

Title: Semantic Mobile Base Station Placement

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Abstract: Location of Base Stations in mobile networks plays an important role in coverage and signal strength received by users. As Internet of Things (IoT), autonomous vehicles and smart cities evolve, wireless network coverage will have a quintessential role in ensuring seamless connectivity. Due to use of higher carrier frequencies, blockages such as buildings and vegetation cause the communication to primarily be Line of Sight (LoS), further increasing the importance of base station placement. In this thesis, we propose a novel placement pipeline in which we perform semantic segmentation of aerial drone imagery using DeepLabv3+ and create its 2.5D model with the help of Digital Surface Model (DSM). This is used along with Vienna 5G simulator for finding the best location for deploying base stations by formulating the problem as a multi-objective function and solving it using Non-Dominated Sorting Genetic Algorithm II (NSGA-II). The case with and without prior deployed base station is considered. We then perform an evaluation of the base station deployment based on Signal to Interference Noise Ratio (SINR) coverage probability and user down-link throughput. This is followed by comparison with other base station placement methods and benefit offered by our approach.



FIGURE 2.1: Received Power heatmap from Winprop

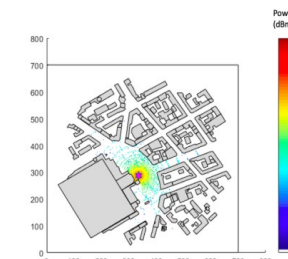


FIGURE 2.2: Received Power heatmap from RWTH mm-Wave Planning Tool

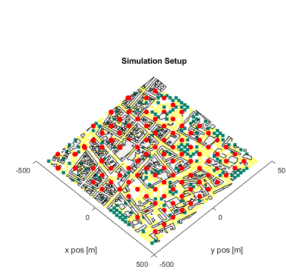


FIGURE 5.1: Top view of Scenario I with candidate BS location

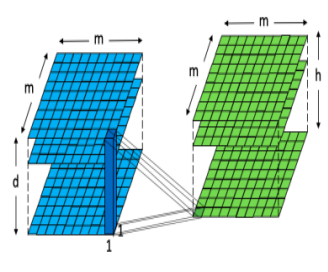


FIGURE 4.4: Pointwise Convolution

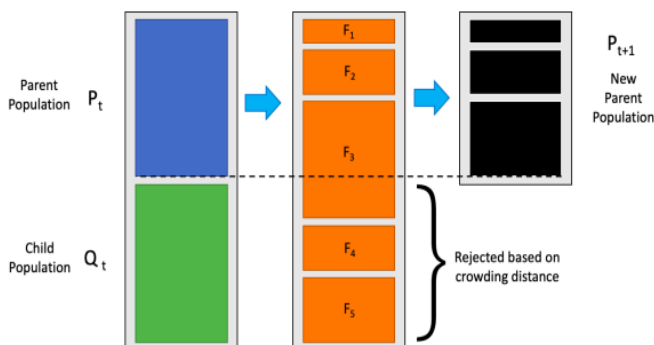


FIGURE 3.4: Population generation in NSGA-II

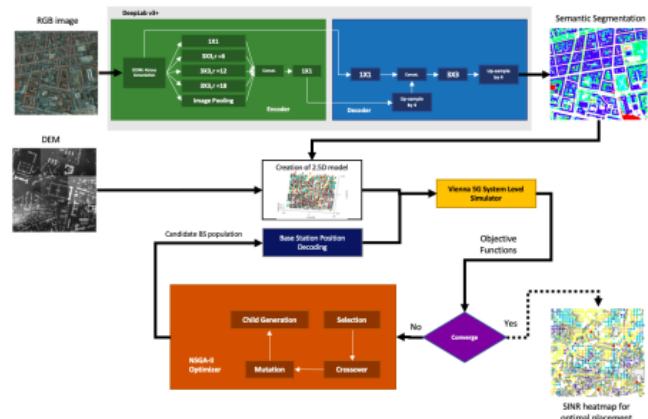


FIGURE 1.2: Overview of the proposed pipeline for BS Placement.