**Capstone 3 Project Ideas**

Here are the three potential projects with associated data to support the Final Capstone Project.

1. Digit Recognition using Deep Learning.
2. Breast Cancer Recognition with Neural Networks.
3. Time Series Analysis: Ubiquant Market Prediction.

**1. Digit Recognition using Deep Learning**

Train neural networks (NNs), including convolutional ones, for recognizing handwritten images. Enhance the performance of NN models by creating a graphical interface in Tkinter that would allow a user to provide feedback on classification results. This GUI window would allow to draw an image, see its classification as one of the digits, specify a correct label in case if the digit was misclassified, save the misclassified image and its label for model re-training, and keep track of prediction accuracy. Study training and testing performance and accuracy for different architectures. See if performance significantly improves after providing sufficiently many manually labeled handwritten digit images.

Data: MNIST database, from keras.datasets import mnist.

**2. Breast Cancer Recognition with Neural Networks.**

Build a breast cancer classifier on an Invasive Ductal Carcinoma dataset that can accurately classify an image of the microscopic structure of tissue as benign or malignant. Due to the large size of the dataset, extract images in batches using the ImageDataGenerator from Keras. Implement a memory-saving depthwise separable convolution.

Data: the [breast cancer histology image dataset](https://www.kaggle.com/paultimothymooney/breast-histopathology-images/) on Kaggle.

**3. Time Series Analysis: Ubiquant Market Prediction**

Build a model that forecasts an investment's return rate as accurately as possible. Train and test your algorithm on historical prices provided by Ubiquant Investment (Beijing) Co., Ltd which is a leading domestic quantitative hedge fund based in China. Established in 2012, they rely on international talents in math and computer science along with cutting-edge technology to drive quantitative financial market investment. Overall, Ubiquant is committed to creating long-term stable returns for investors.

Regardless of your investment strategy, fluctuations are expected in the financial market. Despite this variance, professional investors try to estimate their overall returns. Risks and returns differ based on investment types and other factors, which impact stability and volatility.

If successful, you could improve the ability of quantitative researchers to forecast returns. This will enable investors at any scale to make better decisions. You may even discover you have a knack for financial datasets, opening up a world of new opportunities in many industries.

Data: [Featured code competition at Kaggle](https://www.kaggle.com/c/ubiquant-market-prediction).