

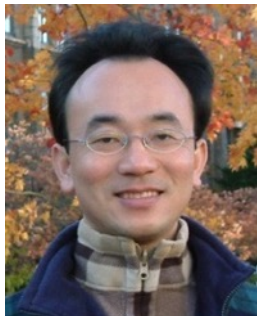
Python for Accounting Applications

Applications of Accounting Data Analytics with Python

1131PAA11

ACC2, NTPU (U2004) (Fall 2024)

Wed 6, 7, 8, (14:10-17:00) (9:10-12:00) (B3F10)



Min-Yuh Day, Ph.D,
Professor

Institute of Information Management, National Taipei University

<https://web.ntpu.edu.tw/~myday>



Syllabus

Week Date Subject/Topics

1 2024/09/11 Introduction to Python for Accounting Applications

2 2024/09/18 Python Programming and Data Science

3 2024/09/25 Foundations of Python Programming

4 2024/10/02 Data Structures

5 2024/10/09 Control Logic and Loops

6 2024/10/16 Functions and Modules; Files and Exception Handling

7 2024/10/23 Data Analytics and Visualization with Python

8 2024/10/30 ~~Midterm Project Report~~ (Self-Learning)

Syllabus

Week Date Subject/Topics

9 2024/11/06 Self-Learning

10 2024/11/13 Midterm Project Report

**11 2024/11/20 Obtaining Data From the Web with Python;
Statistical Analysis with Python**

12 2024/11/27 Machine Learning with Python

13 2024/12/04 Text Analytics with Generative AI and Python

14 2024/12/11 Applications of Accounting Data Analytics with Python

15 2024/12/18 Applications of ESG Data Analytics with Python

16 2024/12/25 Final Project Report

Applications of Accounting Data Analytics with Python

Audit Data Classification

<https://www.kaggle.com/datasets/sid321axn/audit-data/data>

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86

New Notebook

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Audit Data

Audit Risk dataset for classifying fraudulent firms



Data Card Code (19) Discussion (2) Suggestions (0)

About Dataset

Context

Audit Risk Dataset for classifying Fraudulent Firms

Content

The goal of the dataset is to help the auditors by building a classification model that can predict the fraudulent firm on the basis the present and historical risk factors. The information about the sectors and the counts of firms are listed respectively as Irrigation (114), Public Health (77), Buildings and Roads (82), Forest (70), Corporate (47), Animal Husbandry (95), Communication (1), Electrical (4), Land (5), Science and Technology (3), Tourism (1), Fisheries (41), Industries (37), Agriculture (200).

This research work is a case study of an external government audit company which is also the external auditor of government firms of India. During audit-planning, auditors examine the business of different government offices but the target to visit the offices with very-high likelihood and significance of misstatements. This is calculated by assessing the

Usability ⓘ

8.53

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Tags

Business

Software

Finance

Classification

Binary Classification

Audit Data Classification

<https://www.kaggle.com/datasets/sid321axn/audit-data/data>

Audit_Data_Classification.ipynb ☆

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

RAM Gemini
Disk

```
# Audit Data Classification
# Dataset Source: Audit Data: https://www.kaggle.com/datasets/sid321axn/audit-data/data
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import plotly.express as px

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import accuracy_score, confusion_matrix, classification_report
from sklearn.linear_model import LogisticRegression
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from xgboost import XGBClassifier
from sklearn import svm
from sklearn.neural_network import MLPClassifier

import warnings
warnings.filterwarnings("ignore")

# -----
# Load and Inspect Data
# -----
# Audit Data: https://www.kaggle.com/datasets/sid321axn/audit-data/data
df = pd.read_csv('audit_data.csv')
```

<https://colab.research.google.com/drive/1IZnqcenbxSlehvPYb3xMqLVF21oWQdj?usp=sharing>

```
# Audit Data Classification
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import plotly.express as px

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import accuracy_score, confusion_matrix,
classification_report
from sklearn.linear_model import LogisticRegression
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from xgboost import XGBClassifier
from sklearn import svm
from sklearn.neural_network import MLPClassifier

import warnings
warnings.filterwarnings("ignore")
```

```
# Audit Data: https://www.kaggle.com/datasets/sid321axn/audit-data/data
# Load and Inspect Data
df = pd.read_csv('audit_data.csv')

print("Data Overview:")
print(df.head(), "\n")
print("Missing Values:")
print(df.isnull().sum(), "\n")

# Visualize target distribution
sns.countplot(x="Risk", data=df, palette="coolwarm")
plt.title("Count of Risk Labels")
plt.show()
```



```
# Data Preprocessing
df_ml = df.copy()

# Fill missing values in 'Money_Value' with the mean
df_ml['Money_Value'] =
df_ml['Money_Value'].fillna(df_ml['Money_Value'].mean())

# One-hot encode the 'LOCATION_ID' column
location_dummies = pd.get_dummies(df_ml['LOCATION_ID'],
prefix='location')
df_ml = pd.concat([df_ml, location_dummies],
axis=1).drop('LOCATION_ID', axis=1)
```

```
# Separate features and target
y = df_ml['Risk']
X = df_ml.drop('Risk', axis=1)

# Split into train and test sets
X_train, X_test, y_train, y_test = train_test_split(
X, y, train_size=0.7, shuffle=True, random_state=1
)
```

```
# Standardize the numerical features
scaler = StandardScaler()
scaler.fit(X_train)
X_train = pd.DataFrame(scaler.transform(X_train),
index=X_train.index, columns=X_train.columns)
X_test = pd.DataFrame(scaler.transform(X_test),
index=X_test.index, columns=X_test.columns)
```

```
# Utility Functions
def evaluate_model(model, X_test, y_test,
model_name="Model"):
    """
    Fits a given model to the test data, computes predictions,
    and returns accuracy score and confusion matrix.
    """
    y_pred = model.predict(X_test)
    acc = accuracy_score(y_test, y_pred)
    cm = confusion_matrix(y_test, y_pred)
    print(f"{model_name} Accuracy: {acc:.4f}")
    print(classification_report(y_test, y_pred))
    return acc, cm
```

```
def plot_confusion_matrix(cm, labels=['No Risk', 'Risk'],
title="Confusion Matrix"):
    """
    Plots a confusion matrix with the given labels.
    """
    disp = sns.heatmap(cm, annot=True, fmt='g', cmap='Blues',
xticklabels=labels, yticklabels=labels)
plt.title(title)
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.show()
```

```
def plot_bar_comparison(df, x_col, y_col, title, x_label,
y_label):
    """
    Plots a horizontal bar chart for comparison of models based
    on a specified metric.
    """
    fig = px.bar(df, y=y_col, x=x_col, color=y_col, text=x_col,
orientation='h', title=title)
    fig.update_layout(xaxis_title=x_label, yaxis_title=y_label)
    fig.show()
```

```
# Modeling
models = {
    "Decision Tree": DecisionTreeClassifier(random_state=1),
    "Random Forest":
        RandomForestClassifier(n_estimators=100,
                               random_state=1),
    "Logistic Regression":
        LogisticRegression(random_state=1),
    "XGBoost Classifier": XGBClassifier(random_state=1,
                                        use_label_encoder=False, eval_metric='mlogloss'),
    "Support Vector Machine": svm.SVC(kernel='linear',
                                       random_state=1),
    "Neural Network": MLPClassifier(random_state=1,
                                    max_iter=200)
}
```

```
results = []
confusion_matrices = {}

# Train, evaluate, and store results
for name, model in models.items():
    model.fit(X_train, y_train)
    acc, cm = evaluate_model(model, X_test, y_test,
                             model_name=name)
    results.append((name, acc))
    confusion_matrices[name] = cm
```



```
# Compare Model Performance
results_df = pd.DataFrame(results, columns=['Model',
'Accuracy'])
results_df['Accuracy'] = results_df['Accuracy'] * 100
results_df = results_df.sort_values(by='Accuracy',
ascending=False)

print("\nModel Performance Comparison:")
print(results_df)
```

```
results_df['Text'] = results_df.apply(lambda row:
f"{row['Model']}: {row['Accuracy']:.2f}%", axis=1)
plot_bar_comparison(results_df, x_col="Accuracy",
y_col="Model",
title="Model Accuracy Comparison",
x_label="Accuracy (%)", y_label="Model")
```

```
# Error Analysis (FP, FN, TN)
analysis_data = []
for name, cm in confusion_matrices.items():
    TN, FP = cm[0,0], cm[0,1]
    FN, TP = cm[1,0], cm[1,1]
    analysis_data.append([name, FP, FN, TP])

analysis_df = pd.DataFrame(analysis_data, columns=['Model',
'False Positives', 'False Negative', 'True Negative'])
```

```
# Visualize False Positives
fp_df = analysis_df[['Model', 'False
Positives']].sort_values(by='False Positives',
ascending=False)
fp_df['Text'] = fp_df.apply(lambda row: f"{row['Model']}:
{row['False Positives']}", axis=1)
plot_bar_comparison(fp_df, x_col='False Positives',
y_col='Model',
title="False Positives Comparison",
x_label="False Positives", y_label="Model")
```

```
# Visualize False Negatives
fn_df = analysis_df[['Model', 'False
Negative']].sort_values(by='False Negative',
ascending=False)
fn_df['Text'] = fn_df.apply(lambda row: f"{row['Model']}:
{row['False Negative']}", axis=1)
plot_bar_comparison(fn_df, x_col='False Negative',
y_col='Model',
title="False Negatives Comparison",
x_label="False Negative", y_label="Model")
```

```
# Visualize True Negatives
tn_df = analysis_df[['Model', 'True
Negative']].sort_values(by='True Negative',
ascending=False)
tn_df['Text'] = tn_df.apply(lambda row: f"{row['Model']}:
{row['True Negative']}", axis=1)
plot_bar_comparison(tn_df, x_col='True Negative',
y_col='Model',
title="True Negative (Correct Risk Predictions)
Comparison",
x_label="True Negative", y_label="Model")
```

```
# Feature Importance (From Random Forest)
if 'Random Forest' in models:
    rfc = models['Random Forest']
    importances = rfc.feature_importances_
    indices = np.argsort(importances)[::-1]
    names = [X.columns[i] for i in indices]

    fig = px.bar(x=names, y=importances[indices],
                 title="Feature Importance (Random Forest)")
    fig.update_xaxes(tickangle=90)
    fig.show()
```

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Building RAG Agents With LLMs

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About this Course

Generative AI describes technologies that are used to generate new content based on a variety of inputs. In recent time, Generative AI involves the use of neural networks to identify patterns and structures within existing data to generate new content. In this course, you will learn Generative AI concepts, applications, as well as the challenges and opportunities in this exciting field.

Learning Objectives

Upon completion, you will have a basic understanding of Generative AI and be able to more effectively use the various tools built on this

Course Details

Duration: 02:00**Price:** Free**Level:** Technical - Beginner**Subject:** Generative AI/LLM**Language:** English

https://learn.nvidia.com/courses/course-detail?course_id=course-v1:DLI+S-FX-15+V1

Introduction to Transformer-Based Natural Language Processing

Self-paced Course

Introduction to Transformer-Based Natural Language Processing

Learn how Transformers are used as the building blocks of modern large language models (LLMs). You'll then use these models for various NLP tasks, including text classification, named-entity recognition (NER), author attribution, and question answering.

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About this Course

Large Language Models (LLMs), or Transformers, have revolutionized the field of natural language processing (NLP). Driven by recent advancements, applications of NLP and generative AI have exploded in the past decade. With the proliferation of applications like chatbots and intelligent virtual assistants, organizations are infusing their businesses with more interactive human-machine experiences. Understanding how Transformer-based large language models (LLMs) can be used to manipulate, analyze, and generate text-based data is essential. Modern pre-trained LLMs can encapsulate the nuance, context, and sophistication of language, just as humans do. When fine-tuned and deployed correctly, developers can use these LLMs to build powerful NLP applications that provide natural and seamless human-computer interactions within chatbots, AI voice agents, and more. In this course, you'll learn how Transformers are used as the building blocks of modern large language models (LLMs). You'll then use these models for various NLP

Course Details

Duration: 06:00**Price:** \$30**Level:** Technical - Beginner**Subject:** Generative AI/LLM**Language:** English

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Building RAG Agents with LLMs

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Self-paced Course

Building RAG Agents with LLMs

Agents powered by large language models (LLMs) have shown great retrieval capability for using tools, looking at documents, and plan their approaches. This course will show you how to deploy an agent system in practice with the flexibility to scale up your system to meet the demands of users and customers.



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About this Course

This course is free for a limited time.

The evolution and adoption of large language models (LLMs) have been nothing short of revolutionary, with retrieval-based systems at the forefront of this technological leap. These models are not just tools for automation; they are partners in enhancing productivity, capable of holding informed conversations by interacting with a vast array of tools and documents. This course is designed for those eager to explore the potential of these systems, focusing on practical deployment and the efficient implementation required to manage the considerable demands of both users and deep learning models. As we delve into the intricacies of LLMs, participants will gain insights into advanced orchestration techniques that include internal reasoning, dialog management, and effective tooling strategies.

Course Details

Duration: 08:00

Price: Free

Level: Technical - Intermediate

Subject: Generative AI/LLM

Language: English

Course Prerequisites:

Introductory deep learning knowledge, with comfort

https://learn.nvidia.com/courses/course-detail?course_id=course-v1:DLI+S-FX-15+V1

Generative AI with Diffusion Models

Self-paced Course

Generative AI with Diffusion Models

Take a deeper dive into denoising diffusion models, which are a popular choice for text-to-image pipelines, with applications in creative content generation, data augmentation, simulation and planning, anomaly detection, drug discovery, personalized recommendations, and more.



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About this Course

Thanks to improvements in computing power and scientific theory, generative AI is more accessible than ever before. Generative AI plays a significant role across industries due to its numerous applications, such as creative content generation, data augmentation, simulation and planning, anomaly detection, drug discovery, personalized recommendations, and more. In this course, learners will take a deeper dive into denoising diffusion models, which are a popular choice for text-to-image pipelines.

Learning Objectives

https://learn.nvidia.com/courses/course-detail?course_id=course-v1:DLI+S-FX-14+V1

Course Details

Duration: 08:00

Price: \$90

Subject: Generative AI/LLM

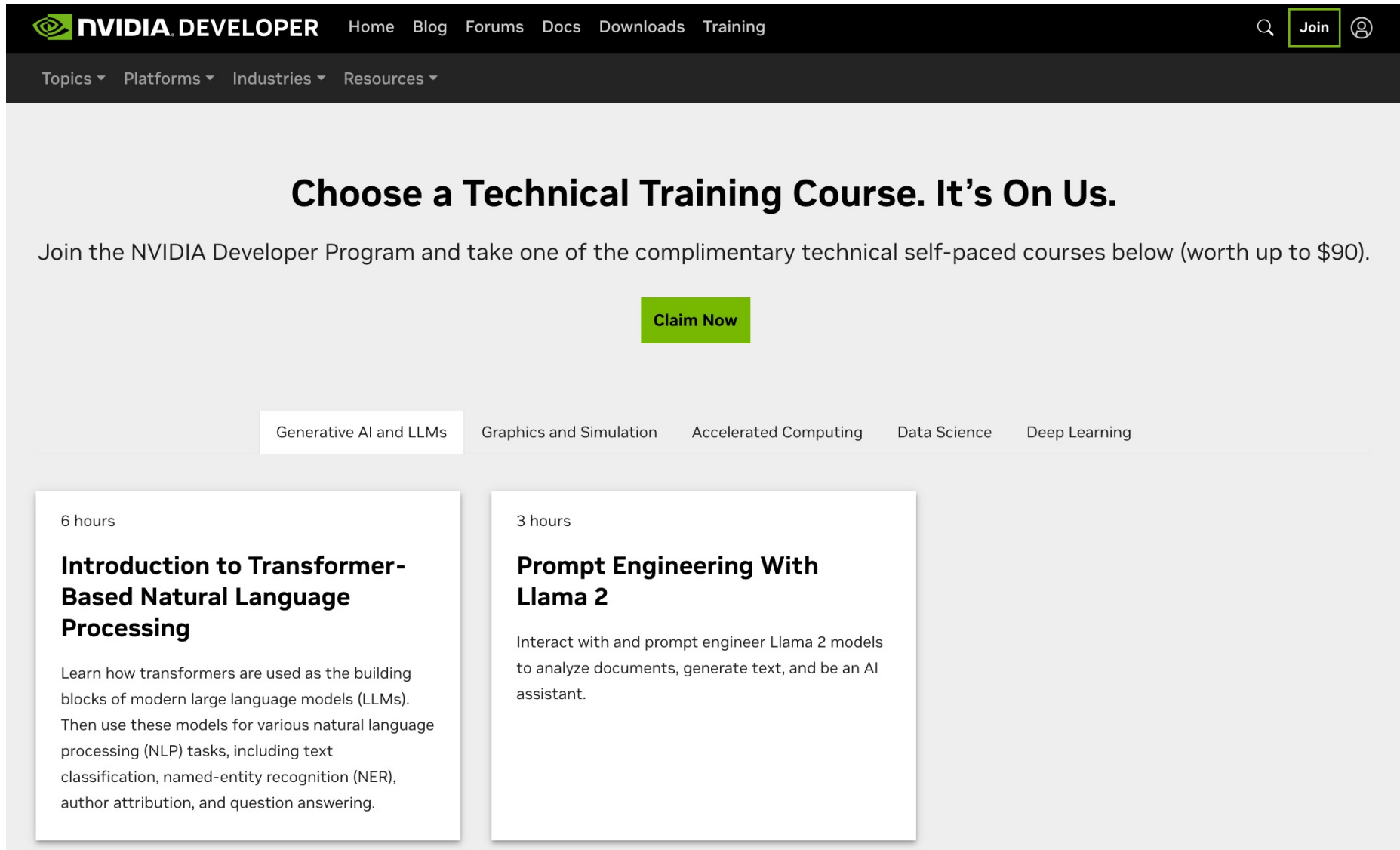
Language: English

Course Prerequisites:

A basic understanding of [Deep Learning Concepts](#).

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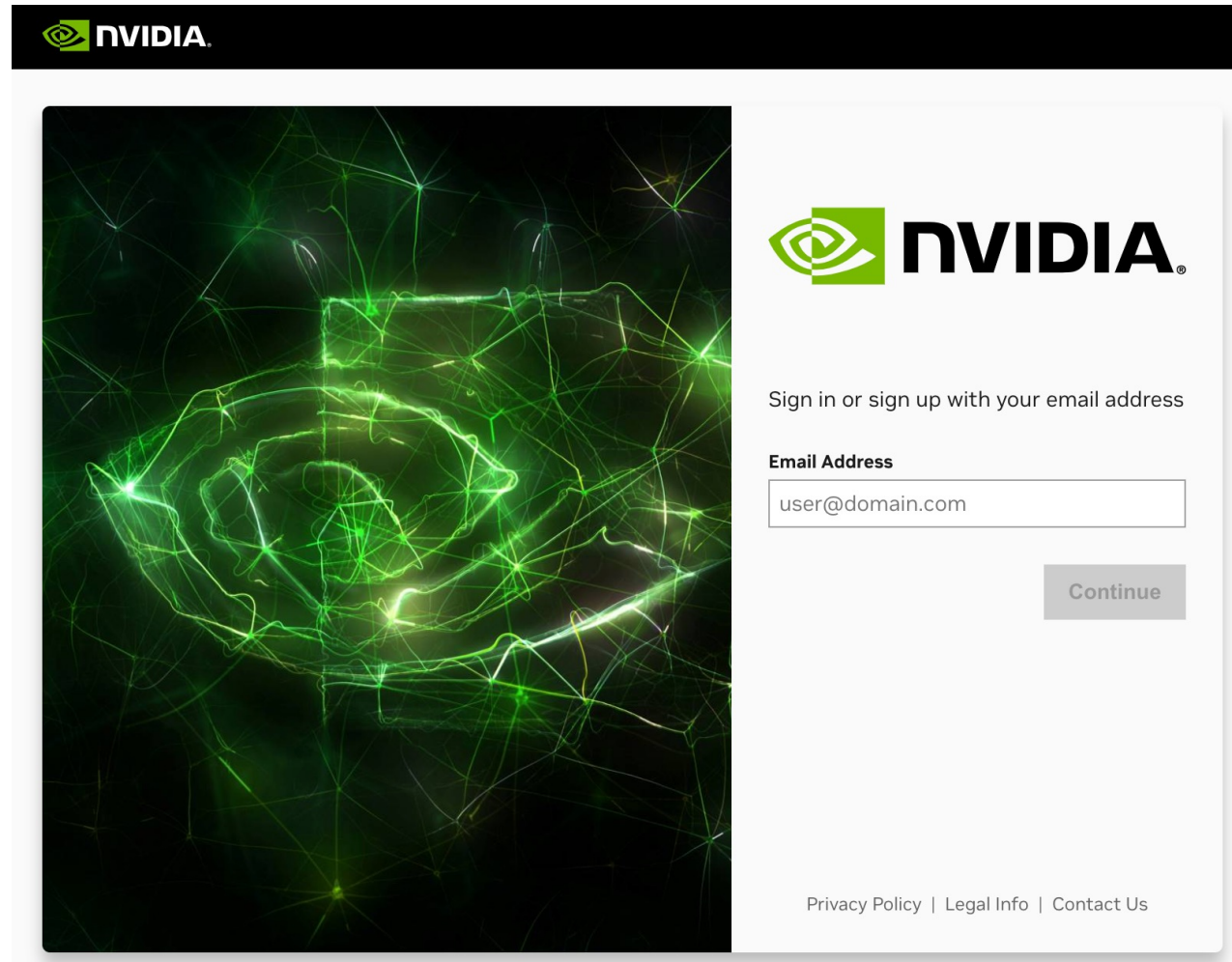


The screenshot shows the NVIDIA Developer Program website. At the top, there is a navigation bar with the NVIDIA logo, the text 'NVIDIA DEVELOPER', and links for Home, Blog, Forums, Docs, Downloads, and Training. A search icon and a 'Join' button are also present. Below the navigation bar, there are dropdown menus for Topics, Platforms, Industries, and Resources. The main content area features a large heading: 'Choose a Technical Training Course. It's On Us.' Below this heading is a paragraph: 'Join the NVIDIA Developer Program and take one of the complimentary technical self-paced courses below (worth up to \$90).' A prominent green 'Claim Now' button is centered below the paragraph. Underneath the button, there are five category tabs: 'Generative AI and LLMs', 'Graphics and Simulation', 'Accelerated Computing', 'Data Science', and 'Deep Learning'. The 'Generative AI and LLMs' tab is selected. Below the tabs, there are two course cards. The first card is titled 'Introduction to Transformer-Based Natural Language Processing' and is 6 hours long. The second card is titled 'Prompt Engineering With Llama 2' and is 3 hours long. The description for the second course reads: 'Interact with and prompt engineer Llama 2 models to analyze documents, generate text, and be an AI assistant.'

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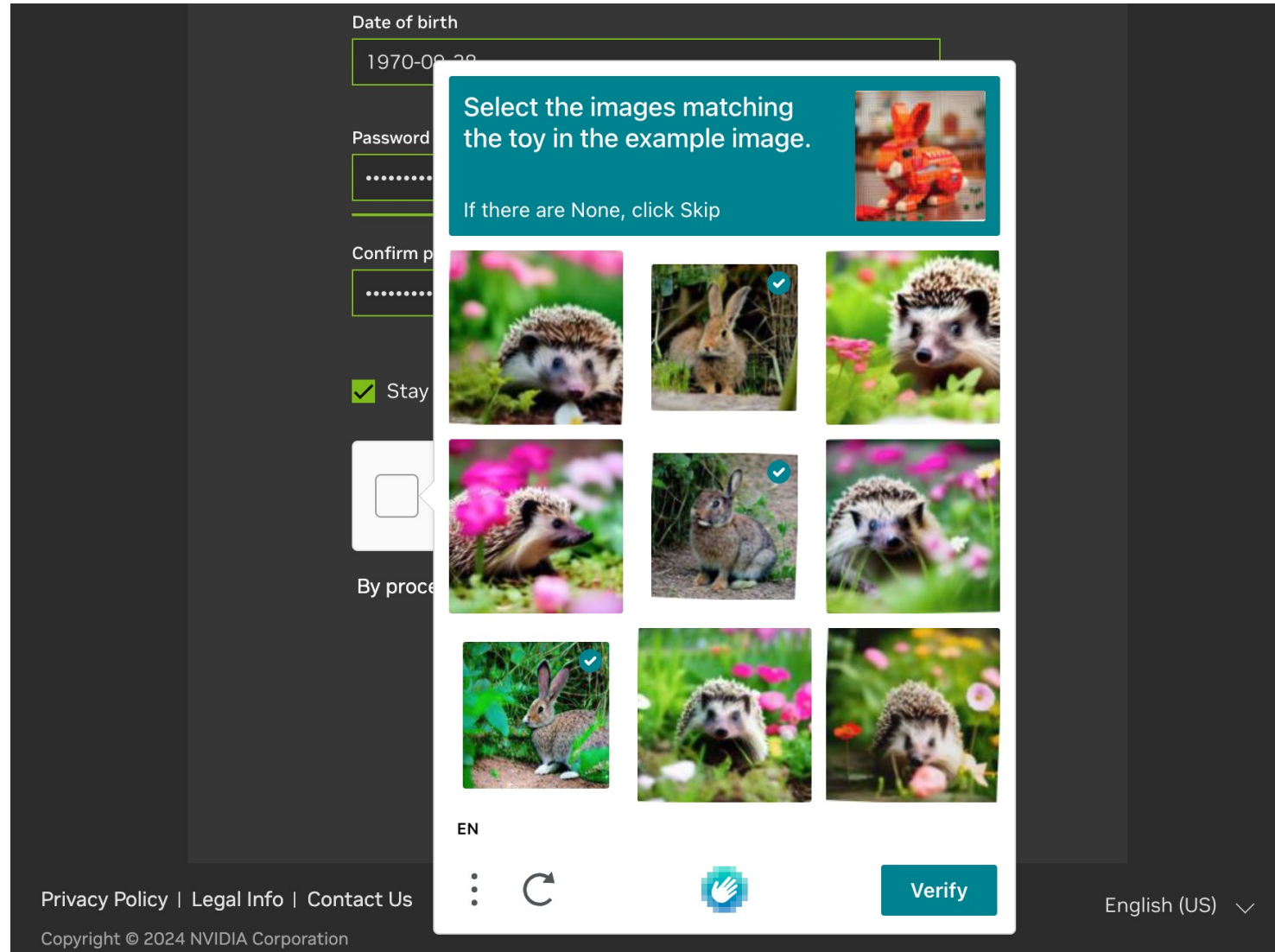
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The screenshot shows a registration form with fields for "Date of birth" (1970-00-20), "Password", and "Confirm password". A "Stay" checkbox is checked. Below the form is a "By proceeding" button. A CAPTCHA challenge is overlaid on the form, asking the user to "Select the images matching the toy in the example image." The example image is a red toy rabbit. The challenge grid contains nine images: three rabbits and six hedgehogs. Three rabbits are selected with blue checkmarks. At the bottom of the CAPTCHA window are icons for a menu, refresh, and a hand cursor, along with a "Verify" button. The background shows a dark sidebar with "Privacy Policy | Legal Info | Contact Us" and "Copyright © 2024 NVIDIA Corporation". The bottom right of the page shows "English (US) ▾".

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Generative AI with Diffusion Models

Building Real-Time Video AI Applications

Introduction to Robotic Simulations in Isaac Sim

Introduction to Physics-informed Machine Learning with Modulus

Essentials of USD in Omniverse: Access Expires 09/18/2025

Synthetic Data Generation for Training Computer Vision Models

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Generative AI with Diffusion Models

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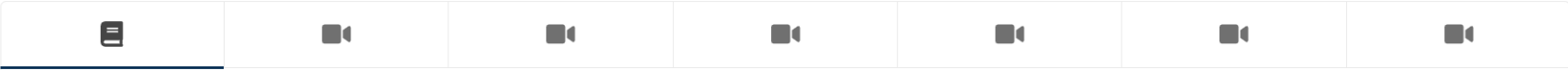
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Welcome to Generative AI with Diffusion Models. Please click "Next" below to get started.

Underneath each video is a link to start your own private server for hands-on coding practice. Click the "Start" button to boot up the server. In a few minutes after the server is done loading, click "Launch" to access the code labs.

1: From U-Nets to Diffusion

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