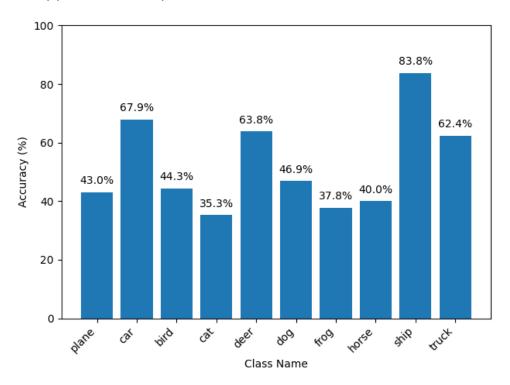
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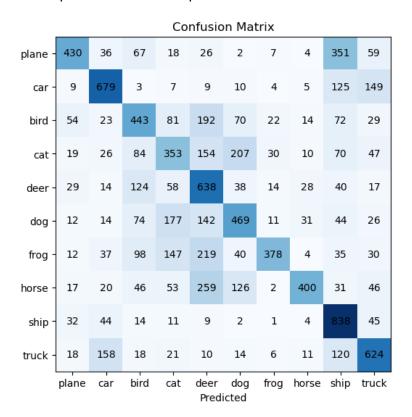
10 Neural Network Design

Section 1

1. The accuracy plotted as a bar plot:



2. The confusion matrix plotted as a heatmap:



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3.

Autograd is a mechanism for automatic differentiation, which is a key component in training neural networks through backpropagation. It automatically computes gradients (derivatives) of tensors with respect to a given loss function. This is essential for optimizing the model's parameters using gradient-based optimization algorithms.

During the backpropagation the neural network adjusts its parameters proportionate to the error in its guess. It does this by traversing backwards from the output, collecting the derivatives of the error with respect to the parameters of the functions and optimizing the parameters using gradient descent.

Section 2

1.

RNN stands for Recurrent Neural Network, which is a type of artificial neural network designed for processing sequences of data. Unlike traditional feedforward neural networks, where data flows in one direction from input to output, RNNs have loops in their architecture that allow them to maintain a hidden state representing information about previous elements in a sequence. This hidden state enables RNNs to capture and process sequential dependencies in data.

2.

There are several reasons why we use RNNs when working with texts. They can handle sequential data and their dependencies which is necessary for natural language processing (NLP). Their input can vary in size. This helps since sentences or texts can be of different length. Further they can capture the contextual information in a text. They maintain a hidden state that contains information about the preceding words or characters, which allows them to understand the context and meaning of the current word.

3.

In my opinion the text generation in case of the tutorial is at best mediocre. Some of the names feel natural but most of them seem weird.

4.

RNNs can be suitable model types for regression and classification in other domains than NLP:

- They are commonly used for time series forecasting and analysis. They can capture temporal dependencies and patterns in data, making them well-suited for tasks like stock price prediction, weather forecasting, energy consumption forecasting, and anomaly detection in time series data.
- RNNs are also valuable for speech recognition tasks. They can model the sequential
 nature of speech and convert spoken language into text. Speech recognition is used in
 applications such as voice assistants, transcription services, and voice command
 recognition.

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3. They can be further used in healthcare for tasks such as disease prediction, patient monitoring, and medical signal analysis. For instance, they can be used to predict patient outcomes or detect anomalies in physiological signals.