

$$\begin{array}{c} ? \\ ? \\ ? \\ ? \\ k \\ 0 \\ 2k \\ \ell_1 \\ ? \\ \ell_1 \\ ? \\ ell_1 \\ ? \\ \ell_1 \\ \omega_1 \\ s \\ \alpha \in^n \\ s \\ \mathcal{O}(s \log n) \\ ? \end{array}$$

$$(1) \quad y_i = \langle \alpha, \psi_i \rangle$$

$$(2) \quad y = \Psi \alpha$$

$$\begin{array}{c} y_i \\ i^{th} \\ \alpha \in^n \\ \psi_i \\ i^{th} \\ y_i \\ \Psi \\ \psi_i \\ s \\ x_i \end{array}$$

$$\alpha = \sum_{i=1}^n \phi_i x_i$$

$$(3) \quad \begin{array}{c} x \in \\ \alpha \in \\ \phi_i \\ n \end{array}$$

$$(4) \quad \begin{array}{c} \alpha = \Phi x \\ \Sigma_s \\ \tilde{n} \end{array}$$

$$(5) \quad \Sigma_s = \{x \in^n \colon |\text{supp} \left(x\right)| \leq s\}$$

$$\begin{array}{c} \text{supp} \left(x\right) \\ x \\ sensing\_example.jpg A visualisation of the Compressive Sensing problem as an under – determined system \\ \tilde{x} \\ \alpha \in^n \\ A \in^{m \times n} \\ n \ll \end{array}$$

$$(6) \quad y = \Psi \alpha = \Psi \Phi x = Ax$$

$$\begin{array}{c} A \\ A \\ \Phi \\ \Psi \\ n \\ n = \\ x \\ A \\ A \\ s \\ \delta \in \\ (0,1) \\ x \in \\ \Sigma_s \end{array}$$

$$(7) \quad (1-\delta)\,x_2^2 \leq Ax_2^2 \leq (1+\delta)\,x_2^2$$

$$\begin{array}{c} A \\ \tilde{n} \\ A \\ ? \\ A^T A \\ A \\ n \\ s \\ I,J \subset \\ [n] \\ s \\ u \in^n \end{array}$$

$$(8) \quad \langle Au_I, Au_J \rangle \leq \delta u_{I2} u_{J2}$$