

Square Mesh Section for IRI Section and IRI Data Format



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IRI Section

Current Problems

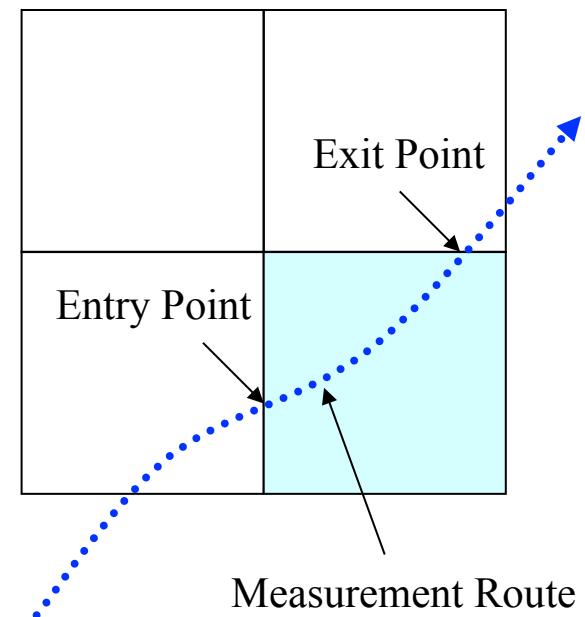
Usually, IRI is calculated for the section which is defined by each road location markers.

But it is difficult to collect these informations.

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

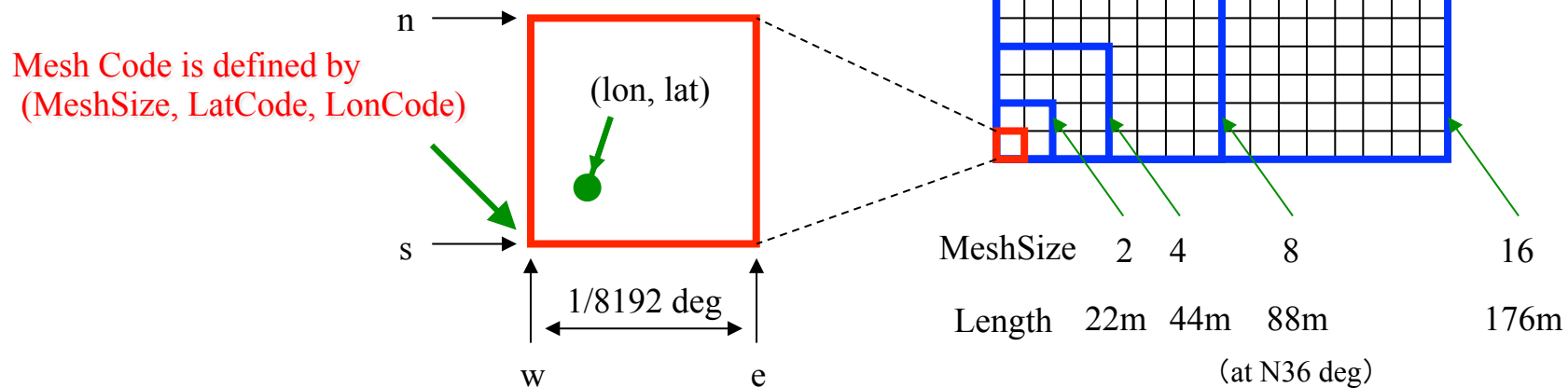
Basic Mesh size

```
LonCode =
w = int(lon / 8192)
e = w + 1
```

```
LatCode =
s = int(int((1/cos(lat)) * α))
    = int(LOG((1+sin(lat)) / (1-sin(lat))) / 2 * α)
n = s + 1                α=469367.1234291810
```

Expand Mesh size

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



IRI Data Format

Sample Data

devicetime	meshsize	latcode	loncode	lat1	lon1	lat2	lon2	l	speed	iri	n	sum1
1431476406033	2	314168	1144522	35.77108	139.712233	35.771112	139.712401	15.5	7.291	8.61	48	0.413488
1431476501485	2	314172	1144530	35.77148	139.713347	35.771672	139.713313	21.5	6.035	3.55	70	0.248579
1431476501485	4	314172	1144528	35.77148	139.713347	35.771672	139.713313	21.5	6.035	3.55	70	0.248579
1431476501485	8	314168	1144528	35.77148	139.713347	35.771672	139.713313	21.5	6.035	3.55	70	0.248579
1431476501485	16	314160	1144528	35.77148	139.713347	35.771672	139.713313	21.5	6.035	3.55	70	0.248579
1431476504390	2	314174	1144530	35.771675	139.713312	35.77187	139.713264	22.2	7.319	2.52	84	0.211864
1431476504390	4	314176	1144528	35.771675	139.713312	35.772068	139.713232	44.1	7.679	2.63	169	0.444356
1431476504390	8	314176	1144528	35.771675	139.713312	35.772518	139.713135	94.1	8.256	4.29	363	1.558886
1431476504390	16	314176	1144528	35.771675	139.713312	35.773296	139.713135	180.1	7.788	5.19	731	3.790661

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] (= 1000 * sum1 / n)
n	Number of data in this section
sum1	Summation in this section [m]