# Industrial Postgraduate Programme (IPP) PhD Thesis - Enhancing Generalizability of Machine Learning Model in Production

## Job description

Project Related to Advanced Data Analytics Large amount of data are usually required to achieve generalizable deep learning image classification models. However, obtaining labeled production image data is expensive. Data augmentation is a method to increase generalizability and is routinely performed in each application. Recent research has shown that Generative Adversarial Network (GAN) can be used to produce sufficiently high quality labelled images to perform learning and these images can be used to effectively conduct data augmentation. GAN is a class of neural networks which aim to learn to produce images with the characteristics of those found in a given training distribution.

Various data analytical solutions are developed in manufacturing to enhance decision making, e.g. fault detection, classification or quality control. The applied models often assume that the environment of data generation is constant, which means the feature (or label) space or distribution of data does not change over time. This is because it is difficult to account for new changes in the environment during model training.

However, changes are inevitable in production. These may be due to changes in product design or production processes, changes in manufacturing location, adding new sensors on machines or the effect of aging in sensors can cause changes in feature space or data distribution. In a traditional approach, models are retrained with data collected from new environment to overcome model degradation. Thus, collecting sufficient data from the new environment is often difficult and time consuming.

**The scope includes:**
1.Explore different kind of GANs approach to evaluate the feasibility in performing data augmentation in various image classification use cases intended to lengthen model life cycle and reduce deployed model retraining activity.

2.Conduct a survey of various knowledge transfer (domain adaptation) method approaches, and evaluate knowledge transfer approaches in production application across various domain change scenario

3.Evaluate possible incremental online learning approaches, assess implementation feasibility, and potential risk.

**The candidate will also receive:**

- A monthly working stipend of S$4,000
- Full sponsorship of school fees

## At a glance

| | |
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| Location: | |
| Job ID: | **67288** |
| Start date: | **as soon as possible** |
| Entry level: | **0-1 year** |
| Type: | **Full time** |
| Contract: | **Temporary** |

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## Profile

- Singaporean Citizen or Permanent Resident at the time of application
- Data Science, Artificial Intelligence, Computer Science Related Bachelor
- Be eligible for full-time PhD studies

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