School of Computer Science
Faculty of Science
National University of Engineering

Test 1

Subject: Machine Learning for Data Science **Period: 2019.2**

In order to work with the first two questions you can use the xarray module or the netCDF4 one.

1. (8 pts.) Read the NetCDF file: sst1.cdf. Fill the missing temperatures by the mean of the non-missing ones. Finally, serialize and deserialize the new –ready to process– data structure. You can read the sst1.txt file for a perspective of the previous file.

2. (8 pts.) Read the NetCDF file: sst2.cdf. Fill the missing temperatures by the mean of the non-missing ones of the same day and month. Finally, serialize and deserialize the new –ready to process– data structure. You can read the sst2.txt file for a perspective of the previous file.

3. (2 pts.) Let $\Omega := \{\ldots, -2, -1, 0, 1, 2, \ldots\}$ and

$$\mathcal{C} := \{\{1, 2, 3\}, \{2, 3\}\}\,.$$

   What is the σ-algebra generated by $\mathcal{C}$?

4. (2 pts.) Let $\Omega := \mathbb{R}$,

$$\mathcal{C}_1 := \{(-\infty, a]\ ;\ a \in \mathbb{R}\} \text{ and}$$
$$\mathcal{C}_2 := \{(-\infty, b)\ ;\ b \in \mathbb{R}\}\,.$$

   It is well known that $\mathcal{C}_1$ and $\mathcal{C}_2$ generate the same σ-algebra: called the σ-algebra of Borel on $\mathbb{R}$. Show that $(-\infty, 0)$ could be expressed as a countable union of elements of $\mathcal{C}_1$.

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