14313–14323. <https://doi.org/10.1109/CVPR46437.2021.01409>

Li, X., Li, C., Rahaman, M. M., Sun, H., Li, X., Wu, J., Yao, Y., & Grzegorzec, M. (2022). A comprehensive review of computer-aided whole-slide image analysis: from datasets to feature extraction, segmentation, classification and detection approaches. *Artificial Intelligence Review*, 55(6), 4809–4878. <https://doi.org/10.1007/s10462-021-10121-0>

Liu, X., Zhang, F., Hou, Z., Mian, L., Wang, Z., Zhang, J., & Tang, J. (2021). Self-supervised Learning: Generative or Contrastive. *IEEE Transactions on Knowledge and Data Engineering*, 35(1), 857–876. <https://doi.org/10.1109/TKDE.2021.3090866>

Lu, M. Y., Williamson, D. F. K., Chen, T. Y., Chen, R. J., Barbieri, M., & Mahmood, F. (2021). Data-efficient and weakly supervised computational pathology on whole-slide images. *Nature Biomedical Engineering*, 5(6), 555–570. <https://doi.org/10.1038/s41551-020-00682-w>

Maksoud, S., Zhao, K., Hobson, P., Jennings, A., & Lovell, B. C. (2020). SOS: Selective objective switch for rapid immunofluorescence whole slide image classification. *Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition*, 3861–3870. <https://doi.org/10.1109/CVPR42600.2020.00392>

Maron, O., & Lozano-perez, T. (n.d.). *A Framework for Multiple-Instance Learning*.

Nair, V., & Hinton, G. E. (2010). Rectified linear units improve restricted boltzmann machines.

*Proceedings of the 27th International Conference on Machine Learning (ICML-10)*, 807–814.

- Paszke, A., Gross, S., Massa, F., Lerer, A., Bradbury, J., Chanan, G., Killeen, T., Lin, Z., Gimelshein, N., & Antiga, L. (2019). Pytorch: An imperative style, high-performance deep learning library. *Advances in Neural Information Processing Systems*, 32.
- Pati, P., Jaume, G., Ayadi, Z., Thandiackal, K., Bozorgtabar, B., Gabrani, M., & Goksel, O. (2023). *Weakly Supervised Joint Whole-Slide Segmentation and Classification in Prostate Cancer*. <http://arxiv.org/abs/2301.02933>
- Qi, C. R., Su, H., Mo, K., & Guibas, L. J. (2017). Pointnet: Deep learning on point sets for 3d classification and segmentation. *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, 652–660.
- Qu, L., Luo, X., Liu, S., Wang, M., & Song, Z. (2022). *DGMIL : Distribution Guided Multiple Instance. Mil*.
- Qu, L., Luo, X., Wang, M., & Song, Z. (2022). *Bi-directional Weakly Supervised Knowledge Distillation for Whole Slide Image Classification. NeurIPS*. <http://arxiv.org/abs/2210.03664>
- Rasoolijaberi, M., Babaei, M., Riasatian, A., Hemati, S., Ashrafi, P., Gonzalez, R., & Tizhoosh, H. R. (2022). Multi-Magnification Image Search in Digital Pathology. *IEEE Journal of Biomedical and Health Informatics*, 26(9), 4611–4622. <https://doi.org/10.1109/JBHI.2022.3181531>
- Razzak, M. I., Naz, S., & Zaib, A. (2018). Deep learning for medical image processing: Overview, challenges and the future. *Lecture Notes in Computational Vision and Biomechanics*, 26, 323–350. [https://doi.org/10.1007/978-3-319-65981-7\\_12](https://doi.org/10.1007/978-3-319-65981-7_12)
- Shao, Z., Bian, H., Chen, Y., Wang, Y., Zhang, J., Ji, X., & Zhang, Y. (2021). TransMIL: Transformer based Correlated Multiple Instance Learning for Whole Slide Image Classification. *Advances in Neural Information Processing Systems*, 3(NeurIPS), 2136–2147.
- Sharma, Y., Shrivastava, A., Ehsan, L., Moskaluk, C. A., Syed, S., & Brown, D. E. (2021). *Cluster-to-Conquer: A Framework for End-to-End Multi-Instance Learning for Whole Slide Image Classification*. 682–698. <http://arxiv.org/abs/2103.10626>



- Sinaga, K. P., & Yang, M. S. (2020). Unsupervised K-means clustering algorithm. *IEEE Access*, 8, 80716–80727. <https://doi.org/10.1109/ACCESS.2020.2988796>
- Sirinukunwattana, K., Pluim, J. P. W., Chen, H., Qi, X., Heng, P. A., Guo, Y. B., Wang, L. Y., Matuszewski, B. J., Bruni, E., Sanchez, U., Böhm, A., Ronneberger, O., Cheikh, B. Ben, Racoceanu, D., Kainz, P., Pfeiffer, M., Urschler, M., Snead, D. R. J., & Rajpoot, N. M. (2017). Gland segmentation in colon histology images: The glas challenge contest. *Medical Image Analysis*, 35, 489–502. <https://doi.org/10.1016/j.media.2016.08.008>
- Srinidhi, C. L., Ciga, O., & Martel, A. L. (2021). Deep neural network models for computational histopathology: A survey. *Medical Image Analysis*, 67. <https://doi.org/10.1016/j.media.2020.101813>
- Takahama, S., Kurose, Y., Mukuta, Y., Abe, H., Fukayama, M., Yoshizawa, A., Kitagawa, M., & Harada, T. (2019). Multi-stage pathological image classification using semantic segmentation. *Proceedings of the IEEE International Conference on Computer Vision, 2019-Octob*, 10701–10710. <https://doi.org/10.1109/ICCV.2019.01080>
- Tellez, D., Balkenhol, M., Otte-Höller, I., van de Loo, R., Vogels, R., Bult, P., Wauters, C., Vreuls, W., Mol, S., & Karssemeijer, N. (2018). Whole-slide mitosis detection in H&E breast histology using PHH3 as a reference to train distilled stain-invariant convolutional networks. *IEEE Transactions on Medical Imaging*, 37(9), 2126–2136.
- Tomita, N., Abdollahi, B., Wei, J., Ren, B., Suriawinata, A., & Hassanpour, S. (2019a). Attention-Based Deep Neural Networks for Detection of Cancerous and Precancerous Esophagus Tissue on Histopathological Slides. *JAMA Network Open*, 2(11), 1–13. <https://doi.org/10.1001/jamanetworkopen.2019.14645>
- Tomita, N., Abdollahi, B., Wei, J., Ren, B., Suriawinata, A., & Hassanpour, S. (2019b). Attention-Based Deep Neural Networks for Detection of Cancerous and Precancerous Esophagus Tissue on Histopathological Slides. *JAMA Network Open*, 2(11), e1914645. <https://doi.org/10.1001/jamanetworkopen.2019.14645>
- Upchurch, P., Gardner, J., Pleiss, G., Pless, R., Snavely, N., Bala, K., & Weinberger, K. (2017). Deep feature interpolation for image content changes. *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, 7064–7073.
- Van der Maaten, L., & Hinton, G. (2008). Visualizing data using t-SNE. *Journal of Machine*

- Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., & Kaiser, L. (2017). Attention Is All You Need. *31st Conference on Neural Information Processing Systems (NIPS 2017)*, 8(1), 8–15. <https://doi.org/10.1109/2943.974352>
- Vujović, Ž. (2021). Classification Model Evaluation Metrics. *International Journal of Advanced Computer Science and Applications*, 12(6), 599–606. <https://doi.org/10.14569/IJACSA.2021.0120670>
- Wang, Xi, Chen, H., Gan, C., Lin, H., & Dou, Q. (2018). Weakly Supervised Learning for Whole Slide Lung Cancer Image Classification. *1st Conference on Medical Image with Deep Learning (MIDL 2018), Amsterdam, The Netherlands, Midl*, 1–10. <https://www.semanticscholar.org/paper/Weakly-Supervised-Learning-for-Whole-Slide-Lung-Wang-Chen/35d0998f2c5b53591073d36c9e2b0ddc89a496b1>
- Wang, Xi, Chen, H., Gan, C., Lin, H., Dou, Q., Tsougenis, E., Huang, Q., Cai, M., & Heng, P.-A. (2019). Weakly supervised deep learning for whole slide lung cancer image analysis. *IEEE Transactions on Cybernetics*, 50(9), 3950–3962.
- Wang, Xinggang, Yan, Y., Tang, P., Bai, X., & Liu, W. (2018). Revisiting multiple instance neural networks. *Pattern Recognition*, 74, 15–24. <https://doi.org/10.1016/j.patcog.2017.08.026>
- Wang, Y., Li, J., & Metze, F. (2018). Comparing the max and noisy-or pooling functions in multiple instance learning for weakly supervised sequence learning tasks. *Proceedings of the Annual Conference of the International Speech Communication Association, INTERSPEECH, 2018-Septe(September)*, 1339–1343. <https://doi.org/10.21437/Interspeech.2018-990>
- Wu, S., Zhang, H., Valiant, G., & Ré, C. (2020). On the generalization effects of linear transformations in data augmentation. *International Conference on Machine Learning*, 10410–10420.
- Xu, Y., Jia, Z., Ai, Y., Zhang, F., Lai, M., & Chang, E. I. C. (2015). Deep convolutional activation features for large scale Brain Tumor histopathology image classification and segmentation. *ICASSP, IEEE International Conference on Acoustics, Speech and Signal Processing - Proceedings, 2015-Augus*, 947–951.



<https://doi.org/10.1109/ICASSP.2015.7178109>

- Yan, J., Chen, H., Wang, K., Ji, Y., Zhu, Y., Li, J., Xie, D., Xu, Z., Huang, J., Cheng, S., Li, X., & Yao, J. (2021). Hierarchical Attention Guided Framework for Multi-resolution Collaborative Whole Slide Image Segmentation. *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, 12908 LNCS(September), 153–163. [https://doi.org/10.1007/978-3-030-87237-3\\_15](https://doi.org/10.1007/978-3-030-87237-3_15)
- Yang, J., Chen, H., Yan, J., Chen, X., & Yao, J. (2022). Towards better understanding and better generalization of few-shot classification in histology images with contrastive learning. *ArXiv Preprint ArXiv:2202.09059*.
- Yang, J., Chen, H., Zhao, Y., Yang, F., Zhang, Y., He, L., & Yao, J. (2022). ReMix: A General and Efficient Framework for Multiple Instance Learning Based Whole Slide Image Classification. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 13432 LNCS, 35–45. [https://doi.org/10.1007/978-3-031-16434-7\\_4](https://doi.org/10.1007/978-3-031-16434-7_4)
- Yao, J., Zhu, X., Jonnagaddala, J., Hawkins, N., & Huang, J. (2020). Whole slide images based cancer survival prediction using attention guided deep multiple instance learning networks. *Medical Image Analysis*, 65. <https://doi.org/10.1016/j.media.2020.101789>
- Zaheer, M., Kottur, S., Ravanbakhsh, S., Póczos, B., Salakhutdinov, R., & Smola, A. J. (2017). Deep sets. *Advances in Neural Information Processing Systems, 2017-Decem(ii)*, 3392–3402.
- Zarella, M. D., Bowman, D., Aeffner, F., Farahani, N., Xthona, A., Absar, S. F., Parwani, A., Bui, M., & Hartman, D. J. (2018). A Practical Guide to Whole Slide Imaging: A White Paper From the Digital Pathology Association. *Archives of Pathology & Laboratory Medicine*, 143(2), 222–234. <https://doi.org/10.5858/arpa.2018-0343-RA>
- Zhang, H., Meng, Y., Zhao, Y., Qiao, Y., Yang, X., Coupland, S. E., & Zheng, Y. (2022). DTFD-MIL: Double-Tier Feature Distillation Multiple Instance Learning for Histopathology Whole Slide Image Classification. 18780–18790. <https://doi.org/10.1109/cvpr52688.2022.01824>
- Zhao, Y., Yang, F., Fang, Y., Liu, H., Zhou, N., Zhang, J., Sun, J., Yang, S., Menze, B., Fan, X., & Yao, J. (2020). Predicting Lymph Node Metastasis Using Histopathological Images

Based on Multiple Instance Learning with Deep Graph Convolution. *Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition*, 4836–4845. <https://doi.org/10.1109/CVPR42600.2020.00489>