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HW-4

DATE: / / MO TU WE TH FR SA SU

8)2) Phase transition in Compressed Sensing

$A \in \mathbb{R}^{n \times d}$, $A_{ij} \sim N(0, 1)$

$Ax = b$; x is R- Sparse

($n \times d$, $d \times 1$, $n \times 1$)

Since, A is a random Matrix, it satisfies the RIP property with high probability For the recovery of x using BP algorithm:

$$\min \|x\|_1$$
$$\text{s.t} \quad Ax = b$$

The sparsity conditions to be required are:

$R << n < d$

Further $R \leq C_1 \frac{n}{\log(d/n)}$ ensures that A satisfies RIP with probability at least $1 - 2e^{-C_2 n}$

The heat map of $p(n, R)$ is shown below →

We observe that when $R << n \leq d$ then the recovery of x is achieved with high probability As n decreases & R becomes high, the success probability decreases.