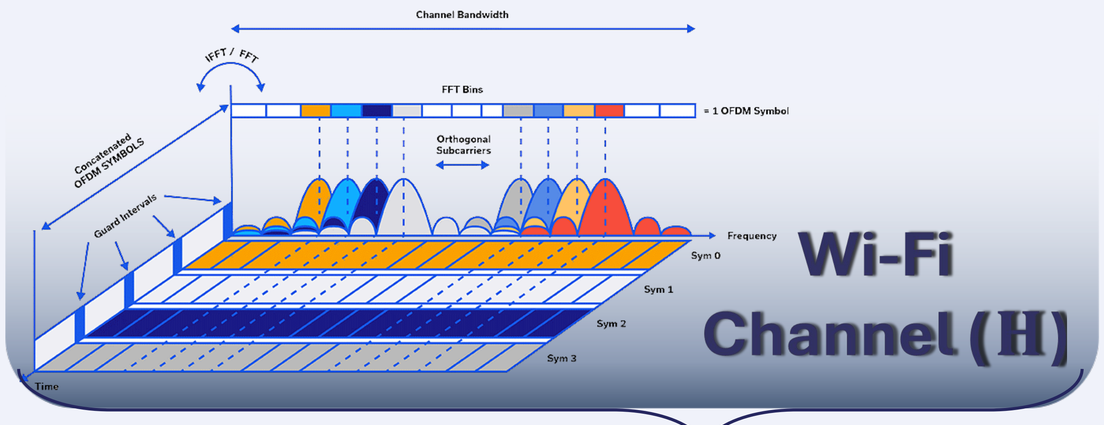
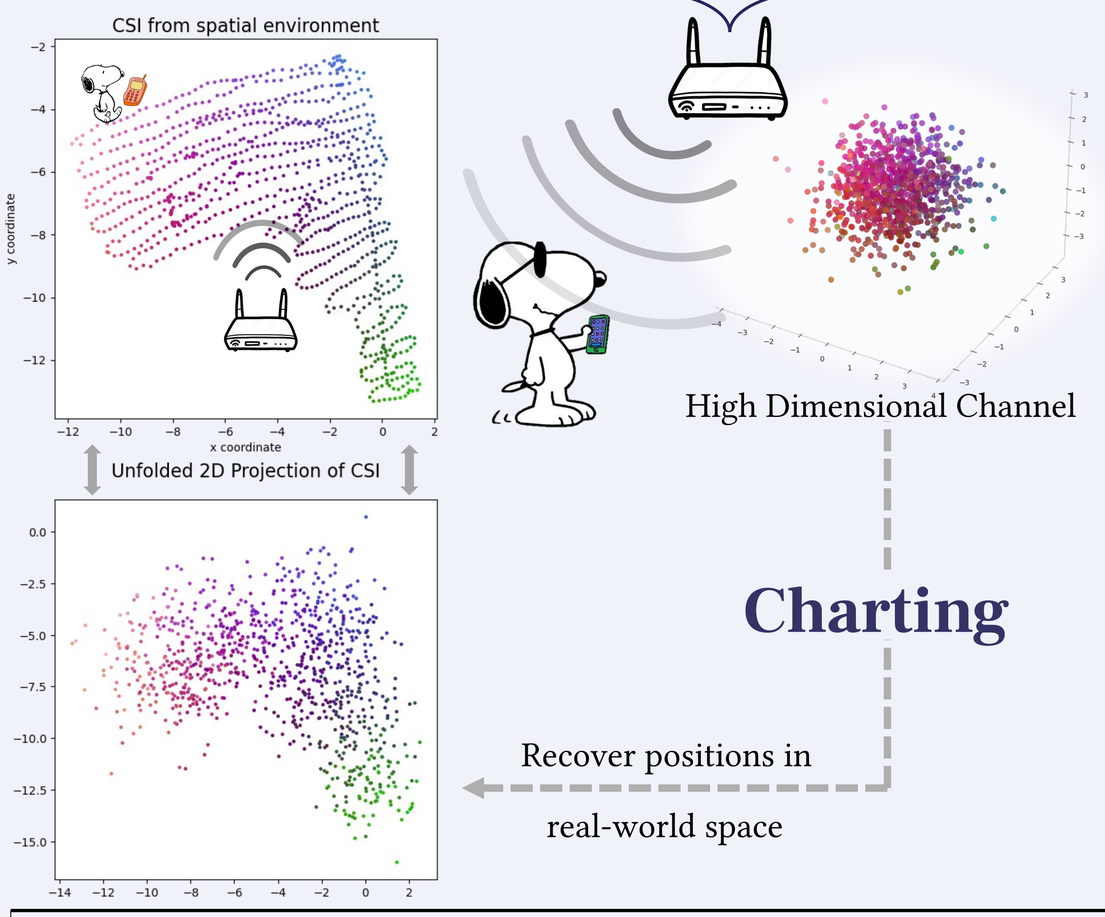
Time Reversal Resonating Strength-Based Dissimilarity For Channel Charting

Aveline Xiaoyuan Han

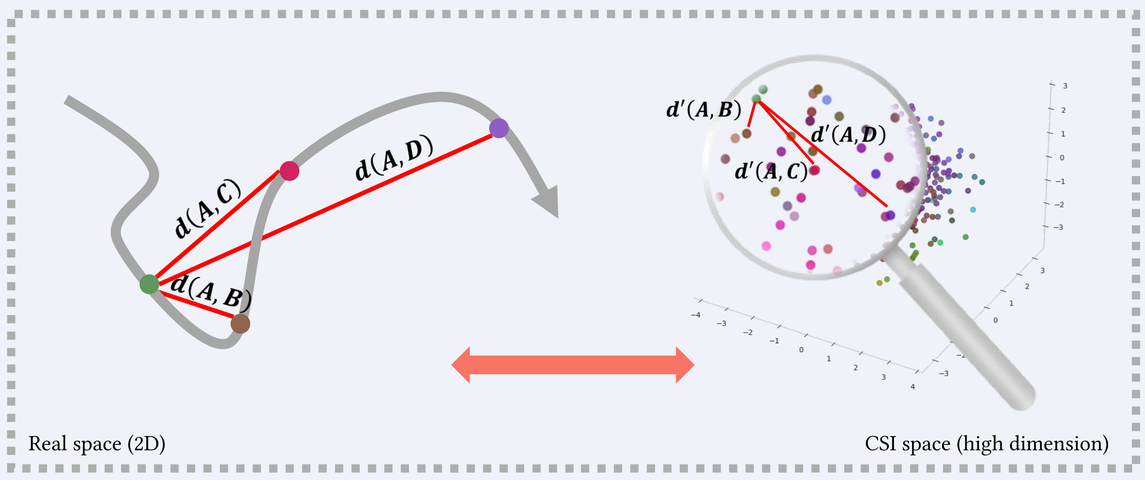
Supervisor: Prof. Wu Chenshu

MOTIVATION





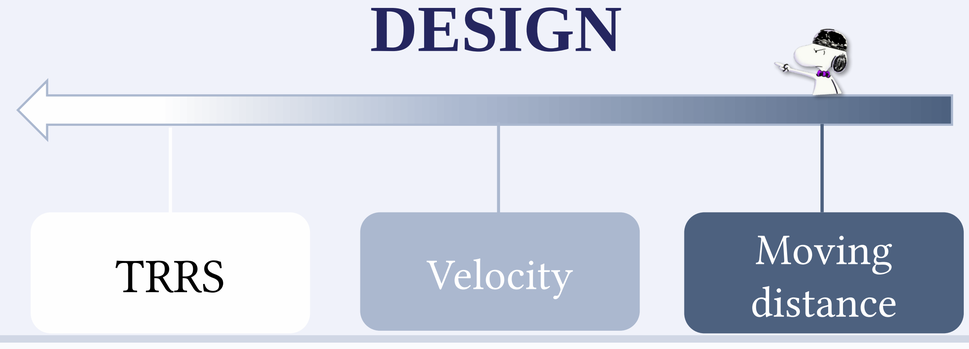
	Wi-Fi Fingerprinting	Channel Charting
Strategy	Supervised	<u>Unsupervised</u>
Environment	Suffer from dynamics	<u>Static & Dynamic</u>

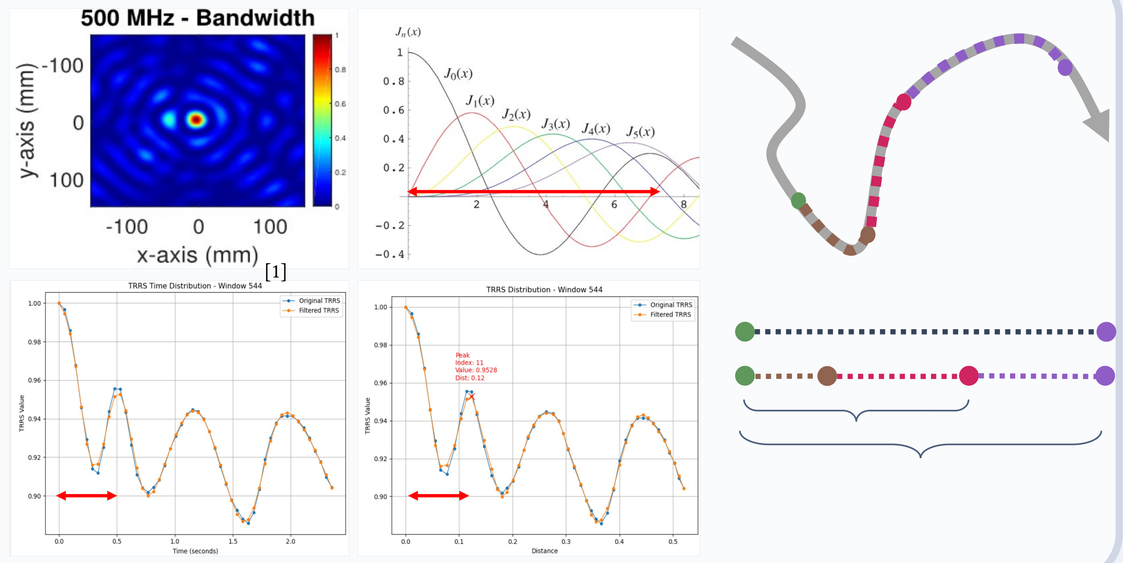


RELATED WORK

Dissimilarities	Rigidity	Dependency	Fragility
Time-Based dissimilarity [4]			
PDR/Odometry-Assisted dissimilarity [5] + IMU			
Path Loss-Based dissimilarity [3]			
Moving Distance dissimilarity (ours)			

DESIGN





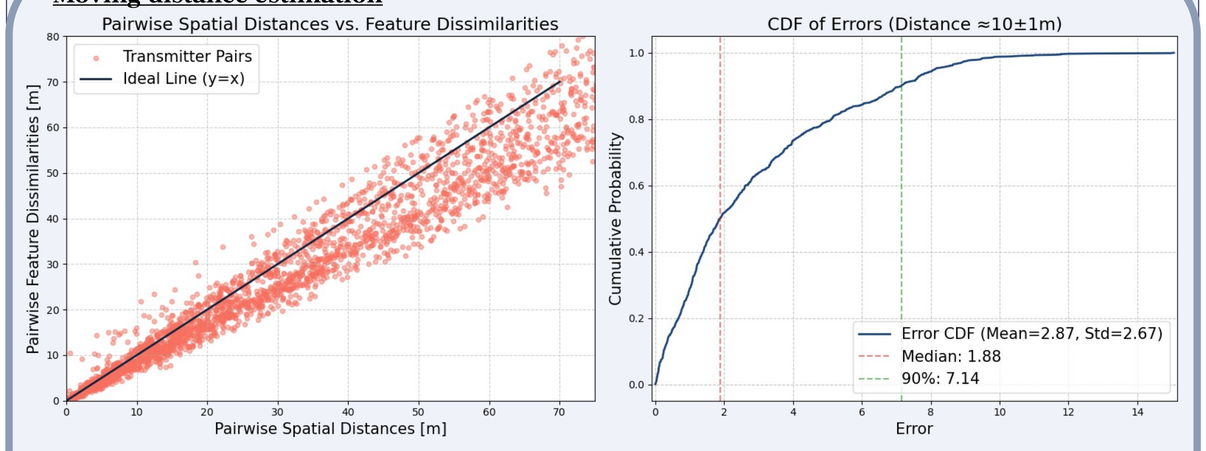
$$\kappa(H_1, H_2) = \frac{\left|H_1^H H_2\right|^2}{\langle H_1, H_1\rangle\langle H_2, H_2\rangle} \quad \kappa(H_1,H_2) = \frac{\left|H_1^H H_2\right|^2}{\langle H_1, H_1\rangle\langle H_2, H_2\rangle} \quad \hat{v} = \frac{d_0 \lambda}{2\pi \hat{t}} \quad d(x_i) = \int_{[2]t=t_x}^{t_y} \hat{v}(t)\, dt \quad d(x,y) = \int_{t=t_x}^{t_y} \hat{v}(t)\, dt$$

1 2 3

4 Pair-wise Dissimilarity matrix

5 Siamese Model / Triplet Model

<u>Moving distance estimation</u>

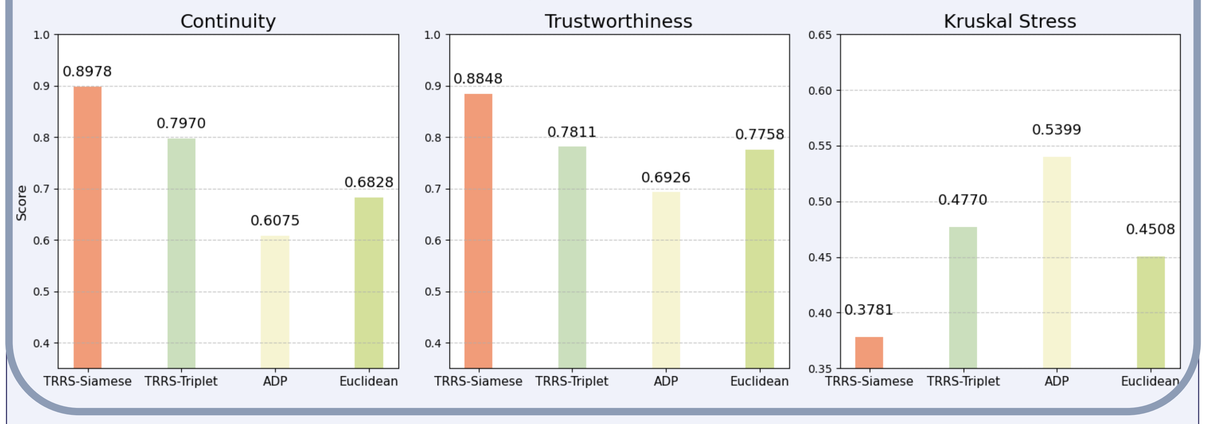


<u>Channel Chart estimation</u>



RESULTS

<u>Performance with different dissimilarity metrics</u>



CONCLUSION

The preliminary results confirm the effectiveness and superiority of using moving distance as dissimilarity metric to perform channel charting.

Future work will focus on evaluating the technique with a self-collected dataset, addressing challenges such as merging separate traces, and adapting the model to handle noisy moving distance measurements.

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