LiDAR Aided Future Beam Prediction in Real-World Millimeter Wave V2I Communications

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Background and Motivation

- The growth of millimeter-wave (mmWave) and terahertz (THz) communication technologies offers significant data rate gains, but they face challenges in highly mobile environments due to beam alignment issues.

- Prior works have explored several sensing modalities like radar, vision, and sub-6 GHz channels to enhance beam prediction and alignment in mmWave systems.
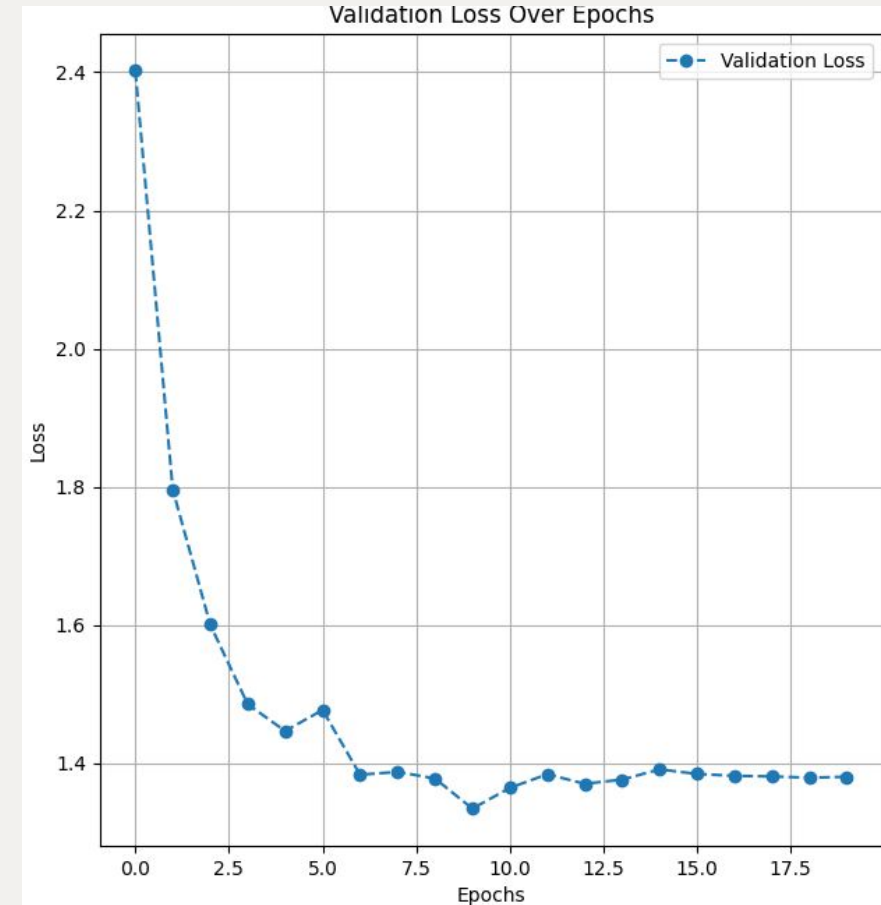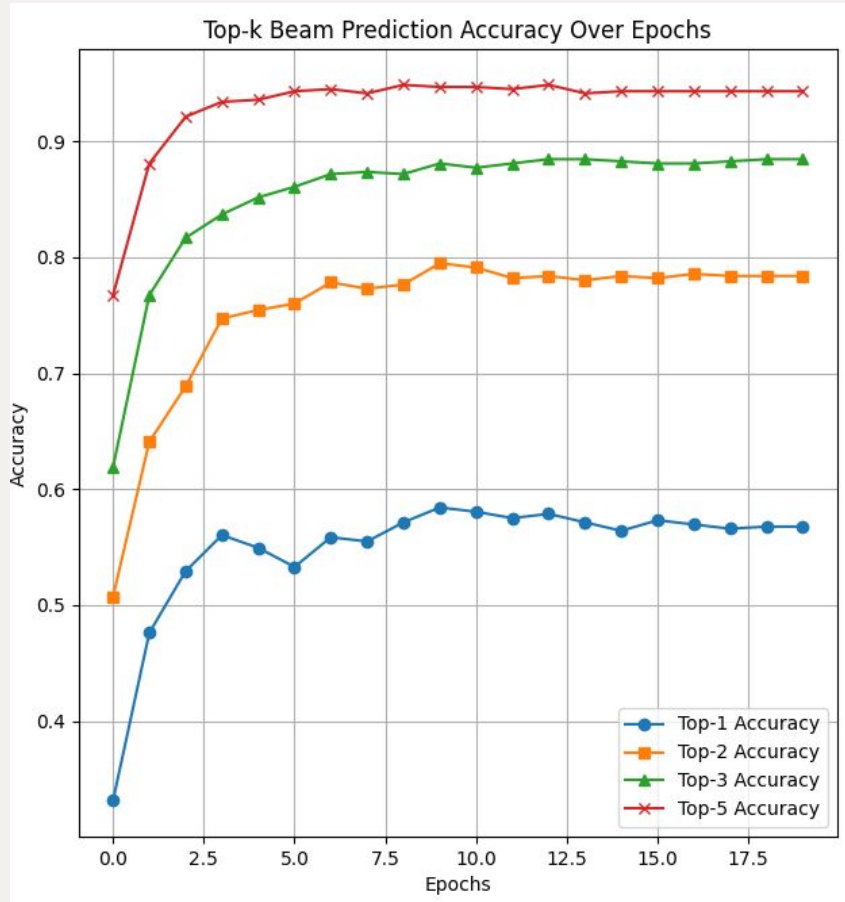
Jiang, S., Charan, G., & Alkhateeb, A. (2022). LiDAR aided future beam prediction in real-world millimeter wave V2I communications. *IEEE Wireless Communications Letters*, *12*(2), 212-216.

Methodology

- LiDAR Sensing
- ML Model (RNN)
- Beam Prediction
- Dataset (DeepSense6G Scenario-8)

Liu, X., Zhang, H., Sun, K., Long, K., & Karagiannidis, G. (2023). AI-driven Integration of Sensing and Communication in the 6G Era. *IEEE Network*.

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Reproduced Results

Planned Actions

- Tinker with different dataset
- Multi-user scenario(MIMO)
- Model Optimization(Hybrid sensing: radar, RGB, GPS, etc.)

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References

- Jiang, S., Charan, G., & Alkhateeb, A. (2022). LiDAR aided future beam prediction in real-world millimeter wave V2I communications. *IEEE Wireless Communications Letters*, *12*(2), 212-216.

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