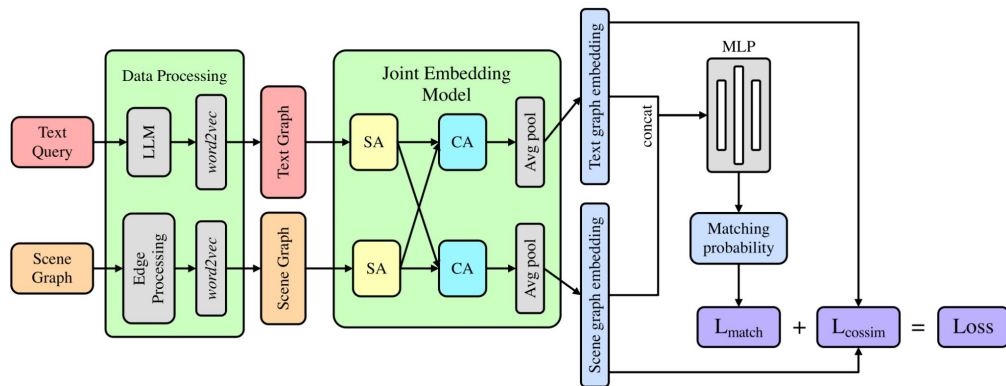

Локализация по графу сцены

Кондрашов Тимофей, 3 курс, кафедра «ПИР»
Научный руководитель: Дмитрий Александрович Юдин
Центр когнитивного моделирования МФТИ, 1 апреля, 2025

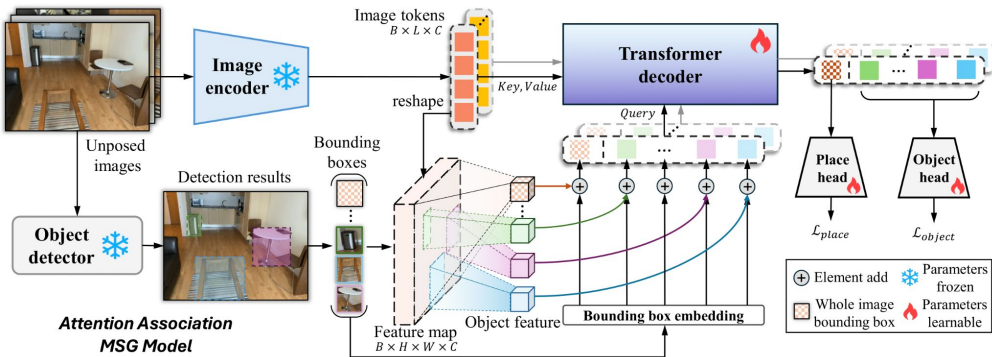
Поставленная задача

С помощью данных с RGBD камер робота и сегментированных объектов решать задачу локализации.

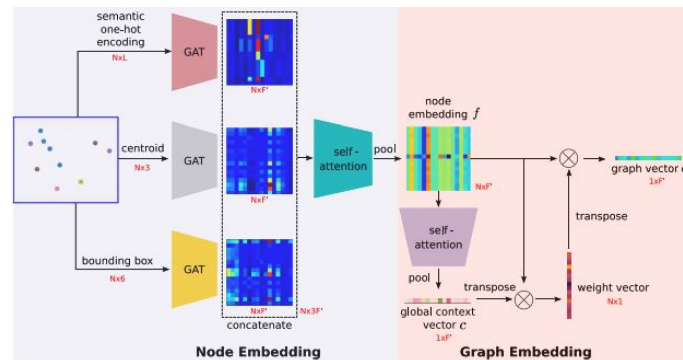
Срез научных работ



Where am I? Cross-View Geo-localization with Natural Language Descriptions. [1]



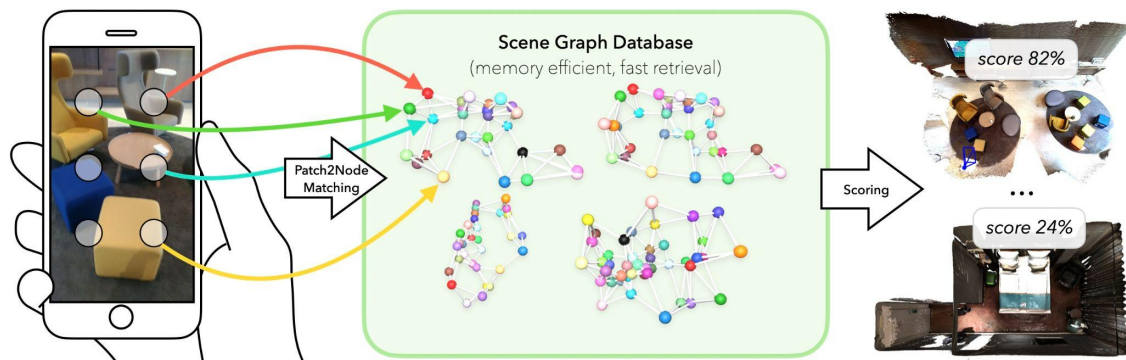
LiDAR Loop Closure Detection using Semantic Graphs with Graph Attention Networks. [2]



Multiview Scene Graph. [3]

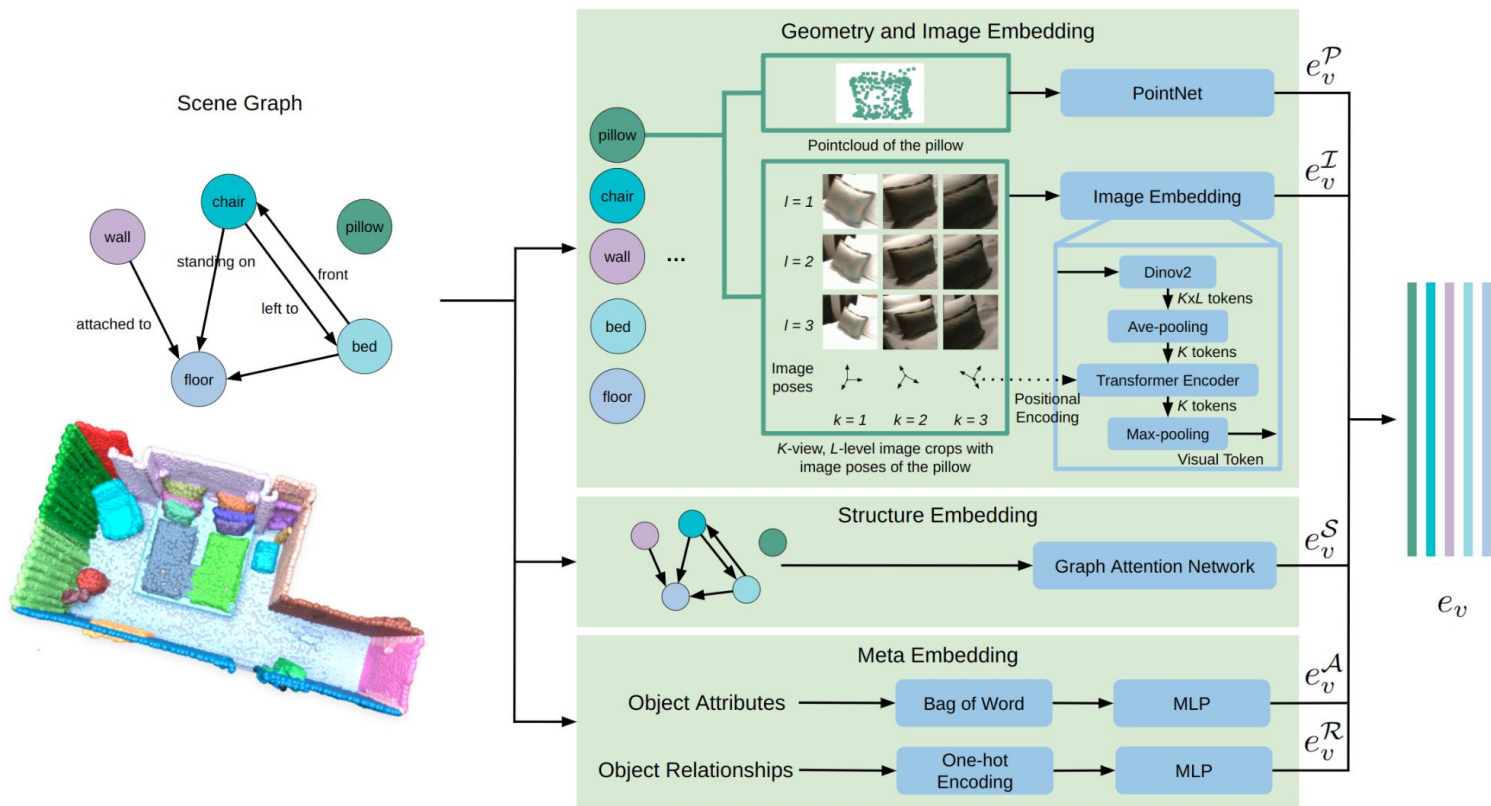
SceneGraphLoc

- Первый бейзлайн метод
- На 5 комнатах показывал R@1 точность 97%



SceneGraphLoc: Cross-Modal Coarse Visual Localization on 3D Scene Graphs. [4]

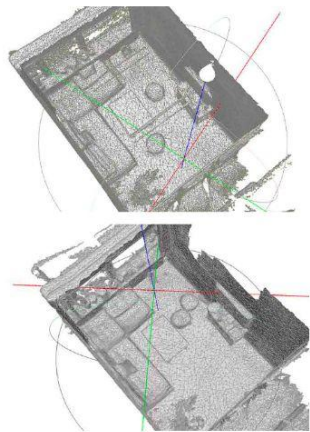
SceneGraphLoc: архитектура и проблемы



OpenPlaceRecognition и 3RScan

- Знакомлюсь с библиотекой OpenPlaceRecognition
- Интегрирую туда датасет 3RScan

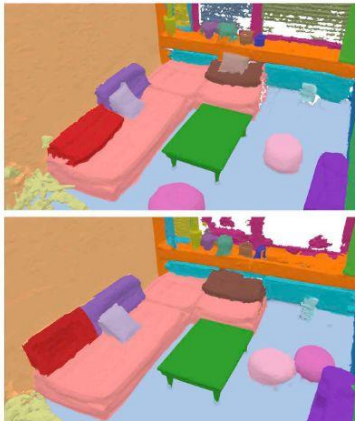
a) 3D reconstructions



b) aligned, texture-mapped 3D meshes



c) dense scene-aware instance level 3D semantic annotation



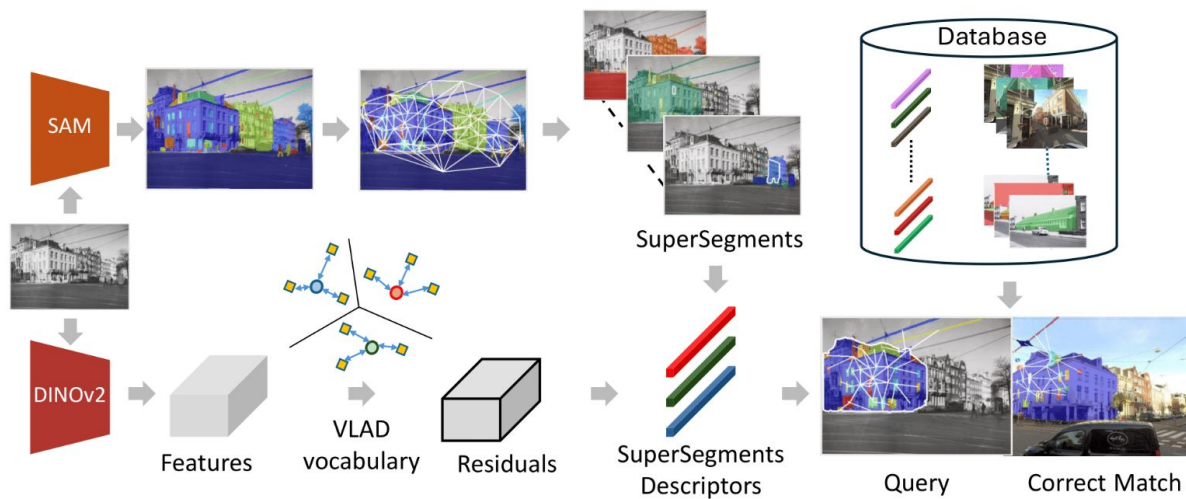
d) local object alignment of changes



e) snapshots of calibrated RGB-D sequences (depth not displayed)



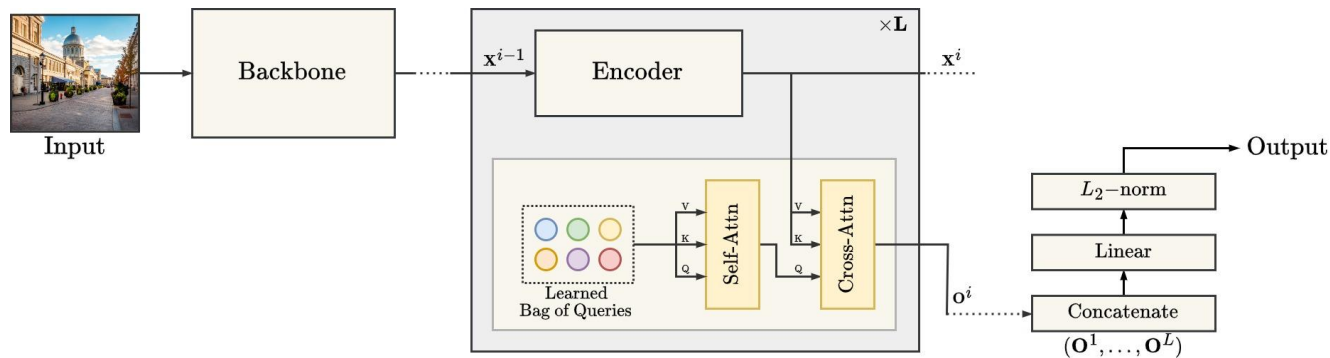
SegVLAD



SegVLAD pipeline. [6]

SegVLAD: эксперименты

- Заменить DINOv2 на Bag of Queries
- Изменить подсчет embedding-а для сегмента
- Добавить веса для сегментов



Bag of Queries pipeline [7]

References

- [1] Ye, Junyan, et al. "Where am I? Cross-View Geo-localization with Natural Language Descriptions." arXiv preprint arXiv:2412.17007 (2024).
 - [2] Yang, Liudi, et al. "LiDAR Loop Closure Detection using Semantic Graphs with Graph Attention Networks." Journal of Intelligent & Robotic Systems 111.1 (2025): 1-16.
 - [3] Zhang, Juexiao, et al. "Multiview Scene Graph." Advances in Neural Information Processing Systems 37 (2025): 17761-17788.
 - [4] Miao, Yang, et al. "SceneGraphLoc: Cross-Modal Coarse Visual Localization on 3D Scene Graphs." European Conference on Computer Vision. Cham: Springer Nature Switzerland, 2024.
 - [5] Wald, Johanna, et al. "Rio: 3d object instance re-localization in changing indoor environments." Proceedings of the IEEE/CVF International Conference on Computer Vision. 2019.
 - [6] Garg, Kartik, et al. "Revisit Anything: Visual Place Recognition via Image Segment Retrieval." European Conference on Computer Vision. Cham: Springer Nature Switzerland, 2024.
 - [7] Ali-Bey, Amar, Brahim Chaib-draa, and Philippe Giguère. "BoQ: A place is worth a bag of learnable queries." Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2024.
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