COMS21202: Symbols, Patterns and Signals

Examinable Material

Lec2.pdf, Lec3.pdf, Lec4.pdf and all problem classes are examinable unless specifically mentioned below.

Non-Examinable Material

- Lec1.pdf is purely motivational and is non examinable.
- Lec5.pdf is information only and is non examinable.
- Code and Lab sheets are needed for the coursework but not the tests or the final exam. You are not asked to reproduce code or for any Matlab/Python commands.
- Historical references - names, dates - are non-examinable.
- Challenges are non examinable. They are out of the course's scope and are purely 'challenges'.

Formulas that will be provided in the test/exam

- Minkowski distance:

$$D(x,y) = (\sum_{i=1}^{n} |x_i - y_i|^p)^{\frac{1}{p}}$$

- Dynamic Time Warping:

$$DTW(\mathbf{X},\mathbf{Y}) = D(x_0,y_0) + min\{DTW(\mathbf{X}, REST(\mathbf{Y})), DTW(REST(\mathbf{X}),\mathbf{Y}), DTW(REST(\mathbf{X}), REST(\mathbf{Y}))\}$$

- One-dimensional Gaussian/Normal probability density function:

$$p(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

- Multi-dimensional Gaussian/Normal probability density function:

$$p(\mathbf{x}) = \frac{1}{\sqrt{(2\pi)^M |\Sigma|}} e^{-\frac{1}{2}(\mathbf{x}-\boldsymbol{\mu})^T \Sigma^{-1} (\mathbf{x}-\boldsymbol{\mu})}$$

- Least Squares Matrix Form:

$$\mathbf{a}_{LS} = (\mathbf{X}^T\mathbf{X})^{-1}\,\mathbf{X}^T\,\mathbf{y}$$

- Binomial Distribution (D successes from N runs):

$$P(D|N) = \frac{N!}{D!(N-D)!} \alpha^D (1-\alpha)^{N-D}$$