

Square Mesh Section for IRI Section and IRI Data Format



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IRI Section

Current Problems

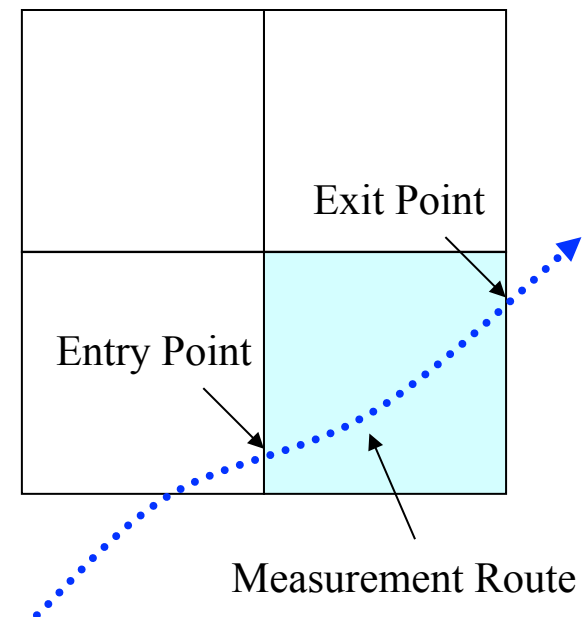
Usually, IRI is calculated for the section that is defined by each road location markers.

But it is difficult to collect this information.

Proposed Method (BumpRecorder Basic Method)

Square Mesh is defined by only using latitude and longitude, instead using road location markers.

For measurement route, a cross over section is used for IRI calculation.



Square Mesh Code

North South length and East West length of Square Mesh are same. And basic size is $1/8192 \text{ deg}(1/2^{13})$ that is about 10m.

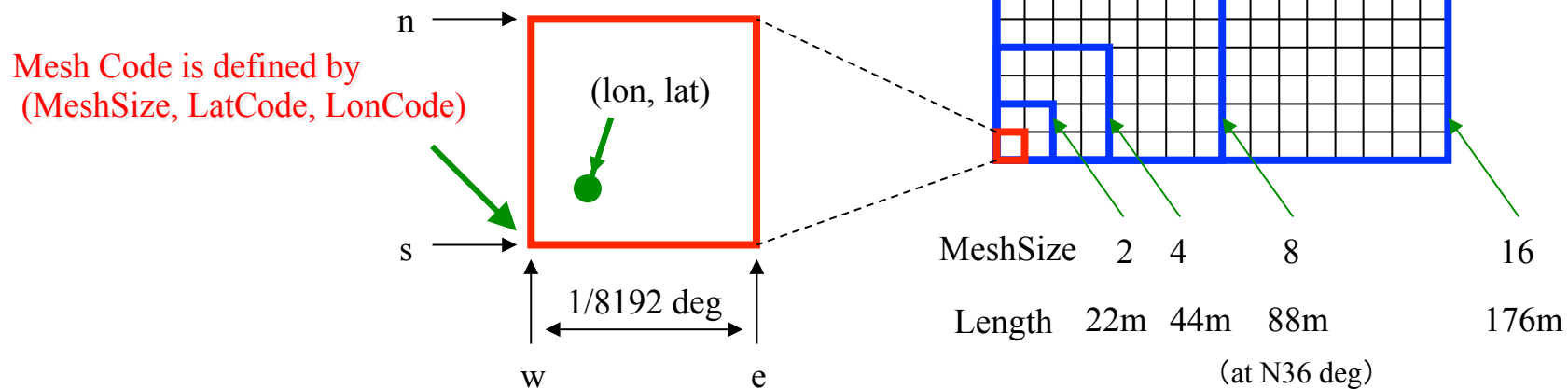
Basic Mesh size

LonCode =
 $w = \text{int}(\text{lon} / 8192)$
 $e = w + 1$

LatCode =
 $s = \text{int}(\int (1/\cos(\text{lat})) * \alpha)$
 $= \text{int}(\text{LOG}((1+\sin(\text{lat})) / (1-\sin(\text{lat}))) / 2 * \alpha)$
 $n = s + 1$ $\alpha=469367.1234291810$

Expand Mesh size

Mesh size is defined by x2, x4, x8, x16 ...



* BumpRecorder Web is calculating IRI for Mesh Size 2, 4, 8, 16...

* Depending on driving route, IRI section length is different between neighboring sections.

IRI Data Format

Sample Data

devicetime	meshsize	latcode	loncode	lat1	lon1	lat2	lon2	l	speed	iri
1431476406033	2	314168	1144522	35.77108	139.712233	35.771112	139.712401	15.5	7.29	8.61
1431476501485	2	314172	1144530	35.77148	139.713347	35.771672	139.713313	21.5	6.03	3.55
1431476501485	4	314172	1144528	35.77148	139.713347	35.771672	139.713313	21.5	6.03	3.55
1431476501485	8	314168	1144528	35.77148	139.713347	35.771672	139.713313	21.5	6.03	3.55
1431476501485	16	314160	1144528	35.77148	139.713347	35.771672	139.713313	21.5	6.03	3.55
1431476504390	2	314174	1144530	35.771675	139.713312	35.77187	139.713264	22.2	7.31	2.52
1431476504390	4	314176	1144528	35.771675	139.713312	35.772068	139.713232	44.1	7.67	2.63
1431476504390	8	314176	1144528	35.771675	139.713312	35.772518	139.713135	94.1	8.25	4.29
1431476504390	16	314176	1144528	35.771675	139.713312	35.773296	139.713135	180.1	7.78	5.19

Columns

devicetime	Smartphone OS time, it is epoch seconds UTC [ms]
meshsize	Square Mesh Code of size, it include 2, 4, 8, 16
latcode	of latitude
loncode	of longitude
lat1	Latitude for entry point
lon1	Longitude for entry point
lat2	Latitude for exit point
lon2	Longitude for exit point
l	Section length [m]
speed	Average driving speed [m/s]
iri	IRI [mm/m]