ZLaP-ECE-570-Final-Project

This is a reimplementation and extension of **Vladan Stojnić, Yannis Kalantidis, Giorgos Tolias, "Label Propagation for Zero-shot Classification with Vision-Language Models", In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024.**

Code is publically-available online and was used to gather a list of functions and as a reference for math-intensive functions not described programmatically in the paper such as graph creation. As such my code will bear strong resemblance for the code functions, and I will compare and evaluate my code to theirs in my course paper. I have also planned an extension: A practical pipeline using ZLaP for retail applications.

As described in my project proposal, imagine this scenario:

> You work in retail distribution, so the classes/objects will change often enough to make manual data gathering and labeling infeasible, and these objects are not detectable with classical computer vision. Zero-shot classification would allow you to classify these objects based simply on a class label and some unlabeled images of your objects. This is especially valuable when dealing with new product lines or seasonal items that may not have been seen when the model was first deployed.
>
> Furthermore, ZLaP does not require a training step so it can be deployed without extensive prerequisite setup time, especially since the label propagation is based on KNN which does not require deployment on a large GPU cluster.

I created a plan/order for function implementation based on their simplicity and usage in other functions:

Category	Functionality	Status	Completion Date
Utils	normalize	✔️	Oct 29, 2024
	accuracy	✔️	Oct 29, 2024
	get_data	✔️	Oct 29, 2024
	voc_ap	✔️	Oct 29, 2024
	voc_mAP	✔️	Oct 29, 2024
	search_faiss	✔️	Oct 29, 2024
	normalize connection graph	✔️	Oct 30, 2024
	laplacian	✔️	Oct 30, 2024
	dfs	✔️	Oct 30, 2024
Main Functions	get_args	✔️	Oct 29, 2024
	combine_separate_knns	✔️	Oct 29, 2024

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Category	Functionality	Status	Completion Date
	create_separate_graph	✔️	Oct 31, 2024
	do_transductive_lp	✔️	Oct 31, 2024
	get_neighbors_for_inductive	✔️	Oct 31, 2024
	do_inductive_lp	✔️	Oct 31, 2024
	get_Linv	✔️	Oct 31, 2024
	do_sparse_inductive_lp	✔️	Oct 31, 2024
	main	⬜	
Expansions	Train on custom data	⬜	
	Evaluate on retail data	⬜	