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```
{
    nbformat: 4,
    nbformat_minor: 0,
  - metadata: {
      - colab: {
            name: "Lab3.ipynb",
            provenance: [ ],
            collapsed_sections: [ ]
        },
      - kernelspec: {
            name: "python3",
            display_name: "Python 3"
        },
      - language_info: {
            name: "python"
        }
    },
  - cells: [
      - {
            cell_type: "code",
            execution_count: 3,
          - metadata: {
                id: "QdCTUCgWJ23O"
            },
            outputs: [ ],
          - source: [
                "import matplotlib as plt
                ",
                "import numpy as np
                ",
                "import cv2
                ",
                "from google.colab.patches import cv2_imshow # for image display"
            ]
        },
      - {
            cell_type: "code",
          - source: [
                "from google.colab import drive
                ",
                "drive.mount('/content/drive')
                "
            ],
          - metadata: {
              - colab: {
                    base_uri: "https://localhost:8080/"
                },
                id: "7bGTnN6cJ_BZ",
                outputId: "12b9e1c5-2107-42a0-f459-405bb3c0bc91"
            },
            execution_count: 2,
          - outputs: [
              - {
                    output_type: "stream",
                    name: "stdout",
                  - text: [
                        "Mounted at /content/drive
                        "
                    ]
                }
            ]
        },
      - {
            cell_type: "code",
          - source: [
                "img = cv2.imread("/content/drive/My Drive/colab/mountain.jpg",1)
                ",
                "cv2_imshow(img)"
            ],
          - metadata: {
              - colab: {
                    base_uri: "https://localhost:8080/",
                    height: 417
                },
                id: "CF3NTmAwKjvR",
                outputId: "c7b31cd6-d6a2-494f-a84b-963049e6fa92"
            },
            execution_count: 6,
          - outputs: [
              - {
                    output_type: "display_data",
                  - data: {
                        image/png: "iVBORw0KGgoAAAANSUhEUgAAAoAAAAGQCAIAAACxkUZyAAEAAElEQVR4nOz9adBsyXUYiJ1zcrn31vJt7/ve/nrvRjc2AghQgAJREipJIUWNptIxDsiy
                        ",
                      - text/plain: [
                            "<PIL.Image.Image image mode=RGB size=640x400 at 0x7F633A206450>"
                        ]
                    },
                    metadata: { }
```


metadata.colab.name

```
            ,
        ]
    },
  - {
        cell_type: "code",
      - source: [
            "img = cv2.cvtColor(img,cv2.COLOR_BGR2RGB)
            ",
            "cv2_imshow(img)
            ",
            "twoDimage = img.reshape((-1,3))
            ",
            "twoDimage = np.float32(twoDimage)"
        ],
      - metadata: {
          - colab: {
                base_uri: "https://localhost:8080/",
                height: 417
            },
            id: "S0fgmdxcKbqX",
            outputId: "de51023b-e6fe-49af-b1e2-3bd31a3644a6"
        },
        execution_count: 8,
      - outputs: [
          - {
                output_type: "display_data",
              - data: {
                    image/png: "iVBORw0KGgoAAAANSUhEUgAAAoAAAAGQCAIAAACxkUZyAAEAAElEQVR4nOz9adBsyXUYiJ1zcrn31vJt7/ve/nrvRjc2AgQBghQgAJREipJIUWNptIxDsiy
                    ",
                  - text/plain: [
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                    ]
                },
                metadata: { }
            }
        ]
    },
  - {
        cell_type: "code",
      - source: [
            "criteria = (cv2.TERM_CRITERIA_EPS + cv2.TERM_CRITERIA_MAX_ITER, 10, 1.0)
            ",
            "K = 2
            ",
            "attempts=10
            "
        ],
      - metadata: {
            id: "aBO6JI3JLiUm"
        },
        execution_count: 9,
        outputs: [ ]
    },
  - {
        cell_type: "code",
      - source: [
            "K=6
            ",
            "ret,label,center=cv2.kmeans(twoDimage,K,None,criteria,attempts,cv2.KMEANS_PP_CENTERS)
            ",
            "center = np.uint8(center)
            ",
            "res = center[label.flatten()]
            ",
            "result_image = res.reshape((img.shape))"
        ],
      - metadata: {
            id: "RX5OvPYyLpyW"
        },
        execution_count: 20,
        outputs: [ ]
    },
  - {
        cell_type: "code",
      - source: [
            "cv2_imshow(result_image)"
        ],
      - metadata: {
          - colab: {
                base_uri: "https://localhost:8080/",
                height: 417
            },
            id: "LA340JImLsmc",
            outputId: "9793e62e-b573-4ae3-b17a-0227842623ca"
        },
        execution_count: 21,
      - outputs: [
          - {
                output_type: "display_data",
              - data: {
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```


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                    ",
                  - text/plain: [
                        "<PIL.Image.Image image mode=RGB size=640x400 at 0x7F63381C8690>"
                    ]
                },
                metadata: { }
            }
        ]
    },
  - {
        cell_type: "markdown",
      - source: [
            ""
        ],
      - metadata: {
            id: "D0Js1sxVNcVS"
        }
    },
  - {
        cell_type: "code",
      - source: [
            "img = cv2.resize(img,(256,256))
            ",
            "cv2_imshow(img)
            ",
            "gray = cv2.cvtColor(img,cv2.COLOR_RGB2GRAY)
            ",
            "_,thresh = cv2.threshold(gray, np.mean(gray), 255, cv2.THRESH_BINARY)
            ",
            "edges = cv2.dilate(cv2.Canny(thresh,0,255),None)
            ",
            "#edges = cv2.Canny(thresh,0,255)
            ",
            "cv2_imshow(edges)"
        ],
      - metadata: {
          - colab: {
                base_uri: "https://localhost:8080/",
                height: 529
            },
            id: "tEdCNWy4Nc51",
            outputId: "9ad45716-0ad2-478c-d902-c351bd3ce77c"
        },
        execution_count: 41,
      - outputs: [
          - {
                output_type: "display_data",
              - data: {
                    image/png: "iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAIAAADTED8xAAEAAElEQVR4nKz9d4AmyVEgikdEZlbVZ9tP93i7Ozu7s96vvEcgYYQx3HogBOSOMzxDh7HHe8
                    ",
                  - text/plain: [
                        "<PIL.Image.Image image mode=RGB size=256x256 at 0x7F633817A8D0>"
                    ]
                },
                metadata: { }
            },
          - {
                output_type: "display_data",
              - data: {
                    image/png: "iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAAAAAB5Gfe6AAAOWUlEQVR4nN1d25qEIAjW+Xr/V3YvypSjqGi1/8XObFMKCIioGcN/QQohhNj92M+dkIeQBp/
                    ",
                  - text/plain: [
                        "<PIL.Image.Image image mode=L size=256x256 at 0x7F633815C990>"
                    ]
                },
                metadata: { }
            }
        ]
    },
  - {
        cell_type: "code",
      - source: [
            "cv2_imshow(thresh)"
        ],
      - metadata: {
          - colab: {
                base_uri: "https://localhost:8080/",
                height: 273
            },
            id: "YsDm4oXWM33X",
            outputId: "71cfe3da-c2d3-424c-8ea4-0cd3f8d1f14b"
        },
        execution_count: 31,
      - outputs: [
          - {
                output_type: "display_data",
              - data: {
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                    ",
                  - text/plain: [
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```
                "<PIL.Image.Image image mode=L size=256x256 at 0x7F63381C7290>"
            ]
        },
        metadata: { }
    }
  ]
},
- {
    cell_type: "code",
  - source: [
        ""
    ],
  - metadata: {
        id: "GZcevtPYPiyz"
    },
    execution_count: null,
    outputs: [ ]
},
- {
    cell_type: "markdown",
  - source: [
        "iii) Detecting and Drawing Contours
        "
    ],
  - metadata: {
        id: "-1idS-E3QFit"
    }
},
- {
    cell_type: "code",
  - source: [
        "#img = cv2.imread("/content/drive/My Drive/colab/mountain.jpg",1)
        ",
        "cnt = sorted(cv2.findContours(edges, cv2.RETR_LIST, cv2.CHAIN_APPROX_SIMPLE)[-2], key=cv2.contourArea)[-1]
        ",
        "mask = np.zeros((256,256), np.uint8)
        ",
        "masked = cv2.drawContours(mask, [cnt],-1, 255, -1)
        ",
        "cv2_imshow(masked)
        "
    ],
  - metadata: {
      - colab: {
            base_uri: "https://localhost:8080/",
            height: 273
        },
        id: "PXBkXVAsQH07",
        outputId: "42407953-99db-4ef3-c33f-09cf3529c9ab"
    },
    execution_count: 49,
  - outputs: [
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          - data: {
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                ",
              - text/plain: [
                    "<PIL.Image.Image image mode=L size=256x256 at 0x7F63380E95D0>"
                ]
            },
            metadata: { }
        }
    ]
},
- {
    cell_type: "code",
  - source: [
        "dst = cv2.bitwise_and(img, img, mask=mask)
        ",
        "segmented = cv2.cvtColor(dst, cv2.COLOR_BGR2RGB)
        ",
        "
        ",
        "cv2_imshow(dst)
        ",
        "cv2_imshow(segmented)"
    ],
  - metadata: {
      - colab: {
            base_uri: "https://localhost:8080/",
            height: 529
        },
        id: "XthG9WudQShd",
        outputId: "7bc1ffa9-4b8b-49c6-b2b7-869854479463"
    },
    execution_count: 45,
  - outputs: [
      - {
            output_type: "display_data",
```

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```
        - data: {
              image/png: "iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAIAAADTED8xAADFuklEQVR4nOzdZ6AdR3k4/JnZXk4/5/Z+ddV7s+Qid2PcsakhlAAGAwmBhBBKQgpJgJjQApj
              ",
            - text/plain: [
                  "<PIL.Image.Image image mode=RGB size=256x256 at 0x7F6338102DD0>"
              ]
          },
          metadata: { }
      },
    - {
          output_type: "display_data",
        - data: {
              image/png: "iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAIAAADTED8xAADFu0lEQVR4nOzdZ5wkR304/KrqHCbPbM57ezkn3SmcshDKIKIxwYBAgI3BxphgY/uPbcBgkgU
              ",
            - text/plain: [
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              ]
          },
          metadata: { }
      }
  ]
},
- {
      cell_type: "code",
    - source: [
          ""
      ],
    - metadata: {
          id: "T7ebQ-dGQo1n"
      },
      execution_count: null,
      outputs: [ ]
  },
- {
      cell_type: "markdown",
    - source: [
          " Segmentation using Color Masking
          ",
          " "
      ],
    - metadata: {
          id: "hpfGtFonSWno"
      }
  },
- {
      cell_type: "code",
    - source: [
          "rgb_img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
          ",
          "hsv_img = cv2.cvtColor(rgb_img, cv2.COLOR_RGB2HSV)"
      ],
    - metadata: {
          id: "U0y7mYcBSYvH"
      },
      execution_count: 52,
      outputs: [ ]
  },
- {
      cell_type: "code",
    - source: [
          "light_blue = (90, 70, 50)
          ",
          "dark_blue = (128, 255, 255)
          ",
          "# You can use the following values for green
          ",
          "light_green = (30, 30, 30)
          ",
          "dark_greek = (70, 255, 255)
          ",
          "mask = cv2.inRange(hsv_img, light_green, dark_greek)"
      ],
    - metadata: {
          id: "deCuVgK4SmkS"
      },
      execution_count: 58,
      outputs: [ ]
  },
- {
      cell_type: "code",
    - source: [
          "result = cv2.bitwise_and(img, img, mask=mask)
          ",
          "cv2_imshow(result)"
      ],
    - metadata: {
        - colab: {
              base_uri: "https://localhost:8080/",
              height: 273
metadata.colab.name },
```

id: "6hWvC07ZS06S",
outputId: "7429e7ec-6d43-4aad-d705-a421dbefcdaa"
},
execution_count: 59,
- outputs: [
- {
output_type: "display_data",
- data: {
image/png: "iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAIAAADTED8xAACv30lEQVR4nOydd4BdRdXAz5RbXy9bk+xuOgkkgdAtCIqIIgoWugURRBFQUUGwIYroZ0eRjqB
",
- text/plain: [
"<PIL.Image.Image image mode=RGB size=256x256 at 0x7F63381482D0>"
]
},
metadata: { }
}
]
}
]
}

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metadata.colab.name