

INDOOR LOCALIZATION USING WIFI FINGER PRINTING

Problem identification:- Origin of idea → • Locating labs and other places.
• Frustations & parents.

Available.

Solution → 1) GPS → Short coming
↳ Line of sight (Not for indoor)
↳ Accuracy (10 mtr). } Not Good.

RFID, Bluetooth, Ultrasonic

Approaches:-

① Trilateration (Randomness of received signals)
DAD → we needed to establish 3 anchor points.

- ① Fingerprinting →
- Need of map
- It is a technique by which every location has its unique id (fingerprint) on basis of received signal strengths of wifi.
- We needed a coordinate sys. so we used different tiles.

→ Data Collection :-

Access point →

mac address : RSSI (max -20
-110 - 0)

RSSI = (Receive signal strength - sent sig strength) (always -ve)
close to zero - higher strength

Analogy
of
fingerprint

Algorithms

① Brute force → Count.

②

③

→ Back pg



Accuracy significant & improved

↳ upto 2m (95%)

↳ TC improve

↳ Multi-threading

Improvement

- nearest neighbour



nearest pt came in this range only then accept

- inertia factor

Data Collection

week (0,0)

~~DAY~~ 1

MA1 $\rightarrow (-40, -50)$

2

$(-40, -60)$

3

$(-50, -65)$

4

\rightarrow multiple iteration

all weeks



Nth labra



ADVANTAGES

- Completely offline
 \rightarrow no net

] If all database is stored at user mobile

- Implementation cost

\rightarrow only labar work

o ~~App~~ Accuracy \rightarrow upto 2m (GPS 10m)

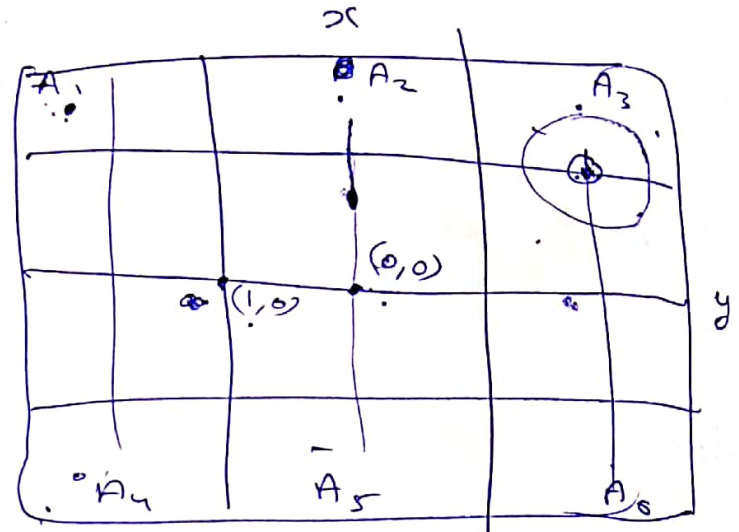
Disad

\rightarrow labarians

Brute force

APPROACH - I

1st file $\rightarrow C_1++$
2nd F. $\rightarrow C_2++$



RAW

Explain

- How the counts of each file updated.
- Why duplicates were important (weights)
- But they caused problems ~~too~~ which is explained by the given test case.
- one A? cannot uniquely identify a position.

$(1,0) \cdot \text{cov}$ max \rightarrow ~~big~~ RSSI

$(0,0) \cdot \text{cov}$ $m A_1$ —

$m A_2$ —

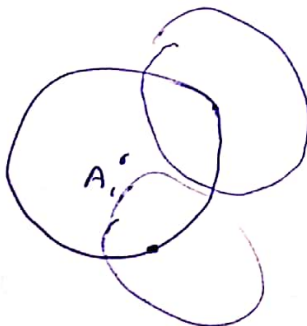
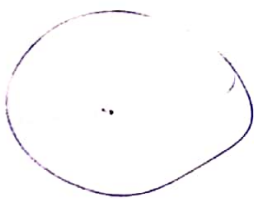
$m A_3$ —

$m A_0$ —

60 entries

Test Case

9



$m A_1 = -45 \times 4$
 $m A_1 = -55 \times 1$
 $m A_1 = -60 \times 5$
 $m A_2 = -40 \times 3$
 $m A_2 = -45 \times 7$
 $m A_3 = -60 \times 2$
 $m A_3 = -70 \times 8$

$m A_1 = -45 \times 10$
 $m A_2 = -80 \times 5$
 $m A_2 = -70 \times 5$
 $m A_3 = -30 \times 5$

$m A_1 = -45$ $m A_2 = -40$ $m A_3 = -60$

removal of outlier

* we do not need to care about min value because the best signal strength cannot get wrong.

→ So we just consider difference between consecutive values to be the deciding factor.

→ we chose a threshold value of '5' for the difference.

- List of all mac - same - sig.

- Sort

- Iterate

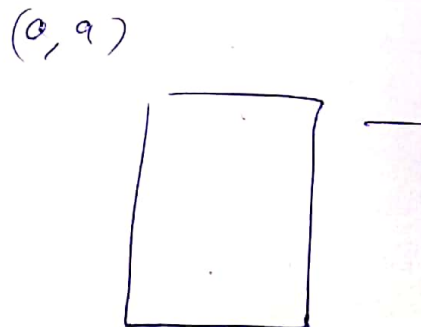
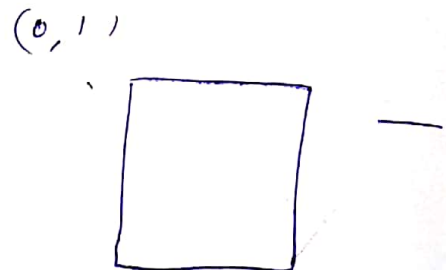
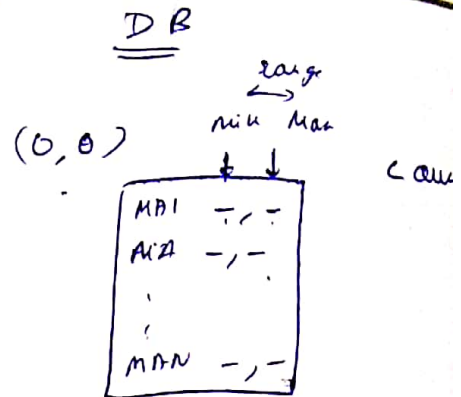
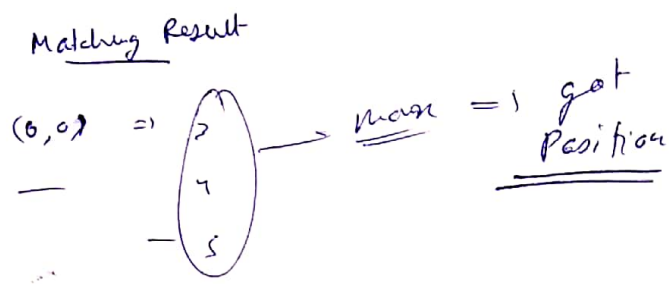
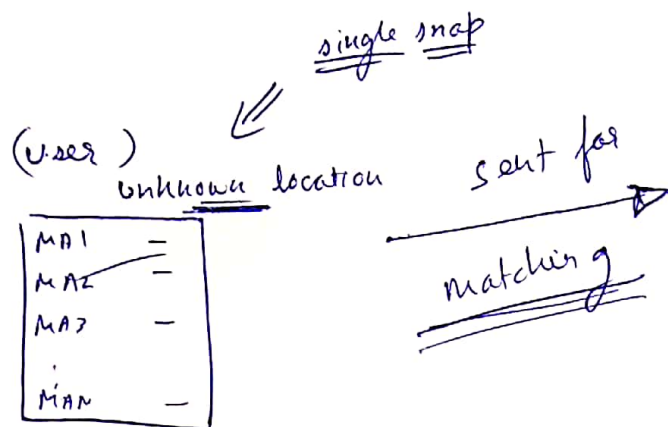
- If $A[i] - A[i+1] > 5$

- remove $A[i+1]$;

→ Some ~~some~~ cases were handled manually in

45, 46, 47, 54, 55, 56, ~~57~~

↓



- why Ubuntu?
- why not dbms?
- Explain trilateration?
- Standard deviation? \rightarrow App 3.
- Access point, router, signal multiplier?
- RSSI negative value reason?
- .CSV
- file system in Python
- For 1 minute?
- Multiple floors?

Draw \rightarrow • Variation of signal strength on same address
 • Obstacles dip varies the strength

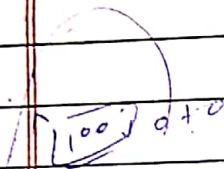
0 1 2 3 4 5 6 7 8 9

lat locate
→ wifi, bluetooth, RFID,
range

Date _____
Page _____

① trilateration

② fingerprinting



→ point's name dihat

→ solution → tiles in floor



↑
coordinate system

→ data collection

→ wifi access pts ki
MAC

① $(2^8 + 2^3 + 5^9)$
99

110

~50

→ value

$$RSSI = (\text{receive}) - (\text{emit})$$

= 110

$$\frac{-20 \text{ max}}{-13}$$

→ Ubuntu

software free

if asked

② BTS

update

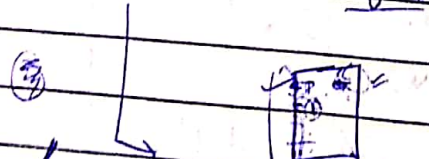
LINSSIP

→ screenshot

Algo

① Brute force → freq

② $(2, 1)$ $(2, 0)$ $(2, 2)$



total count per file

Contribution
down name

gp	RSSI
1	110
2	110
3	110
4	110
5	110

10 - 12 times

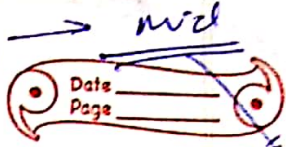
→ 5 variation
base of object
in floor

in dupli cells

① Reduce Redundancy ~~auth~~

why

- ① → down fallu
- ② → — khoton



② Unique

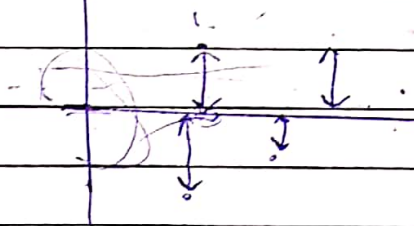
MACI 50 } → MACI 50
MACI 50

✓ Reject → total reduction of downside
no bad

③ Range

L min → max (of MACI)

(-70, -50, -40, -30, -20)



auth remove

↑ pta kerna
he lige

SP lagar

auth
hager
nhi

L ①

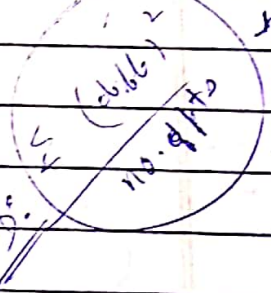
min - max

~~100~~

auth

(-101)

-80



Strong signal & outlier

(4.5, 4.6, 4.7, 4.8, 4.9, 5.0)
(4.5, 4.6, 4.7, 4.8, 4.9, 5.0)

②

Aug → window - shift

③

send → diff threshold → (9.0000 > 5.0000)

-110

1st ele

remov

110

not

expose

target

①

min - max
✓ ✓

↓

- author d
- min - max formed
- 41, 42, 45 ← DB
43 ← input
↓
so formed array

technique (Algo's) - matching ✓

speed ↑ ⇒ multithreading (?)

Improvement & in Process

① Combination → Trilateration