**Team CS\_H6 report**

**Trials:**

1. **Augmentation:**

We made several augmentations to the images as:

* Flipping the images horizontally
* Flipping the images vertically
* Rotating the images by -50 to 20 degrees
* Rotating the images by 20 to -50 degrees
* Cropping one side of the images 30%
* Shearing the images by -40 to 40 degrees

**Model:**

We tried the VGG16 model which consists of:

* 1× convolution layer of 64 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 64 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size)
* 2× convolution layer of 128 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 3× convolution layer of 256 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 3× convolution layer of 512 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 3× convolution layer of 512 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× fully connected layer with 1000 neurons and dropout 30%
* 1× fully connected layer with 100 neurons and dropout 30%
* Output layer with 6 neurons and softmax activation function

**Number of epochs:** 600

**Accuracy:** 80.339%

1. **Augmentation:**

We made several augmentations to the images as:

* Flipping the images horizontally
* Flipping the images vertically
* Rotating the images by -50 to 20 degrees
* Rotating the images by 20 to -50 degrees
* Cropping one side of the images 30%
* Shearing the images by -40 to 40 degrees
* Multiplying 50% of all images with a random value between 0.5 and 1.5 and multiply the remaining 50% channel-wise
* Modifying the contrast of the images uniformly from the interval [0.75, 1.5]

**Model:**

We tried the VGG19 model which consists of:

* 2× convolution layer of 64 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 2× convolution layer of 128 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 4× convolution layer of 256 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 4× convolution layer of 512 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 4× convolution layer of 512 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× fully connected layer with 394 neurons
* 1× fully connected layer with 182 neurons
* Output layer with 6 neurons and softmax activation function

**Number of epochs:** 250

**Accuracy:** 78.155%

1. **Augmentation:**

We made several augmentations to the images as:

* Flipping the images horizontally
* Flipping the images vertically
* Rotating the images by -50 to 20 degrees
* Rotating the images by 20 to -50 degrees
* Cropping one side of the images 30%
* Shearing the images by -40 to 40 degrees

**Model:**

We tried a CNN model which consists of:

* 1× convolution layer of 32 channels of 2×2 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 64 channels of 2×2 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 128 channels of 2×2 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 64 channels of 2×2 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 32 channels of 2×2 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× fully connected layer with 1024 neurons and dropout 50%
* Output layer with 6 neurons and softmax activation function

**Number of epochs:** 350

**Accuracy:** 75%

1. **Augmentation:**

We made several augmentations to the images as:

* Flipping the images horizontally
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* Rotating the images by 20 to -50 degrees
* Cropping one side of the images 30%
* Shearing the images by -40 to 40 degrees

**Model:**

We tried a CNN model which consists of:

* 1× convolution layer of 32 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 64 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 128 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 64 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× convolution layer of 512 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× fully connected layer with 256 neurons and dropout 50%
* 1× fully connected layer with 128 neurons and dropout 50%
* Output layer with 6 neurons and softmax activation function

**Number of epochs:** 600

**Accuracy:** 79.611%

1. **Augmentation:**

We made several augmentations to the images as:

* Flipping the images horizontally
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* Rotating the images by 20 to -50 degrees
* Cropping one side of the images 30%
* Shearing the images by -40 to 40 degrees

**Model:**

We tried the VGG16 model using transfer learning which consists

of:

* 2× convolution layer of 64 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 2× convolution layer of 128 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 3× convolution layer of 256 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 3× convolution layer of 512 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 3× convolution layer of 512 channels of 3×3 kernel and same padding
* 1× max pool layer of 2×2 pool size
* 1× fully connected layer with 1000 neurons
* 1× fully connected layer with 100 neurons
* Output layer with 6 neurons and softmax activation function

**Number of epochs:** 370

**Accuracy:** 84.466%