# Comprehensive Guidelines on Shell Scripting for AI Applications in Ubuntu

Prof. Mehdi Pirahandeh, Inha University

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# 1 Introduction

Shell scripting in Ubuntu is a powerful tool for automating tasks, managing files, and conducting data science experiments. This document provides a comprehensive guide, including practical examples related to AI applications.

# 2 Prerequisites

Ensure you have Ubuntu installed, access to a terminal, and basic familiarity with Linux commands. Knowledge of AI and machine learning concepts is also beneficial.

# 3 Creating a Shell Script

## 3.1 Using a Text Editor

You can use text editors like Vim, Nano, or Gedit. For instance, to create a script with Nano, type:

```
$ nano my_script.sh
```

## 3.2 The Shebang Line

Start your script with a shebang (#!/bin/bash) to specify the interpreter for running your script.

```
#!/bin/bash
```

## 3.3 Making the Script Executable

After saving the file, make it executable with:

```
$ chmod +x my_script.sh
```

# 4 Running a Shell Script

## 4.1 Using bash Command

Use the `bash` command:

```
$ bash my_script.sh
```

### 4.2 Using ./ Syntax

Or, you can use:

```
$ ./my_script.sh
```

## 5 Modifying a Shell Script

To modify, open the script in a text editor, make changes, and save. Always remember to test your script after making modifications.

## 6 Testing and Debugging

For debugging, use the `-x` option:

```
$ bash -x my_script.sh
```

## 7 Examples of Shell Scripts for AI Applications

### 7.1 Data Collection

**Example 1: Downloading a Dataset**

```
#!/bin/bash
wget https://example.com/dataset.zip
unzip dataset.zip
```

### 7.2 File Manipulation

**Example 2: Renaming Files**

```
#!/bin/bash
for file in *.jpg; do
    mv "$file" "prefix_$file"
done
```

### 7.3 Data Preprocessing

**Example 3: Converting CSV to JSON**

```
#!/bin/bash
csvtojson input.csv > output.json
```

## 7.4 Running Models

**Example 4: Running a Python Script**

```
#!/bin/bash
python3 run_model.py
```

## 7.5 Monitoring

**Example 5: Monitoring GPU Usage**

```
#!/bin/bash
nvidia-smi
```

## 7.6 Batch Processing

**Example 6: Running Multiple Experiments**

```
#!/bin/bash
for seed in {1..5}; do
    python3 experiment.py --seed $seed
done
```

## 7.7 Scheduling

**Example 7: Scheduling Tasks with Cron**

```
#!/bin/bash
# Add this line to your crontab
# 0 * * * * /path/to/your/script.sh
```

## 7.8 Networking

**Example 8: Sending Data to a Remote Server**

```
#!/bin/bash
scp data.txt username@remote:/path/to/destination
```

## 7.9 Resource Cleanup

**Example 9: Deleting Temporary Files**

```
#!/bin/bash
rm -rf /tmp/*
```

### 7.10 Automation

**Example 10: Automating End-to-End ML Pipeline**

```
#!/bin/bash
# Data Collection
wget https://example.com/dataset.zip
unzip dataset.zip
# Preprocessing
python3 preprocess.py
# Training
python3 train.py
# Evaluation
python3 evaluate.py
```

## 8 Conclusion

This guide provides both foundational knowledge and practical examples for shell scripting in Ubuntu, tailored for AI applications. It is a stepping stone for automating and improving your AI workflows.