

Re-Implementing SpotFi for WiFi localization Using the WILD-v2 Dataset

Project Authors Name: MATTHEW FIORENZA, RAJ BAKHUNCHHE

Project Evaluator Name: Hengrui Pei

- Guidelines to review the report for Question 1-3 below:
<https://dl.acm.org/journal/dgov/reviewer-guidelines>
- Guidelines to review the code artifacts for Question 4-8 below:
<https://conferences.sigcomm.org/sigcomm/2022/cf-artifacts.html>

1. Summary

I think this project re-implemented the SpotFi WiFi localization approach on the WILD-v2 dataset to study how well super-resolution Angle-of-Arrival (AoA) methods generalize beyond the original Intel 5300 CSI data. They implemented MUSIC-based AoA estimation and adapted the SpotFi signal model to the new hardware and dataset characteristics, analyzing AoA behavior along known ground-truth trajectories. Due to dataset limitations and phase distortions, the study primarily focused on AoA and compared MUSIC with FFT-based methods, ultimately finding that localization accuracy is dataset-dependent and highlighting practical challenges in transferring SpotFi to new environments.

2. Strengths

Successfully re-implements the core SpotFi localization pipeline rather than treating it as a black box.

Evaluates generalization by applying SpotFi to a new dataset (WILD-v2) with different hardware conditions.

Strong theoretical grounding with a clear MUSIC-based AoA formulation.

3. Weakness

Evaluation is constrained by dataset characteristics (single trajectory and clustered samples), reducing robustness of statistical conclusions

The project focuses mainly on AoA estimation and does not fully implement joint AoA-ToF localization, which limits direct comparability with the original SpotFi approach.

Moreover, practical constraints related to CSI quality and measurement conditions may affect phase stability, which poses challenges for fully exploiting the theoretical benefits of subspace-based localization methods.

4. Documentation: Is the artifact/code sufficiently documented?

Rate from 0% to 100%, where 0% means "documentation is completely insufficient" and 100% means "documentation is absolutely sufficient". If you need to assess both a dataset and tools, please take the average and comment below. In assessing tools, please consider if they are easy or difficult to install/set up and get to run. In assessing datasets, please consider if the meta data is sufficient.

Choices are:

- 1. 0%
- 2. 20%
- 3. 40%
- 4. 60%
- 5. 80%
- 6. 100%

Documentation: Comment on/explain your choice above:

100%

The artifact provides clear and sufficient documentation, including a README, dependency descriptions, and explanations of the code structure and experimental workflow. The tools are straightforward to install and run with standard software, and the provided documentation is adequate to understand.

5. Completeness: Do the submitted artifacts/code include all of the key components described in the report?

Rate from 0% to 100%, where 0% means "does not include any key components" and 100% means "includes all key components".

Choices are:

- 1. 0%
- 2. 20%
- 3. 40%
- 4. 60%
- 5. 80%
- 6. 100%

Completeness: Comment on/explain your choice above

100%

It was good. The submitted code includes the main scripts and functions required to reproduce the key results discussed in the report, such as localization performance

evaluation, CDF analysis, and comparisons between different algorithms. The artifact is generally complete with respect to the reported methodology and results.

6. Exercisability: Do the submitted artifacts/code include the scripts and data needed to run the experiments described in the paper, and can the software be successfully executed?

Rate from 0% to 100%, where 0% means "the scripts/software cannot be successfully executed and/or no data is included" and 100% means "the artifact includes all necessary scripts/software and data, and scripts/software (if present) can be successfully executed".

Choices are:

- 1. 0%
- 2. 20%
- 3. 40%
- 4. 60%
- 5. 80%
- 6. 100%

Exercisability: Comment on/explain your choice above

80%

The submitted artifact includes the complete codebase and scripts required to run the experiments, and the software can be successfully executed. However, the training data file referenced in the experiments could not be located or opened, which prevents full end-to-end execution without additional effort. Aside from this missing data component, the experimental workflow and scripts are clear and largely runnable, justifying a score of 80%.

7. Results attainable: Does the artifact/code make it possible, with reasonable effort, to obtain the key results from the artifact/code?

Rate from 0% to 100%, where 0% means "no results can be obtained" and 100% means "all results can be obtained".

Choices are:

- 1. 0%
- 2. 20%
- 3. 40%
- 4. 60%
- 5. 80%
- 6. 100%

Results attainable: Comment on/explain your choice above

100%

The artifact includes the necessary models, scripts, and documentation to reproduce the key results reported in the project with reasonable effort.

8. Results completeness: How many key results of the paper/report is the provided code meant to support?

Rate from 0% to 100%, where 0% means "the artifact is meant to support no key results" and 100% means "the artifact is meant to support all key results".

Choices are:

- 1. 0%
- 2. 20%
- 3. 40%
- 4. 60%
- 5. 80%
- 6. 100%

Results completeness: Comment on/explain your choice above

100%

Overall it was good, the provided code supports most of the key results in the report, including AoA estimation using FFT and MUSIC, CDF plots of localization error, Comparisons across algorithms and number of APs, Visualization of localization scenarios. However, I think it does not fully support: Joint AoA-ToF (2D MUSIC) results; Any results that would require additional CSI phase calibration or preprocessing beyond what is implemented.

Reviewer Team member1 Name, Signature

Hengrui Pei