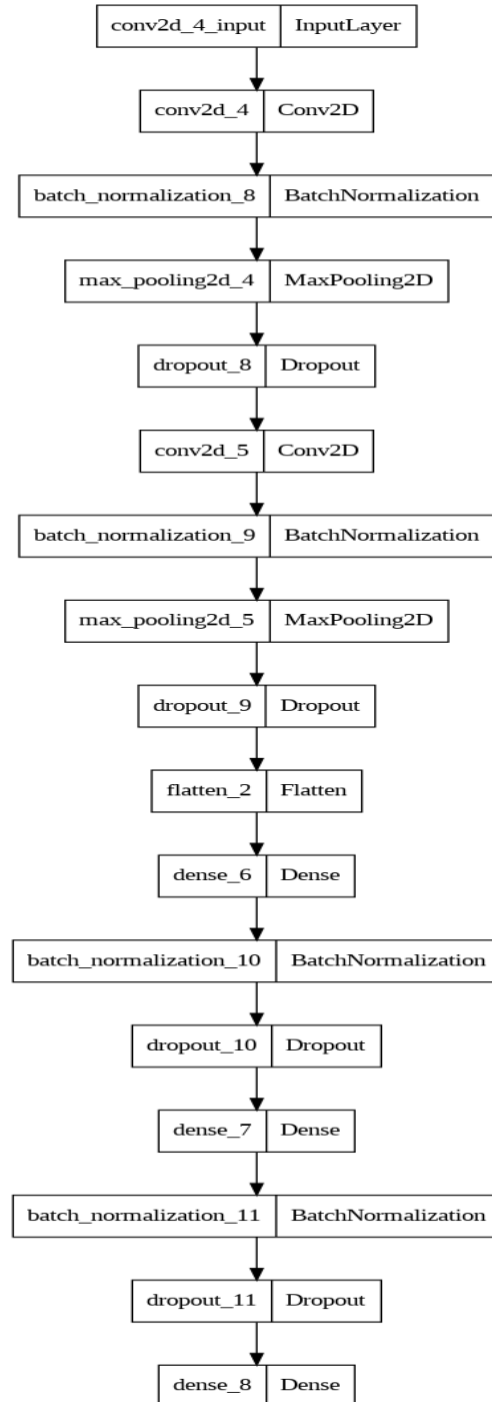


Report

Following are the top three model in the increasing order of accuracy:
Also find the summary of all three models at the end of the report in tabular form.

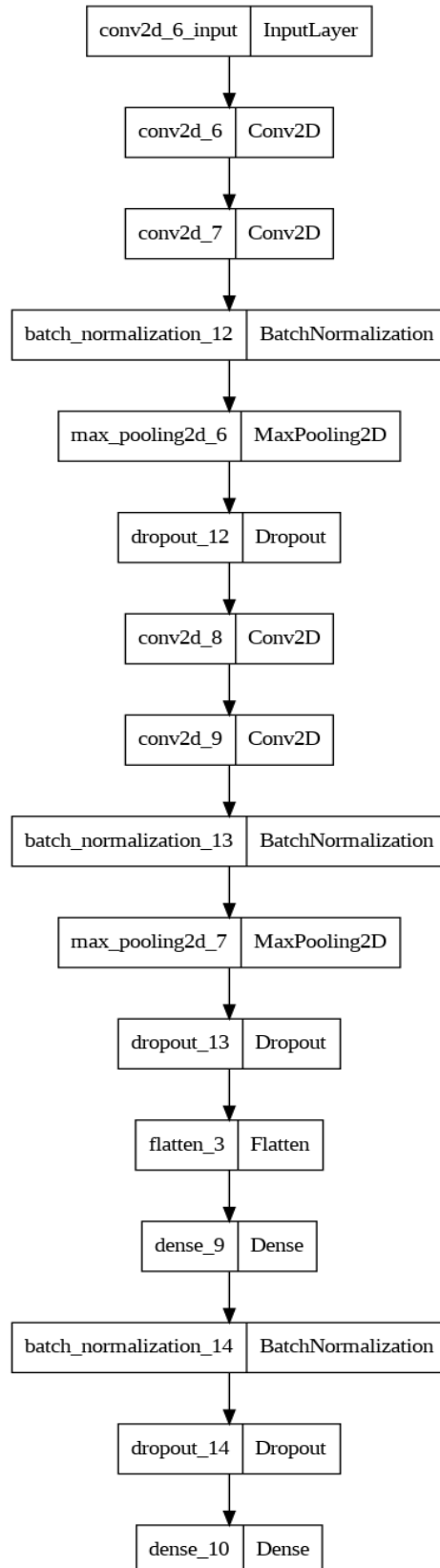
1. Model_4: The below flowchart shows the model plot for Model_4.



Summary of the model:

- **Activation Function:** ReLU (Rectified Linear Unit) and SoftMax
- **Optimizer:** Adam
- **Hyperparameters:**
 - Rotation_range of 15 degrees for data augmentation.
 - Width_shift_range and height_shift_range of 0.1 for horizontal and vertical shift augmentation.
 - Shear_range and zoom_range of 0.1 for shear and zoom augmentation.
 - Horizontal_flip set to True for horizontal flip augmentation.
 - Fill_mode set to 'nearest' for filling the pixels in case of augmentation.
 - Dropout rate of 25% after each MaxPooling2D and Conv2D layers, and 50% after each Dense layer.
 - Batch size of 64 for training the model.
 - Training the model for 50 epochs.
- **Architecture:** The model has a Convolutional Neural Network (CNN) architecture consisting of 2 sets of Conv2D, Batch Normalization, and MaxPooling2D layers followed by 2 sets of Dense, Batch Normalization, and Dropout layers.
- **Accuracy:**
 - **Val Accuracy:** 0.42660000920295715
 - **Test Accuracy:** 0.49559998512268066
- **Ranking:** 181
- **Number of Parameters:** 1,360,036

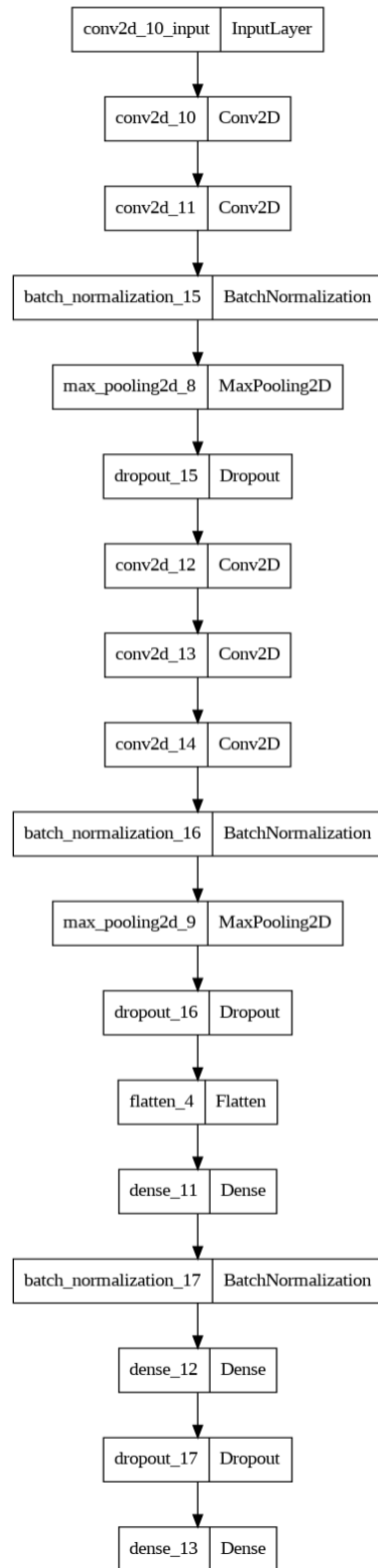
2. Model_5: The below flowchart shows the model plot for Model_5.



Summary of the model:

- **Activation Function:** ReLU (Rectified Linear Unit) and SoftMax
- **Optimizer:** RMSprop
- **Hyperparameters:**
 - Rotation_range of 15 degrees for data augmentation.
 - Width_shift_range and height_shift_range of 0.1 for horizontal and vertical shift augmentation.
 - Shear_range and zoom_range of 0.1 for shear and zoom augmentation.
 - Horizontal_flip set to True for horizontal flip augmentation.
 - Fill_mode set to 'nearest' for filling the pixels in case of augmentation.
 - Dropout rate of 25% after each MaxPooling2D and Conv2D layers, and 50% after each Dense layer.
 - Batch size of 64 for training the model.
 - Training the model for 50 epochs.
- **Architecture:** The model has a Convolutional Neural Network (CNN) architecture consisting of 2 sets of Conv2D, Batch Normalization, and MaxPooling2D layers followed by 1 Dense layer and an output layer.
- **Accuracy:**
 - **Val Accuracy:** 0.5066999793052673
 - **Test Accuracy:** 0.5590999722480774
- **Ranking:** 181
- **Number of Parameters:** 1,299,460

3. Model_6: The below flowchart shows the model plot for Model_6.



Summary of the model:

- **Activation Function:** ReLU (Rectified Linear Unit) and SoftMax
- **Optimizer:** Adam
- **Hyperparameters:**
 - Rotation_range of 15 degrees for data augmentation.
 - Width_shift_range and height_shift_range of 0.1 for horizontal and vertical shift augmentation.
 - Shear_range and zoom_range of 0.1 for shear and zoom augmentation.
 - Horizontal_flip set to True for horizontal flip augmentation.
 - Fill_mode set to 'nearest' for filling the pixels in case of augmentation.
 - Dropout rate of 25% after each MaxPooling2D and Conv2D layers, and 50% after each Dense layer.
 - Batch size of 64 for training the model.
 - Training the model for 50 epochs.
- **Architecture:** The architecture of the above model is a convolutional neural network with 3 sets of convolutional layers, 3 dense layers, and batch normalization and dropout layers.
- **Accuracy:**
 - **Val Accuracy:** 0.8586000204086304
 - **Test Accuracy:** 0.6269000172615051
- **Ranking:** 173
- **Number of Parameters:** 14,575,524

Summary:

Models	Activation Function	Optimizer	Hyper-Parameters	Val Accuracy	Test Accuracy	Rank	No. of Parameters
Model_4	ReLU and SoftMax	Adam	rotation_range=15, width_shift_range=0.1, height_shift_range=0.1, shear_range=0.1, zoom_range=0.1, horizontal_flip=True, fill_mode='nearest'	0.42660000920295715	0.49559998512268066	181	1,360,036
Model_5	ReLU and SoftMax	RMSprop	rotation_range=15, width_shift_range=0.1, height_shift_range=0.1, shear_range=0.1, zoom_range=0.1, horizontal_flip=True, fill_mode='nearest'	0.5066999793052673	0.5590999722480774	181	1,299,460
Model_6	ReLU and SoftMax	Adam	rotation_range=15, width_shift_range=0.1, height_shift_range=0.1, shear_range=0.1, zoom_range=0.1, horizontal_flip=True, fill_mode='nearest'	0.8586000204086304	0.6269000172615051	173	14,575,524