Green Score : an Evaluation Scheme for Pedestrian Environment

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Introduction

- The key to urban planning based on new planning paradigm is constructing high-density cities tied to complex land use patterns and public transportation systems.
- An urban settlement environment that restrains an auto-based life style and encourages walking activities must be considered in urban planning and design.

- Develop the "*Green Score*", a pedestrian index that simplifies pedestrian environment elements depending on types of walking space with a quantitative index, and evaluate and visualize the overall degree of pedestrian friendliness of the environment, as well as pedestrians' convenience and accessibility.

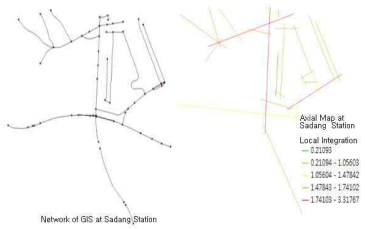
Pedestrian Environment Parameters

- To develop a pedestrian environment index, quantifiable parameters such as mobility, safety, convenience, pleasantness, and environment-friendliness were organized.
- 18 quantifiable parameters were selected, which are viewed to have the potential to be used as indices for the development of GIS.
- 21 street segments related to pleasantness and safety and 9 intersection-related parameters were classified into six areas.

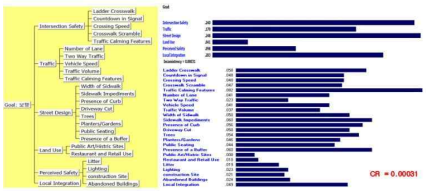
Intersection Safety	Intersection safety parameters include the perception of a vehicle coming toward a pedestrian at a crosswalk, and crosswalk function is measured for mobility and accessibility.
Traffic	The traffic element of the street segment parameter includes prediction of distance to a pedestrian, collision point with a vehicle, degree of pedestrian injury, pedestrian mobility, etc.
Street Design	The street design parameter is an important factor for right of way and the local pedestrian environment, and if well constructed and maintained, it enables the safe walking of pedestrians.
Landuse	The convenient facility and land use parameter includes commercial use and measures the aesthetic aspect of streets.
Perceived Safety	The perceived safety parameter enables strategic design that integrates street lighting and commercial uses to prevent crimes by improving walk-safety awareness through the physical characteristics of the environment.
Walk Accessibility	The walk accessibility parameter evaluates the connectivity and accessibility of street segments' structural space characteristics.

Construction & Analysis of Pedestrian Environment

- First, for pedestrian environment evaluation of intersections, points were assigned to facilities at major crosswalk points interrupted by traffic signals, and vehicle and pedestrian flows, vehicular traffic, and walking and safety facilities were separately measured for the street segment.
- Second, to evaluate the structural space characteristics of the walking path from the perspective of connectivity and accessibility, space syntax was used and connectivity analysis (Global Integration [GI]) was conducted.



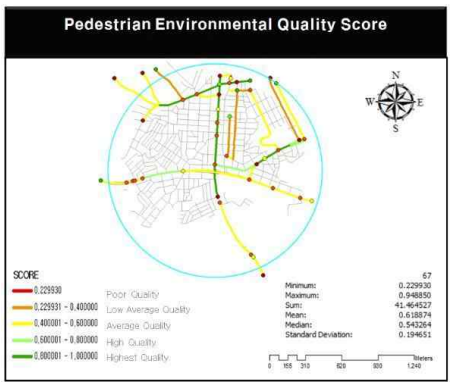
- The Analytic Hierarchy Process (AHP) method was used for the survey results to verify the relations between pedestrian satisfaction and evaluation indexes.



- Pedestrian safety is integrated into street segment and intersection design, and the value ranges from 0 to 100 for each parameter.

Score distribution	Meaning of the Score
100-81	The highest quality, presents the most important pedestrian conditions
80-61	High quality, presents some of important pedestrian conditions
60-41	Average quality, presents pedestrian conditions but need to improve
40-21	Low quality, presents at least pedestrian conditions
Less than 20	Lowest quality, absence of pedestrian conditions

Visualizing the Results and Conclusions



Link ID	Name of Street	Local integration	Total Score
3761220401557	Sadang-ro	3.31767	0.94885044214
3761220330059	Seocho-ro	3.31767	0.94752027433
3761220401539	Dongjak-daero	2.97302	0.87934032395
3761220401522	Hyoryung-ro	2.95684	0.84853809079
3761220320665	Songbang-ro	2.95684	0.74410778499
3761220302361	Nambu beltway	1.47842	0.60512664918
3761220701526	Dogumuri-gil	1.37919	0.54643910087
3761220401840	Bulnaru-gil	1.65883	0.54203202766
3761220302334	Kkachi-gil	1.69831	0.53712247527
3761220401556	Samil-gil	1.69831	0.48862619499
3761220701379	Saemgol-gil	0.87259	0.42288573928
3761220701397	Boram-gil	1.05603	0.42170878132
3761220701400	Isuchodeung-gil	1.00006	0.40656690530
3761220701402	Cheongdugot-gil	1.05603	0.39583806160
3761220701380	Chamnamu-gil	0.87259	0.37473586160
3761220401553	Haksu-gil	1.01899	0.35072423499
3761220701401	Dwitbeol1-gil	0.21093	0.23656023412
3761220701318	Dwitbeolgongwon-gil	0.21093	0.22993039896

- Sadang-ro, Seocho-ro, Dongjak-daero, and Hyoryung-ro turned out to have excellent pedestrian environments in terms of walking path, with scores of over 0.8, and the Sadang Station vicinity had a score of 0.75 on average, having highly convenient facilities and connectivity overall.

- Using a street segment and intersection identifier, a visual map was created that incorporated the evaluation results for a selected region consisting of street segment and intersection spaces.
- Data for the measurement of evaluation indices were collected by observations based on the street segment and intersection visualization results.
- Adjusted measurement values were summed and categorized according to walking dependency, and these were normalized in the range of 0 to 100.

- Developed the *Green Score*, an evaluation index to measure and quantitatively evaluate pedestrian environmental factors in a city.
- Future score measurement models must be applied to a virtual system based on the major points of signals in the physical walking space, continuous and consistent lines for walking paths, and regional planes created by urban planning and land use.
- This will be used to visualize walking patterns and predict evaluation results of pedestrian environment pleasantness and convenience.

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