Abstract. Overcrowded of sidewalks can reduce the level of satisfaction of pedestrians. The large crowd on the sidewalks results in slowing downtime of the pedestrian to arrive at their destination. This study focuses on pedestrian flows modelling using the macroscopic model. The numerical approximation of the macroscopic model is formulated as scalar hyperbolic conservation laws. The Lax-Wendroff scheme is used to discretize the equation of conservation laws. The simulation results show that the numerical approximation in terms of density confirms the exact solution. In this simulation, the velocity function is obtained by curve fitting of observation data using a linear regression method. The observation data, which are consist of velocity-density relation, are obtained from observation of pedestrian flows. The study case of this research conducts on the sidewalks of Braga Street, Bandung, Indonesia. There is a velocity function used in the simulation, i.e. $v = 0.58385 + -0.72442\rho$. In performing the velocity function v, the pedestrian leader position is approximately 0.5 meter in front of the pedestrian leader using the velocity function v_1, and the pedestrian leader using velocity function v_2 position is approximately 0.5 meter in front of the pedestrian leader using the velocity function v at final time $T = 20$ and $T = 30$ seconds. Overall, the numerical experiment shows that the pedestrian leader using the velocity functions v_2 is faster than using v and v_1.