2.5 - 2.6 Applications

Stochastic Matrix / Transition Matrix

- Matrix of probabilities changing from one state to another.

Example:

$$\begin{array}{c} \text{-from-} \\ \begin{array}{cccc} \text{Ford} & \text{Chevy} & \text{Toyota} & \\ \left[\begin{array}{ccc} .8 & .14 & \sim \\ \sim & \sim & \sim \\ \sim & \sim & \sim \end{array}\right] & & & \begin{array}{c} F \\ C \\ D \end{array} \end{array} \end{array}$$

-to-

Probability of Car users of certain brands buying other certain brands next time.

Cryptography

- Encryption Matrix to decode / classify messages.

Example:

$$\underset{1 \times 4}{[\text{orig.}]} \times \underset{4 \times 4}{\left[\begin{array}{c} A \\ \text{encryption} \end{array}\right]} = \underset{1 \times 4}{[\text{coded}]}$$

Coded x inverse (encryption matrix) = original message.

Both kinds of matrices with varying applications and problem scenarios.

Note on stochastic / transition matrices - columns must add to 1, and all matrix elements must be greater than or equal to zero.