Gateway Antarctica
Project Brief

Company

Gateway Antarctica is the Centre for Antarctic Studies and Studies and Research at the University of Canterbury. The centre plays a leading role in national and international Antarctic research projects. This includes areas such as Antarctica's role in climate change, engineering in extreme environments. The centre is a force point for Antarctic study, attracting national and international participation in collaborative research, analysis, learning and networking.

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Students

Shun Li is a student enrolled in Master of Applied Data Science. Currently, He has completed all basic courses required in this program and is participating in a project in Gateway Antarctica.

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Project Summary

Overview

Atmospheric reanalyses are optimal estimates of atmospheric state based on a combination of model output and a wide of observations.

This project will examine whether the various atmospheric reanalyses available are consistent around the world by using pattern classification algorithms, which are applied to near-surface horizontal wind fields from the present day back to 1900.

Objectives

The key goal for this project is to answer the following question:

Can atmospheric reanalyses accurately characterise the atmospheric state in the poorly observed Antarctic region before the advent of satellite observations?

More specifically, to find out that which areas or which years that the results from atmospheric reanalyses can be consistent perfectly, and which areas or which years that the results vary reasonably.

Research questions

Identification of the quality of reanalyses around the Earth: Are they worst in Antarctic?

Specifically, whether the reanalyses are consistent with each other in different areas from the world or in different years from recent centuries ?

Business outcomes

Since this is a research project, several papers could be published to show the achievements in this project. More importantly, by implementing this project，a statistical interpretation about the quality of present reanalyses in different areas and years can be obtained，and the results from this project' analysis can be used to appeal or suggest these different reanalyses products to improve their prediction models and more accurate measurement data so that they can have better consistent results in more areas and more years.

Requirements

This project is suitable for students with a good working knowledge of Python, interested in working with large complex datasets(100GG), and a curiosity about atmospheric science and the climate system. Also, an interest in using advanced data analytic tools, such as the Self-Organizing Map technique, would be benefical.

About python, students should be familiar with several popular libraries like numpy、pandas、matplotlib、xarray and so on.

In addition, a great understand about linear algebra is necessary.For example, Matrix transpose、Matrix multiplication and so on.