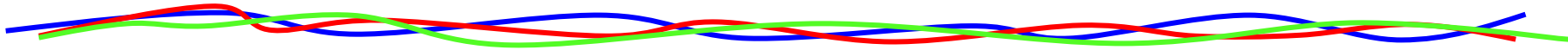# Square Mesh Section
and
Expand Square Mesh Section
for IRI Section

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# Square Mesh 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.

Exit Point

Entry Point

Measurement Route

Square Mesh Code

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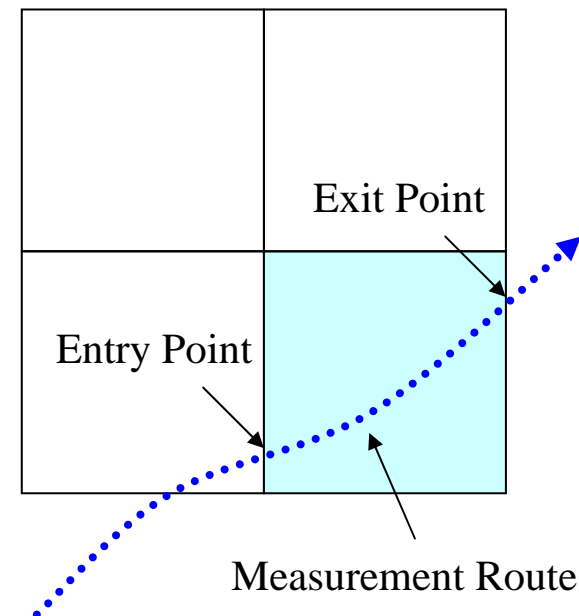
North South length and East West length of Square Mesh are same. And basic size is 1/8192 deg(1/2^13) that is about 10m.

Basic Mesh size

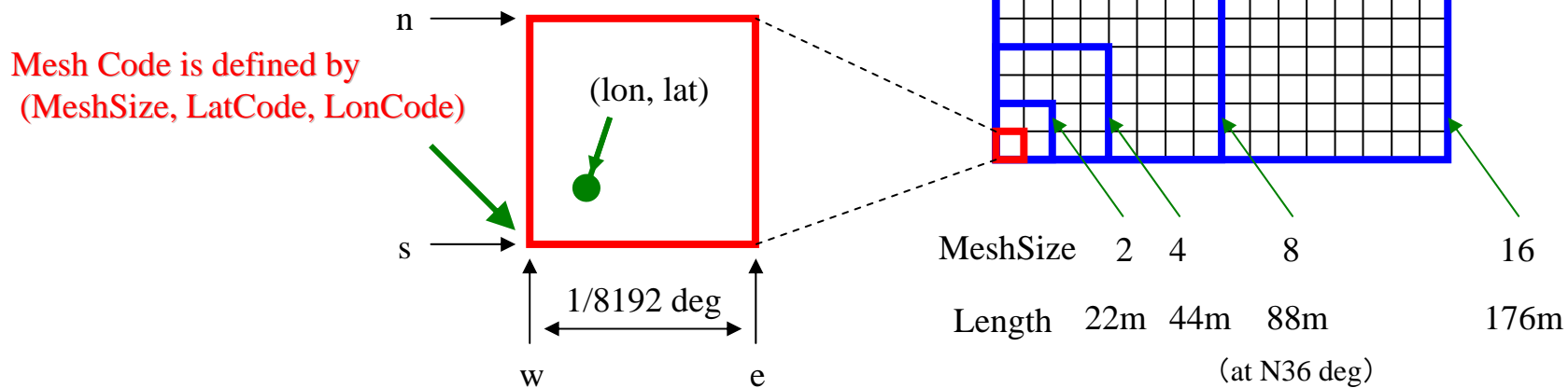LonCode =
w = int(lon / 8192)
e = w + 1

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

Mesh Code is defined by
(MeshSize, LatCode, LonCode)

n →

(lon, lat)

s →

1/8192 deg

w   e

Expand Mesh size

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

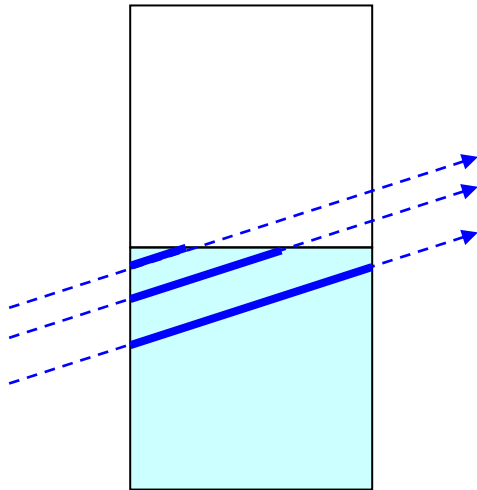| MeshSize	2	4	8	16
Length	22m	44m	88m	176m

（at N36 deg）

* BumpRecorder Web is calculating IRI for Mesh Size 2, 4, 8, 16...
* Depending on driving route, IRI section length is different between neighboring sections.
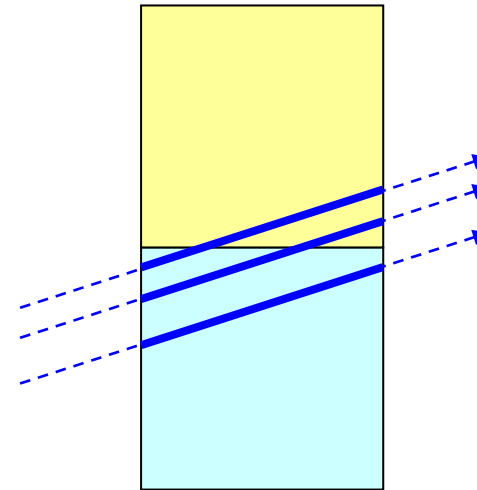
Expand Square Mesh Section

Square Mesh Section

Because GPS has positioning error, driving path is changed, and section length is changed.

Expand Square Mesh Section

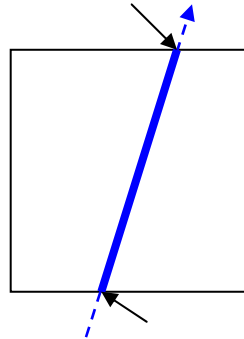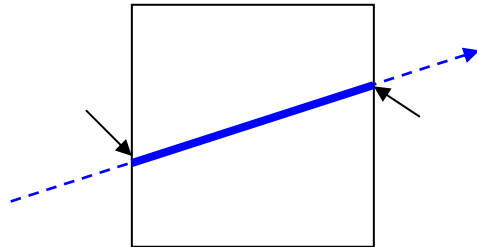To determine same section length, current and next section are merged.
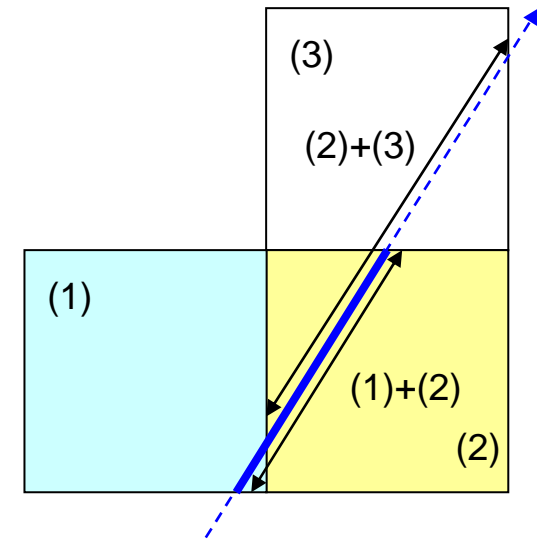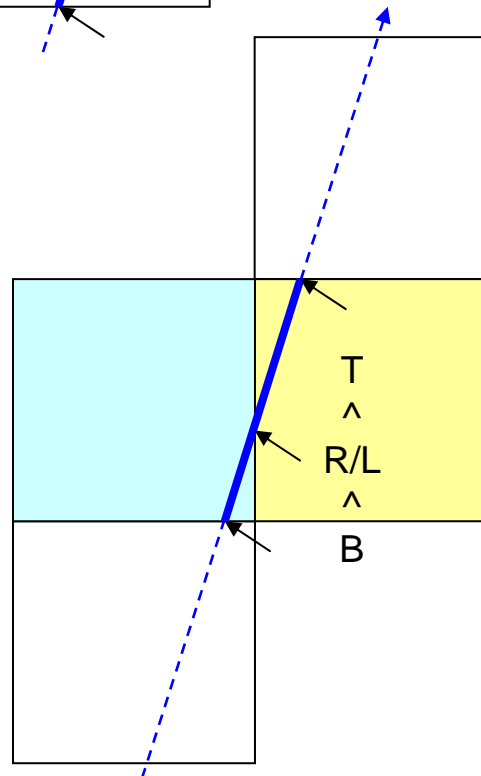
Merge conditions

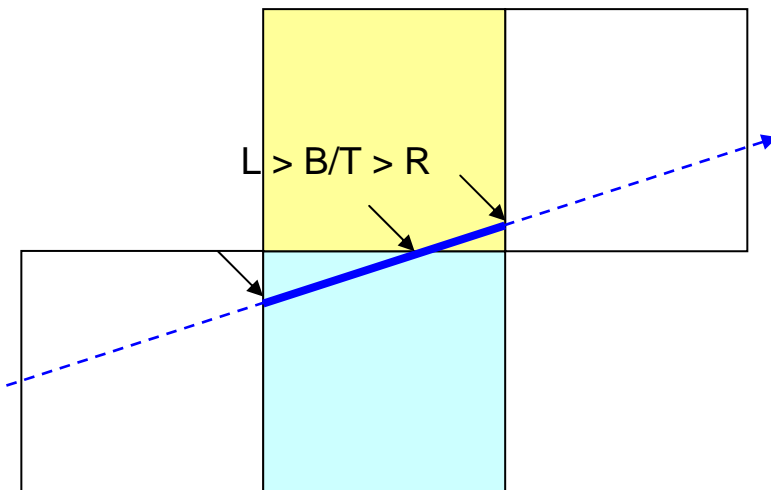## Case 1 : Not merge (Standard)

Enter and exit from/to left/right

Enter and exit from/to top/bottom

Case 2 : Merge

L > B/T > R

T
^
R/L
^
B

(3)

(2)+(3)

(1)

(1)+(2)

(2)

Merge (1)+(2),
because length of (1)+(2)
is shorter than (2)+(3).

4

Merge conditions

Case 1 : Not merge

(2)	L > R
	(3)
T ^ B	(1)
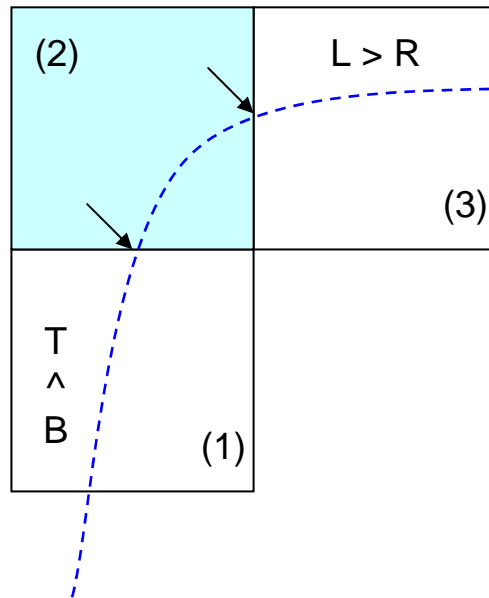
Section (2) is NOT merge,
because previous (1) and next (3) are not
required merge.

There is the sample program as following URL.

http://www.bumprecorder.com/wp-content/uploads/2017/06/samplecode_squaremesh.zip