Vedant Mehta.

Tut 4.

ICA.

Mixing statistically independent sources.
now variance of mixture

$$\mathrm{var}(x) = \langle (x - \langle x\rangle)^2 \rangle$$
$$= \langle x^2 \rangle - (\langle x \rangle)^2$$
$$= \langle (\Sigma' w_i S_i)^2 \rangle - (\langle w_i S_i \rangle)^2$$
$$= \langle (\sum'_{i,j} w_i w_j S_i S_j) \rangle - \langle (\sum_{i,j} w_i w_j S_i \langle S_j \rangle) \rangle$$

$$= \sum'_{i} w_i w_j (\langle S_i S_j - \langle S_i \rangle \langle S_j \rangle) + \sum'_{i,j\, i \neq j} w_i w_j (\langle S_i S_j \rangle - \langle S_i \rangle \langle S_j \rangle$$

$$= \Sigma' w_i^2 (\langle S_i S_j \rangle - \langle S_i \rangle^2) + \sum'_{i,j\, i\neq j} w_i w_j (\langle S_i \rangle \langle S_j \rangle - \langle S_i \rangle \langle S_j \rangle)$$

S_i & S_j are statistically independent.
for $i \neq j$

$$\langle S_i \rangle \langle S_j \rangle = \langle S_i \rangle \langle S_i \rangle = 0.$$
$$\& \ \mathrm{var}(S_i) = 1$$

=> To generate mixture from unit varian[ce]
$\mathrm{var}(x) = 1$

$\Sigma' w_i^2 = 1 \rightarrow$ Following constraint has [to] be followed & imposed on the weights w_i for the mixture to h[a]v[e] unit variance.