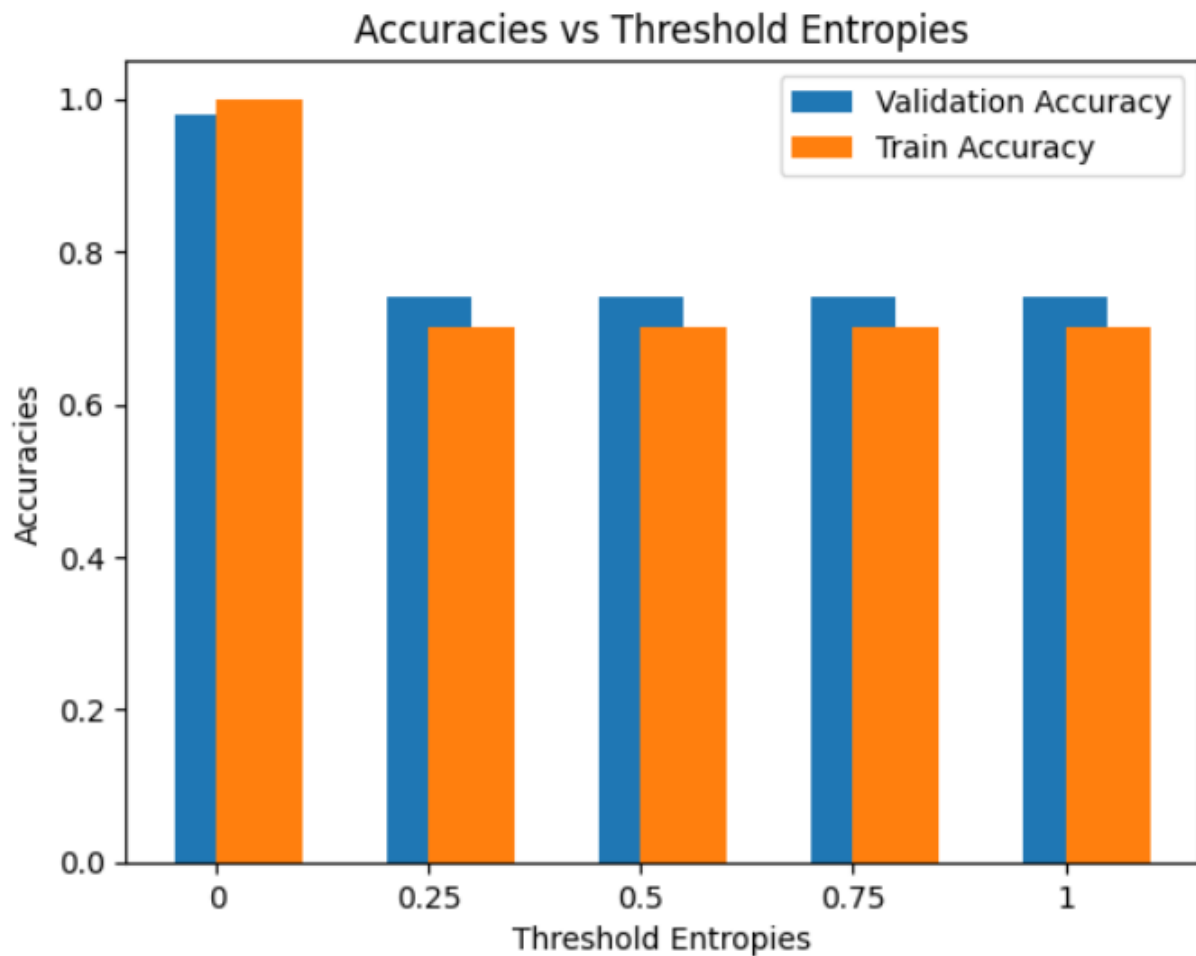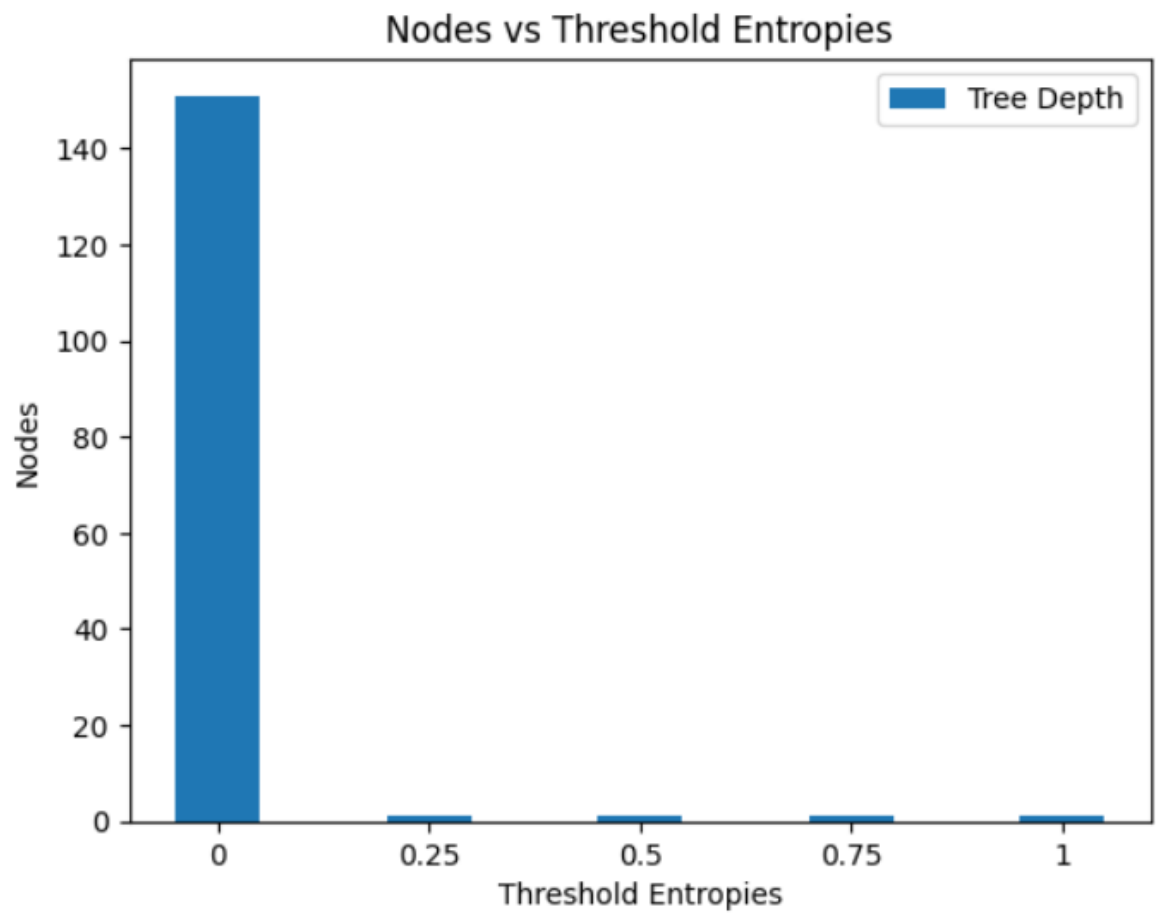# Assignment 4

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Experiment 1

Accuracy on training data with optimal threshold: 1.00
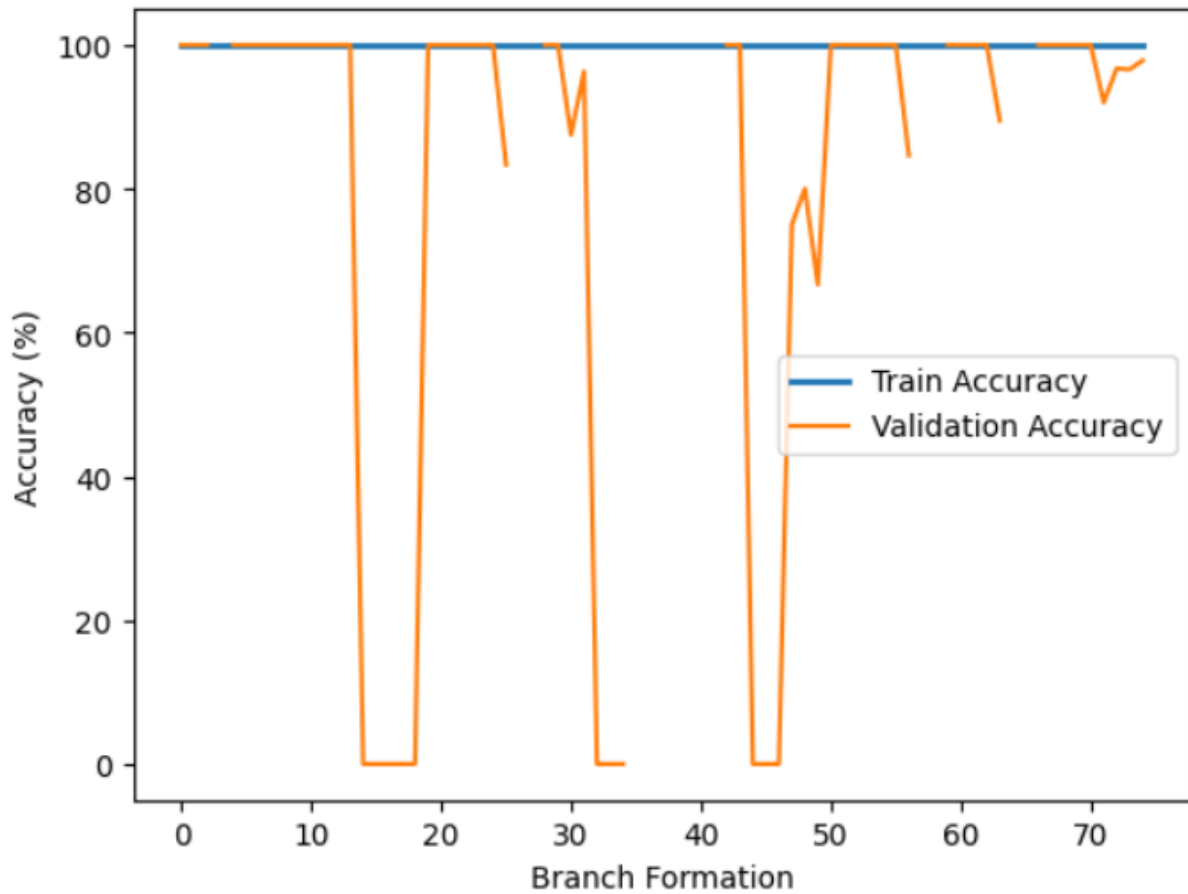**Accuracy on testing data with optimal threshold: 0.97**

Nodes vs Threshold Entropies

```
The best threshold entropy is 0
The no of nodes for it is 151
```

Experiment 2

➔ After early stop:
- Test accuracy: 0.6884057971014492
- Train accuracy: 0.7007722007722008
- Size of tree i.e. number of nodes after early stopping: 3

After early stop:
Test accuracy: 0.6884057971014492
Train accuracy: 0.7007722007722008
Size of tree i.e. number of nodes after early stopping: 3

Experiment 3:
Printing tree
Tree before early stopping:
if Feature 3 <= 2:
  Predicted class: 2
else:
  if Feature 5 <= 0:
   if Feature 4 <= 1:
    if Feature 1 <= 2:
     if Feature 0 <= 2:
      if Feature 0 <= 0:
       Predicted class: 0
      else:
       if Feature 1 <= 0:
        if Feature 0 <= 1:
         if Feature 2 <= 2:
          if Feature 4 <= 0:
           Predicted class: 3
          else:
           Predicted class: 0
         else:
          Predicted class: 3
        else:
         Predicted class: 0
       else:
        if Feature 2 <= 3:
         if Feature 4 <= 0:
          Predicted class: 3
         else:
          if Feature 0 <= 1:
           Predicted class: 1
          else:
           if Feature 2 <= 2:
            Predicted class: 0
           else:
            Predicted class: 3
        else:

```
            Predicted class: 3
        else:
          if Feature 1 <= 0:
            Predicted class: 2
          else:
            Predicted class: 0
      else:
        if Feature 0 <= 2:
          if Feature 0 <= 0:
            Predicted class: 2
          else:
            Predicted class: 0
        else:
          Predicted class: 2
    else:
      if Feature 1 <= 2:
        if Feature 2 <= 2:
          if Feature 3 <= 4:
            if Feature 0 <= 0:
              Predicted class: 0
            else:
              if Feature 0 <= 1:
                Predicted class: 1
              else:
                if Feature 0 <= 2:
                  if Feature 1 <= 0:
                    Predicted class: 0
                  else:
                    Predicted class: 1
                else:
                  Predicted class: 0
          else:
            Predicted class: 2
        else:
          if Feature 1 <= 0:
            if Feature 0 <= 2:
              Predicted class: 0
            else:
              Predicted class: 2
          else:
            if Feature 0 <= 0:
              Predicted class: 0
            else:
              if Feature 0 <= 1:
```

Predicted class: 1
                  else:
                    if Feature 1 <= 1:
                      if Feature 0 <= 2:
                        Predicted class: 1
                      else:
                        Predicted class: 0
                    else:
                      Predicted class: 0
          else:
            if Feature 0 <= 0:
              Predicted class: 2
            else:
              if Feature 0 <= 2:
                if Feature 2 <= 2:
                  if Feature 3 <= 4:
                    Predicted class: 0
                  else:
                    Predicted class: 2
                else:
                  Predicted class: 0
              else:
                Predicted class: 2
        else:
          if Feature 5 <= 1:
            Predicted class: 2
          else:
            if Feature 4 <= 1:
              if Feature 1 <= 2:
                if Feature 0 <= 2:
                  if Feature 0 <= 0:
                    if Feature 2 <= 3:
                      if Feature 4 <= 0:
                        Predicted class: 0
                      else:
                        if Feature 3 <= 4:
                          Predicted class: 2
                        else:
                          Predicted class: 0
                    else:
                      Predicted class: 0
                  else:
                    if Feature 1 <= 0:
                      if Feature 2 <= 3:

```
if Feature 4 <= 0:
  Predicted class: 0
else:
  if Feature 0 <= 1:
    Predicted class: 0
  else:
    if Feature 2 <= 2:
      Predicted class: 2
    else:
      if Feature 3 <= 4:
        Predicted class: 2
      else:
        Predicted class: 0
else:
  Predicted class: 0
else:
  if Feature 1 <= 1:
    if Feature 2 <= 3:
      if Feature 4 <= 0:
        Predicted class: 1
      else:
        if Feature 2 <= 2:
          Predicted class: 0
        else:
          if Feature 3 <= 4:
            Predicted class: 0
          else:
            Predicted class: 1
    else:
      Predicted class: 1
  else:
    if Feature 0 <= 1:
      if Feature 2 <= 2:
        if Feature 3 <= 4:
          Predicted class: 0
        else:
          Predicted class: 1
      else:
        Predicted class: 1
    else:
      Predicted class: 0
else:
  if Feature 1 <= 0:
    Predicted class: 2
```

```
      else:
        if Feature 2 <= 2:
          if Feature 4 <= 0:
            Predicted class: 0
          else:
            Predicted class: 2
        else:
          if Feature 3 <= 4:
            if Feature 1 <= 1:
              Predicted class: 0
            else:
              if Feature 4 <= 0:
                Predicted class: 0
              else:
                Predicted class: 2
          else:
            Predicted class: 0
  else:
    if Feature 0 <= 0:
      Predicted class: 2
    else:
      if Feature 0 <= 2:
        if Feature 2 <= 3:
          if Feature 4 <= 0:
            Predicted class: 0
          else:
            if Feature 2 <= 2:
              Predicted class: 2
            else:
              if Feature 3 <= 4:
                Predicted class: 2
              else:
                Predicted class: 0
        else:
          Predicted class: 0
      else:
        Predicted class: 2
else:
  if Feature 0 <= 2:
    if Feature 0 <= 0:
      Predicted class: 2
    else:
      if Feature 1 <= 2:
        if Feature 1 <= 0:
```

```
        if Feature 0 <= 1:
          Predicted class: 0
        else:
          Predicted class: 2
      else:
        if Feature 2 <= 2:
          if Feature 3 <= 4:
            Predicted class: 0
          else:
            Predicted class: 2
        else:
          Predicted class: 0
      else:
        Predicted class: 2
    else:
      Predicted class: 2
Tree after early stopping

if Feature 3 <= 2:
  Predicted class: 2
else:
  Predicted class: 2
```