# xmqrqhaqt

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## 1 8.1. Script Principal

```
[3]: #Analisis conjunto de datos
    carpeta_imagenes = r"C:
     →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\images"
    carpeta_etiquetas = r"C:
     →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\labels"
    carpeta_mascaras = r"C:
     →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\masks"
    carpeta_img_totas = r"C:
     →\Users\crome\Desktop\TFM\Dades\osaconservation\Limpieza\Dataset_Completo"
    import os
    import numpy as np
    import matplotlib.pyplot as plt
    total_imagenes = os.listdir(carpeta_img_totas)
    print("Total de imagenes: ", len(total_imagenes))
    print("Imagenes procesadas:")
    #Cargamos las imagenes
    imagenes = os.listdir(carpeta_imagenes)
    etiquetas = os.listdir(carpeta_etiquetas)
    mascaras = os.listdir(carpeta_mascaras)
    #Totales
    print("Total de imagenes: ", len(imagenes))
    #% de imagenes del total
    print("Porcentaje de imagenes del total: ", len(imagenes)/
     →len(total_imagenes)*100)
    print("Total de etiquetas: ", len(etiquetas))
    print("Total de mascaras: ", len(mascaras))
    #Total imagenes sin etiqueta
```

```
imagenes sin_etiqueta = [i for i in imagenes if i not in etiquetas]
print("Total de imagenes sin etiqueta: ", len(imagenes_sin_etiqueta))
#Total imagenes sin mascara
imagenes_sin_mascara = [i for i in imagenes if i not in mascaras]
print("Total de imagenes sin mascara: ", len(imagenes_sin_mascara))
#Total etiquetas sin imagen
etiquetas_sin_imagen = [i for i in etiquetas if i not in imagenes]
print("Total de etiquetas sin imagen: ", len(etiquetas_sin_imagen))
#Total mascaras sin imagen
mascaras_sin_imagen = [i for i in mascaras if i not in imagenes]
print("Total de mascaras sin imagen: ", len(mascaras_sin_imagen))
#Total de imagenes con etiqueta y mascara
imagenes_con_etiqueta = [i for i in imagenes if i in etiquetas]
imagenes_con_mascara = [i for i in imagenes if i in mascaras]
imagenes_con_etiqueta_y_mascara = [i for i in imagenes_con_etiqueta if i in_
 →imagenes_con_mascara]
print("Total de imagenes con etiqueta y mascara: ", u
 →len(imagenes_con_etiqueta_y_mascara))
# En train
carpeta_imagenes_train = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset Organizado\train\images
carpeta_etiquetas_train = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\train\labels
carpeta_mascaras_train = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\train\masks"
imagenes_train = os.listdir(carpeta_imagenes_train)
etiquetas_train = os.listdir(carpeta_etiquetas_train)
mascaras_train = os.listdir(carpeta_mascaras_train)
#Totales
print("Total de imagenes train: ", len(imagenes_train))
print("Total de etiquetas train: ", len(etiquetas_train))
print("Total de mascaras train: ", len(mascaras_train))
# En val
carpeta_imagenes_val = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\val\images"
```

```
carpeta_etiquetas_val = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\val\labels"
carpeta_mascaras_val = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\val\masks"
imagenes_val = os.listdir(carpeta_imagenes_val)
etiquetas_val = os.listdir(carpeta_etiquetas_val)
mascaras_val = os.listdir(carpeta_mascaras_val)
#Totales
print("Total de imagenes val: ", len(imagenes_val))
print("Total de etiquetas val: ", len(etiquetas_val))
print("Total de mascaras val: ", len(mascaras_val))
Total de imagenes: 4303
*************************************
*******
Imagenes procesadas:
Total de imagenes: 561
Porcentaje de imagenes del total: 13.03741575644899
Total de etiquetas: 561
Total de mascaras:
Total de imagenes sin etiqueta:
Total de imagenes sin mascara:
                           561
Total de etiquetas sin imagen:
Total de mascaras sin imagen: 566
Total de imagenes con etiqueta y mascara: 0
*******
Total de imagenes train:
Total de etiquetas train:
Total de mascaras train: 452
*************************************
*******
Total de imagenes val: 112
Total de etiquetas val: 112
Total de mascaras val: 114
```

#### 1. Introducción

Este notebook está diseñado para preparar datos, dividirlos en conjuntos de entrenamiento/validación, y entrenar un modelo YOLOv8 para detectar huellas de tortugas. Los pasos incluyen:

Configuración de rutas y organización de archivos. Visualización de etiquetas en las imágenes. Conversión de etiquetas en formato YOLO. División del dataset. Entrenamiento del modelo YOLOv8.

#### 2. Configuración inicial

```
[]: # Importar librerías necesarias
     import os
     import json
     import cv2
     import shutil
     import random
     from ultralytics import YOLO
     # Configuración de rutas principales
     CARPETA MEZCLADA = r"C:
     →\Users\crome\Desktop\TFM\Dades\osaconservation\Para Etiquetar Huellas"
     CARPETA_IMAGENES = os.path.join(CARPETA_MEZCLADA, "images")
     CARPETA_JSON = os.path.join(CARPETA_MEZCLADA, "json")
     # Crear carpetas separadas para imágenes y JSON
     os.makedirs(CARPETA_IMAGENES, exist_ok=True)
     os.makedirs(CARPETA_JSON, exist_ok=True)
     # Mover archivos a sus respectivas carpetas
     for archivo in os.listdir(CARPETA_MEZCLADA):
         ruta_archivo = os.path.join(CARPETA_MEZCLADA, archivo)
         if archivo.lower().endswith(('.jpg', '.jpeg', '.png')):
             shutil.move(ruta_archivo, os.path.join(CARPETA_IMAGENES, archivo))
         elif archivo.lower().endswith('.json'):
             shutil.move(ruta_archivo, os.path.join(CARPETA_JSON, archivo))
     print("Archivos organizados:")
     print(f"- Imágenes movidas a: {CARPETA_IMAGENES}")
     print(f"- Archivos JSON movidos a: {CARPETA_JSON}")
```

### 3. Visualización de etiquetas

```
import json
import cv2
import os

def visualizar_etiquetas(carpeta_imagenes, carpeta_json, carpeta_salida):
    """
    Dibuja las etiquetas de huellas en las imágenes basándose en los archivosu
    JSON.
    """
    os.makedirs(carpeta_salida, exist_ok=True)

for archivo_json in os.listdir(carpeta_json):
    if archivo_json.endswith(".json"):
        ruta_json = os.path.join(carpeta_json, archivo_json)
```

```
ruta_imagen = os.path.join(carpeta_imagenes, archivo_json.replace(".

¬json", ".JPG"))
            if os.path.exists(ruta_imagen):
                # Leer la imagen
                imagen = cv2.imread(ruta imagen)
                # Leer el archivo JSON
                with open(ruta_json, 'r') as f:
                    datos = json.load(f)
                # Dibujar las etiquetas en la imagen
                for shape in datos.get("shapes", []):
                    if shape["shape_type"] == "linestrip":
                        puntos = shape["points"]
                        for i in range(len(puntos) - 1):
                            x1, y1 = int(puntos[i][0]), int(puntos[i][1])
                            x2, y2 = int(puntos[i + 1][0]), int(puntos[i + 1][0])
 →1][1])
                            cv2.line(imagen, (x1, y1), (x2, y2), (0, 255, 0), __
 ⇒2) # Linea verde
                # Guardar la imagen con etiquetas
                ruta_salida = os.path.join(carpeta_salida, archivo_json.

¬replace(".json", ".JPG"))
                cv2.imwrite(ruta_salida, imagen)
CARPETA_SALIDA_VISUALIZACION = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Imagenes_Con_Etiquetas"
visualizar_etiquetas(CARPETA_IMAGENES, CARPETA_JSON,_
 →CARPETA_SALIDA_VISUALIZACION)
```

4. Generar etiquetas YOLO y vacías

```
for shape in datos["shapes"]:
        if shape["shape_type"] == "linestrip":
            puntos = shape["points"]
            if len(puntos) >= 2: # Asegurar que haya al menos dos puntos
                x1, y1 = puntos[0]
                x2, y2 = puntos[-1]
                # Normalizar coordenadas
                xc = ((x1 + x2) / 2) / ancho imagen
                yc = ((y1 + y2) / 2) / alto_imagen
                w = abs(x2 - x1) / ancho_imagen
                h = abs(y2 - y1) / alto_imagen
                # Verificar que las coordenadas están en el rango [0, 1]
                if 0 \le xc \le 1 and 0 \le yc \le 1 and 0 \le w \le 1 and 0 \le h \le 1
 →1:
                    yolo_labels.append(f"0 {xc:.6f} {yc:.6f} {w:.6f} {h:.6f}")
                else:
                    print(f"Coordenadas fuera de rango en {archivo salida txt}:
 \Rightarrow \{xc\}, \{yc\}, \{w\}, \{h\}"\}
    ruta_salida = os.path.join(carpeta_salida_etiquetas, archivo_salida_txt)
    ruta_salida = ruta_salida.replace('.png', '.txt').replace('.jpg', '.txt').

¬replace('.jpeg', '.txt').replace('.JPG', '.txt')
    # Guardar etiquetas YOLO solo si hay datos válidos
    if yolo_labels:
        with open(ruta_salida, 'w') as f:
            f.write("\n".join(yolo_labels))
def procesar imagenes y etiquetas (carpeta imagenes, carpeta json, u
 →carpeta_salida_imagenes, carpeta_salida_etiquetas):
    Copia imágenes con etiquetas JSON asociadas y convierte los JSON en formato_{\sqcup}
 \hookrightarrow YOLO.
    Omite imágenes sin JSON asociado.
    os.makedirs(carpeta_salida_imagenes, exist_ok=True)
    os.makedirs(carpeta_salida_etiquetas, exist_ok=True)
    for archivo in os.listdir(carpeta_imagenes):
        if archivo.lower().endswith(('.jpg', '.jpeg', '.png', '.JPG')):
            archivo_json = archivo.replace('.jpg', '.json').replace('.jpeg', '.
 →json').replace('.png', '.json').replace('.JPG', '.json')
            ruta_json = os.path.join(carpeta_json, archivo_json)
            ruta_imagen = os.path.join(carpeta_imagenes, archivo)
```

```
if os.path.exists(ruta_json): # Solo procesar imágenes con JSON_
 \rightarrow asociado
               # Obtener dimensiones de la imagen
               import cv2
               imagen = cv2.imread(ruta imagen)
               alto_imagen, ancho_imagen = imagen.shape[:2]
               # Copiar imagen
               ruta_destino_imagen = os.path.join(carpeta_salida_imagenes,__
 ⇒archivo)
               shutil.copy(ruta imagen, ruta destino imagen)
               # Convertir JSON a YOLO
               archivo_txt = archivo.replace('.jpg', '.txt').replace('.jpeg',__
 convertir_json_a_yolo(ruta_json, archivo_txt,_
 ⇔carpeta_salida_etiquetas, ancho_imagen, alto_imagen)
def revisar imagenes sin etiquetas(carpeta imagenes, carpeta salida etiquetas):
   Revisa si hay imágenes sin etiquetas YOLO asociadas.
   etiquetas_faltantes = []
   for archivo in os.listdir(carpeta_imagenes):
        if archivo.lower().endswith(('.jpg', '.jpeg', '.png', '.JPG')):
            archivo_txt = archivo.replace('.jpg', '.txt').replace('.jpeg', '.
 atxt').replace('.png', '.txt').replace('.JPG', '.txt')
           ruta_txt = os.path.join(carpeta_salida_etiquetas, archivo_txt)
           if not os.path.exists(ruta_txt):
               etiquetas_faltantes.append(archivo)
   return etiquetas_faltantes
# Configuración de carpetas
CARPETA IMAGENES = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Para_Etiquetar_Huellas\images"
CARPETA JSON = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Para_Etiquetar_Huellas\json"
CARPETA SALIDA IMAGENES = r"C:
 ¬\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\images"
CARPETA_SALIDA_ETIQUETAS = r"C:
 ~\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\labels"
# Procesar imágenes y etiquetas
procesar_imagenes_y_etiquetas(CARPETA_IMAGENES, CARPETA_JSON,__
 →CARPETA_SALIDA_IMAGENES, CARPETA_SALIDA_ETIQUETAS)
```

```
Imágenes sin etiquetas YOLO txt asociadas: ['108FTASK_MAX_2283.JPG',
'108FTASK_MAX_2291.JPG', '108FTASK_MAX_2294.JPG', '108FTASK_MAX_2301.JPG',
'108FTASK_MAX_2302.JPG']
```

Proceso completado: imágenes y etiquetas procesadas correctamente.

5. Dividir el dataset

```
[22]: def dividir dataset(carpeta dataset, carpeta train, carpeta val, val ratio=0.2):
         Divide un conjunto de datos en entrenamiento y validación.
         os.makedirs(os.path.join(carpeta_train, "images"), exist_ok=True)
         os.makedirs(os.path.join(carpeta_train, "labels"), exist_ok=True)
         os.makedirs(os.path.join(carpeta_val, "images"), exist_ok=True)
         os.makedirs(os.path.join(carpeta_val, "labels"), exist_ok=True)
         imagenes = [f for f in os.listdir(os.path.join(carpeta_dataset, "images"))_u
       →if f.lower().endswith(('.jpg', '.jpeg', '.png'))]
         random.shuffle(imagenes)
         val_size = int(len(imagenes) * val_ratio)
         for i, imagen in enumerate(imagenes):
             etiqueta = imagen.replace(".jpg", ".txt").replace(".jpeg", ".txt").

¬replace(".png", ".txt").replace(".JPG", ".txt")

             set_destino = carpeta_val if i < val_size else carpeta_train</pre>
             shutil.copy(os.path.join(carpeta_dataset, "images", imagen), os.path.
       ⇔join(set destino, "images", imagen))
             shutil.copy(os.path.join(carpeta_dataset, "labels", etiqueta), os.path.
       CARPETA_DATASET = r"C:
       →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado"
```

```
CARPETA_TRAIN = os.path.join(CARPETA_DATASET, "train")
CARPETA_VAL = os.path.join(CARPETA_DATASET, "val")
dividir_dataset(CARPETA_DATASET, CARPETA_TRAIN, CARPETA_VAL)
```

#### 6. Entrenar YOLO

```
[2]: import os
  os.environ["KMP_DUPLICATE_LIB_OK"]="TRUE"
  from ultralytics import YOLO
```

```
[2]: import os
     os.environ["KMP DUPLICATE LIB OK"]="TRUE"
     from ultralytics import YOLO
     def entrenar yolo(data path, modelo_salida, epochs=1000, img_size=640):
         Entrena un modelo YOLOv8 con el dataset proporcionado.
         modelo = YOLO("yolov8n.pt")
         modelo.train(
             data=data_path,
             epochs=epochs,
             imgsz=img_size,
             save_period=10,
             project=os.path.dirname(modelo_salida),
             name=os.path.basename(modelo salida).split('.')[0]
         )
     DATA_PATH = r"C:\Users\Carlos\Desktop\pepe\data_other_pc.yaml"
     MODELO_SALIDA = r"C:\Users\Carlos\Desktop\pepe\yolov8_model.pt"
     entrenar_yolo(DATA_PATH, MODELO_SALIDA)
```

Ultralytics 8.3.49 Python-3.10.13 torch-2.5.1+cpu CPU (13th Gen Intel Core(TM) i9-13900KF) engine\trainer: task=detect, mode=train, model=yolov8n.pt, data=C:\Users\Carlos\Desktop\pepe\data\_other\_pc.yaml, epochs=1000, time=None, patience=100, batch=16, imgsz=640, save=True, save period=10, cache=False, device=None, workers=8, project=C:\Users\Carlos\Desktop\pepe, name=yolov8\_model6, exist\_ok=False, pretrained=True, optimizer=auto, verbose=True, seed=0, deterministic=True, single\_cls=False, rect=False, cos\_lr=False, close\_mosaic=10, resume=False, amp=True, fraction=1.0, profile=False, freeze=None, multi\_scale=False, overlap\_mask=True, mask\_ratio=4, dropout=0.0, val=True, split=val, save\_json=False, save\_hybrid=False, conf=None, iou=0.7, max\_det=300, half=False, dnn=False, plots=True, source=None, vid stride=1, stream buffer=False, visualize=False, augment=False, agnostic\_nms=False, classes=None, retina\_masks=False, embed=None, show=False, save frames=False, save txt=False, save conf=False, save crop=False, show\_labels=True, show\_conf=True, show\_boxes=True, line\_width=None,

format=torchscript, keras=False, optimize=False, int8=False, dynamic=False, simplify=True, opset=None, workspace=None, nms=False, lr0=0.01, lrf=0.01, momentum=0.937, weight\_decay=0.0005, warmup\_epochs=3.0, warmup\_momentum=0.8, warmup\_bias\_lr=0.1, box=7.5, cls=0.5, dfl=1.5, pose=12.0, kobj=1.0, nbs=64, hsv\_h=0.015, hsv\_s=0.7, hsv\_v=0.4, degrees=0.0, translate=0.1, scale=0.5, shear=0.0, perspective=0.0, flipud=0.0, fliplr=0.5, bgr=0.0, mosaic=1.0, mixup=0.0, copy\_paste=0.0, copy\_paste\_mode=flip, auto\_augment=randaugment, erasing=0.4, crop\_fraction=1.0, cfg=None, tracker=botsort.yaml, save\_dir=C:\Users\Carlos\Desktop\pepe\yolov8\_mode16
Overriding model.yaml nc=80 with nc=1

from	n n	params	module
arguments			
0 -:	. 1	464	ultralytics.nn.modules.conv.Conv
[3, 16, 3, 2]			
1 -:	. 1	4672	ultralytics.nn.modules.conv.Conv
[16, 32, 3, 2]			
2 -:	. 1	7360	ultralytics.nn.modules.block.C2f
[32, 32, 1, True]			·
3 -1	. 1	18560	ultralytics.nn.modules.conv.Conv
[32, 64, 3, 2]	_	2000	a_o_a_j o_oo
4 -:	2	49664	ultralytics.nn.modules.block.C2f
		49004	ditialytics.mi.modules.block.czi
[64, 64, 2, True]		70004	3. 3
5 -:	. 1	73984	ultralytics.nn.modules.conv.Conv
[64, 128, 3, 2]			
6 –:	. 2	197632	ultralytics.nn.modules.block.C2f
[128, 128, 2, True]			
7 -:	. 1	295424	ultralytics.nn.modules.conv.Conv
[128, 256, 3, 2]			
8 -:	. 1	460288	ultralytics.nn.modules.block.C2f
[256, 256, 1, True]			•
9 -:	. 1	164608	ultralytics.nn.modules.block.SPPF
[256, 256, 5]			J
10 -:	1	0	torch.nn.modules.upsampling.Upsample
[None, 2, 'nearest']		ŭ	vor on. mn. modaros. apsampring. opsampro
11 [-1, 6]	1	0	ultralytics.nn.modules.conv.Concat
	1	U	ultrary cics.mi.modules.comv.comcat
[1]		4.4000.4	1. 1. 1. 1006
12 -:	. 1	148224	ultralytics.nn.modules.block.C2f
[384, 128, 1]			
13 -:	. 1	0	torch.nn.modules.upsampling.Upsample
[None, 2, 'nearest']			
14 [-1, 4]	1	0	ultralytics.nn.modules.conv.Concat
[1]			
15 -:	. 1	37248	ultralytics.nn.modules.block.C2f
[192, 64, 1]			·
16 -:	. 1	36992	ultralytics.nn.modules.conv.Conv
[64, 64, 3, 2]	_	<del>-</del>	<b>y</b>
17 [-1, 12]	1	0	ultralytics.nn.modules.conv.Concat
1, 12,	_	O	arorary orob.mn.modures.comv.comcat

```
Г17
18
                     -1 1
                              123648 ultralytics.nn.modules.block.C2f
[192, 128, 1]
                     -1 1
                              147712 ultralytics.nn.modules.conv.Conv
19
[128, 128, 3, 2]
20
                [-1, 9]
                                   0 ultralytics.nn.modules.conv.Concat
[1]
21
                     -1 1
                              493056 ultralytics.nn.modules.block.C2f
[384, 256, 1]
                              751507 ultralytics.nn.modules.head.Detect
22
           [15, 18, 21] 1
[1, [64, 128, 256]]
Model summary: 225 layers, 3,011,043 parameters, 3,011,027 gradients, 8.2 GFLOPs
Transferred 319/355 items from pretrained weights
TensorBoard: Start with 'tensorboard --logdir
C:\Users\Carlos\Desktop\pepe\yolov8_model6', view at http://localhost:6006/
Freezing layer 'model.22.dfl.conv.weight'
train: Scanning
C:\Users\Carlos\Desktop\pepe\Dataset_Organizado\train\labels.cache... 449
images, 0 backgrounds, 0 corrupt: 100%
                                             | 449/449 [00:00<?, ?it/s]
val: Scanning
C:\Users\Carlos\Desktop\pepe\Dataset_Organizado\val\labels.cache... 112 images,
                                    | 112/112 [00:00<?, ?it/s]
0 backgrounds, 0 corrupt: 100%|
Plotting labels to C:\Users\Carlos\Desktop\pepe\yolov8_model6\labels.jpg...
optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and
'momentum=0.937' and determining best 'optimizer', 'lr0' and 'momentum'
automatically...
optimizer: AdamW(lr=0.002, momentum=0.9) with parameter groups 57
weight(decay=0.0), 64 weight(decay=0.0005), 63 bias(decay=0.0)
TensorBoard: model graph visualization added
Image sizes 640 train, 640 val
Using O dataloader workers
Logging results to C:\Users\Carlos\Desktop\pepe\yolov8_model6
Starting training for 1000 epochs...
                                    cls_loss
     Epoch
               GPU_mem
                         box_loss
                                               dfl_loss Instances
                                                                          Size
     1/1000
                    0G
                            3.096
                                       3.328
                                                  2.562
                                                                  5
                                                                           640:
          | 29/29 [00:37<00:00, 1.29s/it]
100%|
                 Class
                           Images Instances
                                                  Box(P
                                                                  R
                                                                         mAP50
mAP50-95): 100%|
                     | 4/4 [00:03<00:00, 1.04it/s]
                   all
                              112
                                         557
                                                 0.0075
                                                             0.452
                                                                        0.0172
0.00467
```

Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
2/1000 0G 100%    29/29 [00:	36<00:00,	1.26s/it]			640:
Class mAP50-95): 100%	Images 4/4 [00:03			R	mAP50
all 0.00754	112	557	0.0188	0.431	0.0279
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
3/1000 0G 100%    29/29 [00:			2.248	12	640:
	Images	Instances		R	mAP50
all 0.00184	112	557	0.0286	0.0395	0.0071
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
100%    29/29 [00:		1.28s/it]			640:
Class mAP50-95): 100%	Images 4/4 [00:04			R	mAP50
all 0.00397	112	557	0.0317	0.118	0.017
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
5/1000 0G 100%    29/29 [00:		2.783 1.26s/it]	2.223	4	640:
Class mAP50-95): 100%	Images 4/4 [00:04			R	mAP50
all 0.00871	112	557	0.0941	0.111	0.0321

dfl\_loss Instances

Size

Epoch

GPU\_mem

mAP50-95): 100%    4	5<00:00, 1.3 Images 1 4/4 [00:03<0	26s/it] Instances 0:00, 1.04	Box(P 4it/s]	R	
all 0.0145	112	557	0.112	0.154	0.0511
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
7/1000 OG 100%    29/29 [00:36			2.133	6	640:
Class mAP50-95): 100%	Images ] 1/4 [00:03<0			R	mAP50
all 0.0141	112	557	0.112	0.133	0.0489
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
8/1000 OG 100%    29/29 [00:38			2.111	5	640:
	Images 1	Instances		R	mAP50
all 0.00609	112	557	0.0688	0.0898	0.0191
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
9/1000 OG 100%    29/29 [00:36			2.184	12	640:
	Images 1	Instances		R	mAP50
all 0.0108	112	557	0.107	0.106	0.0369
Epoch GPU_mem					
	box_loss	cls_loss	dfl_loss	Instances	Size
10/1000 OG 100%    29/29 [00:36	2.541	2.616	_	Instances 9	Size 640:

0.0133	all	112	557	0.11	0.133	0.0431
11/1000 100%    2	0G 29/29 [00:3 Class	Images	2.611 27s/it] Instances	2.123 Box(P	9	Size 640: mAP50
mAP50-95): 10		112	-		0.126	0.0411
-	0G 29/29 [00:3 Class	Images	2.621 30s/it] Instances	2.106 Box(P	3	
0.0157	all	112	557	0.0981	0.115	0.0498
		box_loss				
13/1000 100%    2 mAP50-95): 10	29/29 [00:3 Class	Images	.27s/it] Instances	Box(P		640: mAP50
0.0126	all	112	557	0.0873	0.185	0.0413
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
14/1000 100%    2	29/29 [00:3 Class	Images	.25s/it] Instances			640: mAP50
mAP50-95): 10		4/4 [00:03< 112			0.156	0.0505

Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
15/1000 OG 100%    29/29 [00:			2.051	14	640:
Class mAP50-95): 100%	Images 4/4 [00:03			R	mAP50
all 0.0193	112	557	0.17	0.135	0.0651
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
16/1000 OG 100%    29/29 [00:			2.051	7	640:
	Images	Instances		R	mAP50
all 0.0129	112	557	0.11	0.115	0.042
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
17/1000 OG 100%    29/29 [00:	2.46 36<00:00,		2.084	2	640:
Class mAP50-95): 100%	Images 4/4 [00:03			R	mAP50
all 0.0231	112	557	0.165	0.117	0.0642
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
18/1000 OG 100%    29/29 [00:			2.097	5	640:
Class mAP50-95): 100%	Images 4/4 [00:03			R	mAP50
all 0.0315	112	557	0.19	0.201	0.0975

dfl\_loss Instances

Size

GPU\_mem

box\_loss

Epoch

mAP50-95): 100%	36<00:00, 1 Images 4/4 [00:03<	.25s/it] Instances 00:00, 1.0	Box(P D5it/s]		mAP50
0.0181	112	557	0.136	0.178	0.0631
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
20/1000 OG 100%    29/29 [00:3			2.033	3	640:
Class mAP50-95): 100%	Images 4/4 [00:03<			R	mAP50
all 0.0226	112	557	0.163	0.154	0.0713
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
21/1000 OG 100%    29/29 [00:3			2.026	13	640:
Class mAP50-95): 100%	Images 4/4 [00:03<			R	mAP50
all 0.0267	112	557	0.158	0.194	0.0814
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
22/1000 OG 100%    29/29 [00:3			2.043	13	640:
	Images	Instances		R	mAP50
all 0.0309	112	557	0.211	0.208	0.0935
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
23/1000 0G			2.015	1	640:
100%   29/29 [00:3 Class mAP50-95): 100%	Images	Instances		R	mAP50

0.0293	all	112	557	0.158	0.194	0.089
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		2.361		2.015	9	640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
mai 00 30). 10		112			0.176	0.0734
0.0241						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		2.29		1.922	0	640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
00 00,1 20		112			0.221	0.101
0.0332						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		2.348		1.984	11	640:
100%    2	Class	Images	Instances		R	mAP50
mAP50-95): 10						
0.0229	all	112	557	0.164	0.212	0.0704
Po cal	(IDII	h	-1- 1	167 7	Turkanaa	Q ÷
27/1000	_	box_loss 2.331	_	_	Instances 8	Size 640:
100%    2				1.979	0	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
11 13,7 10		112			0.224	0.133
0.0415						

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
28/1000 100%    2				1.978	4	640:
mAP50-95): 10		_		Box(P 18it/s]	R	mAP50
0.0321	all	112	557	0.239	0.174	0.102
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
29/1000 100%    2			2.44 1.25s/it]	2.001	12	640:
mAP50-95): 10	Class	Images	Instances	Box(P 18it/s]	R	mAP50
0.024	all	112	557	0.165	0.18	0.0729
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
30/1000				1.98	1	640:
mAP50-95): 10	Class	Images	Instances	Box(P D7it/s]	R	mAP50
0.0291	all	112	557	0.18	0.176	0.0937
Epoch	GPU mem	box loss	cls loss	dfl_loss	Instances	Size
31/1000	OG	2.271	2.458			640:
mAP50-95): 10	Class	Images	Instances	Box(P 28it/s]	R	mAP50
0.0192			557		0.156	0.0596

dfl\_loss Instances

Size

Epoch

GPU\_mem

32/1000 OG 2 100%    29/29 [00:36<00:0 Class In			17 R	
mAP50-95): 100%    4/4 [0 all 0.0277	00:03<00:00, 1.0 112 557		0.156	0.0826
Epoch GPU_mem box_	_loss cls_loss	dfl_loss	Instances	Size
33/1000 OG 2 100%    29/29 [00:36<00:			30	640:
Class In mAP50-95): 100%    4/4 [	mages Instances 00:03<00:00, 1.2		R	mAP50
all 0.0388	112 557	0.214	0.176	0.116
Epoch GPU_mem box_	_loss cls_loss	dfl_loss	Instances	Size
34/1000 OG 2 100%    29/29 [00:36<00:	00, 1.24s/it]			640:
Class In mAP50-95): 100%    4/4 [	mages Instances 00:03<00:00, 1.1		R	mAP50
all 0.0309	112 557	0.198	0.178	0.0992
Epoch GPU_mem box_	_loss cls_loss	dfl_loss	Instances	Size
35/1000 OG 2 100%    29/29 [00:36<00:		1.987	3	640:
	mages Instances		R	mAP50
all 0.0471	112 557	0.254	0.199	0.142
Epoch GPU_mem box_	_loss cls_loss	dfl_loss	Instances	Size
36/1000 OG 2 100%    29/29 [00:35<00:		1.937	18	640:
Class In mAP50-95): 100%    4/4 [	nages Instances 00:03<00:00, 1.2		R	mAP50

0.0436	all	112	557	0.229	0.214	0.126
37/1000	0G 29/29 [00:3 Class 0%	2.231 35<00:00, 1 Images 4/4 [00:03<	2.322 24s/it] Instances	1.918 Box(P 25it/s]	Instances 2 R 0.223	640: mAP50
_	0G 29/29 [00:3 Class 0%	2.238 35<00:00, 1 Images 4/4 [00:03<	2.336 23s/it] Instances	1.911 Box(P	Instances 6 R 0.162	640: mAP50
•	0G 29/29 [00:3 Class 0%	2.194 35<00:00, 1 Images	2.305 23s/it] Instances	1.909 Box(P 7it/s]		640: mAP50
Epoch 40/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 0%	2.274 35<00:00, 1 Images	2.381 24s/it] Instances	1.955 Box(P	Instances 22 R 0.16	640: mAP50

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
41/1000 100%    2				1.894	11	640:
mAP50-95): 10		_			R	mAP50
0.0274	all	112	557	0.204	0.144	0.0852
Fnoch	CDII mom	how logg	cla loga	dfl logg	Instances	Size
-	_	_	_	_		
42/1000 100%    2			2.604 [.24s/it]	1.839	0	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.043	all	112	557	0.276	0.215	0.131
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
43/1000 100%    2		2.249 35<00:00, 1		1.905	14	640:
mAP50-95): 10		•			R	mAP50
0.0613	all	112	557	0.282	0.233	0.168
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
44/1000	OG	2.181	2.327	_		Size
-	0G 9/29 [00:3 Class	2.181 36<00:00, 1 Images	2.327 1.24s/it] Instances	1.894 Box(P	4	
44/1000 100%    2	0G 29/29 [00:3 Class 0%	2.181 36<00:00, 1 Images 4/4 [00:03<	2.327 1.24s/it] Instances	1.894 Box(P 22it/s]	4	640: mAP50
44/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 0%	2.181 36<00:00, 1 Images 4/4 [00:03<	2.327 1.24s/it] Instances	1.894 Box(P 22it/s]	4 R	640: mAP50

dfl\_loss Instances

Size

Epoch

GPU\_mem

45/1000 OG 100%    29/29 [00:36<00				640: mAP50
mAP50-95): 100%    4/4	•		10	mii oo
all 0.0501	112 5	57 0.231	0.214	0.146
Epoch GPU_mem box	c_loss cls_lo	ss dfl_loss	Instances	Size
46/1000 OG 100%    29/29 [00:36<00			9	640:
	Images Instanc	es Box(P	R	mAP50
all 0.0393	112 5	57 0.255	0.189	0.117
Epoch GPU_mem box	closs cls_lo	ss dfl_loss	Instances	Size
47/1000 OG 100%    29/29 [00:35<00			8	640:
Class 1 mAP50-95): 100%    4/4	<pre>[mages Instance] [00:03&lt;00:00,</pre>		R	mAP50
all 0.044	112 5	57 0.228	0.197	0.132
Epoch GPU_mem box	closs cls_lo	ss dfl_loss	Instances	Size
48/1000 OG 100%    29/29 [00:36<00			2	640:
	Images Instanc	es Box(P	R	mAP50
all 0.0429	112 5	57 0.216	0.18	0.131
Epoch GPU_mem box	c_loss cls_lo	ss dfl_loss	Instances	Size
49/1000 OG 100%    29/29 [00:35<00			7	640:
	Images Instanc	es Box(P	R	mAP50

0.0539	all	112	557	0.276	0.237	0.156
50/1000 100%    2	0G 29/29 [00:3 Class	box_loss 2.213 36<00:00, 1 Images	2.274 24s/it] Instances	1.886 Box(P	12	
mAP50-95): 10 0.0614		112			0.241	0.172
_	0G 29/29 [00:3 Class	Images	2.552 24s/it] Instances	1.814 Box(P	1	640:
0.0405		112			0.199	0.116
-	0G 29/29 [00:3 Class 0%	Images 4/4 [00:03<	2.295 25s/it] Instances	1.912 Box(P 9it/s]	9	640: mAP50
_	0G 29/29 [00:3 Class 0%	35<00:00, 1 Images 4/4 [00:03<	2.273 23s/it] Instances	1.872 Box(P @Oit/s]	16	640: mAP50

Epoch G	PU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
54/1000 100%    29/2				1.864	3	640:
mAP50-95): 100%		-		Box(P 23it/s]	R	mAP50
0.0598	all	112	557	0.26	0.219	0.169
Epoch G	PU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
55/1000 100%    29/2				1.923	2	640:
mAP50-95): 100%	Class	Images	Instances	Box(P 29it/s]	R	mAP50
0.0538	all	112	557	0.261	0.194	0.157
Epoch G	PU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
56/1000 100%    29/2				1.876	4	640:
mAP50-95): 100%		•		Box(P 21it/s]	R	mAP50
0.0482	all	112	557	0.254	0.214	0.139
Epoch G	PU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
57/1000 100%    29/2				1.844	8	640:
mAP50-95): 100%		_		Box(P 21it/s]	R	mAP50
0.0383	all	112	557	0.218	0.194	0.113
-						

dfl\_loss Instances

Size

Epoch

GPU\_mem

58/1000 0G 100%    29/29 [00:35<00: Class I mAP50-95): 100%    4/4	00, 1.24s/it] mages Instances	Box(P		640: mAP50
	112 557		0.21	0.151
Epoch GPU_mem box		_	Instances	
100%    29/29 [00:35<00:	00, 1.24s/it] mages Instances	s Box(P		mAP50
	112 557		0.242	0.19
Epoch GPU_mem box	_loss cls_los	s dfl_loss	Instances	Size
60/1000 OG		7 1.845	6	640:
100%   29/29 [00:35<00: Class I mAP50-95): 100%   4/4	mages Instances		R	mAP50
all 0.0493	112 557	7 0.237	0.224	0.133
Epoch GPU_mem box	_loss cls_los:	s dfl_loss	Instances	Size
61/1000 OG 100%    29/29 [00:36<00:		1.838	8	640:
	mages Instances		R	mAP50
all 0.0589	112 55	0.297	0.237	0.169
Epoch GPU_mem box	_loss cls_los:	s dfl_loss	Instances	Size
62/1000 OG		1.843	5	640:
100%   29/29 [00:35<00: Class I mAP50-95): 100%   4/4	mages Instances		R	mAP50

0.0489	all	112	557	0.263	0.207	0.148
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		2.092 36<00:00, 1		1.799	6	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0515	all	112	557	0.304	0.203	0.155
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		2.097		1.835	2	640:
100%   2 mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0592	all	112	557	0.26	0.228	0.165
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
65/1000 100%    2		2.087 86<00:00, 1		1.822	12	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.052	all	112	557	0.275	0.226	0.15
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		2.134		1.817	9	640:
100%   2 mAP50-95): 10	Class	Images	Instances		R	mAP50
mn 00 <i>00)</i> . 10		112			0 215	0 146
0.0543	all	112	001	J.201	3.210	0.110

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
67/1000 100%    2				1.813	16	640:
mAP50-95): 100		-		Box(P 27it/s]	R	mAP50
0.0663	all	112	557	0.283	0.262	0.183
	an					a.
•	_	_	_	dfl_loss		Size
68/1000 100%    2	9/29 [00:3	36<00:00,			9	640:
mAP50-95): 100		•		Box(P 26it/s]	R	mAP50
0.0538	all	112	557	0.298	0.197	0.146
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
69/1000 100%    2			2.399 1.25s/it]	1.844	1	640:
mAP50-95): 100		•		Box(P 22it/s]	R	mAP50
0.0635	all	112	557	0.276	0.248	0.179
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
70/1000 100%    2			2.221 1.25s/it]	1.873	5	640:
mAP50-95): 100	Class	Images	Instances	Box(P 25it/s]	R	mAP50
0.0613	all	112	557	0.268	0.227	0.166

dfl\_loss Instances

Size

Epoch

GPU\_mem

71/1000 OG 100%    29/29 [00:36<0	0:00, 1.25s/i Images Instar	t] nces Box(P		
all 0.0484	112	557 0.263	0.23	0.148
Epoch GPU_mem b	ox_loss cls_l	loss dfl_loss	Instances	Size
72/1000 OG 100%    29/29 [00:36<0			9	640:
	Images Instar	nces Box(P	R	mAP50
all 0.0501	112	557 0.283	0.208	0.148
Epoch GPU_mem b	ox_loss cls_l	loss dfl_loss	Instances	Size
73/1000 OG 100%    29/29 [00:35<0			3	640:
	Images Instar	nces Box(P	R	mAP50
all 0.0537	112	557 0.255	0.202	0.152
Epoch GPU_mem b	ox_loss cls_1	loss dfl_loss	Instances	Size
74/1000 OG 100%    29/29 [00:36<0			5	640:
	Images Instar	nces Box(P	R	mAP50
all 0.0574	112	557 0.272	0.223	0.16
Epoch GPU_mem b	ox_loss cls l	loss dfl loss	Instances	Size
75/1000 OG	2.047 2	.149 1.78		
100%    29/29 [00:35<0 Class mAP50-95): 100%    4/4	Images Instar	nces Box(P	R	mAP50

0.0605	all	112	557	0.273	0.23	0.172
76/1000	0G 29/29 [00:3 Class 0%	box_loss 2.074 35<00:00, 1 Images 4/4 [00:03<	2.154 .24s/it] Instances 00:00, 1.2	1.796 Box(P 4it/s]	8 R	640: mAP50
_	0G 29/29 [00:3 Class 0%	Images	2.107 .24s/it] Instances 00:00, 1.2	1.758 Box(P !5it/s]	5 R	640: mAP50
-	0G 29/29 [00:3 Class 0%	Images	2.174 .25s/it] Instances 00:00, 1.2	1.821 Box(P	6 R	640: mAP50
-	0G 29/29 [00:3 Class 0%	Images	2.147 .24s/it] Instances 00:00, 1.2	1.791 Box(P !5it/s]	3 R	640: mAP50

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
80/1000 100%    29				1.814	5	640:
mAP50-95): 100		-		Box(P 26it/s]	R	mAP50
0.0644	all	112	557	0.278	0.247	0.179
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
81/1000 100%    29				1.864	1	640:
mAP50-95): 100		•		Box(P 25it/s]	R	mAP50
0.0665	all	112	557	0.309	0.224	0.179
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
82/1000 100%    29			2.139 1.24s/it]	1.791	14	640:
mAP50-95): 100		•		Box(P 25it/s]	R	mAP50
0.0742	all	112	557	0.279	0.235	0.189
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
83/1000 100%    29			2.141 [.24s/it]	1.801	10	640:
mAP50-95): 100				Box(P 25it/s]	R	mAP50
0.0703	all	112	557	0.334	0.257	0.192

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Epoch

GPU\_mem

84/1000 0G 2.037 2.181 1.768 100%    29/29 [00:36<00:00, 1.24s/it] Class Images Instances Box(P	3 R	
mAP50-95): 100%    4/4 [00:03<00:00, 1.25it/s]		
all 112 557 0.294 0.062	0.226	0.181
	Tuetanasa	Q:
Epoch GPU_mem box_loss cls_loss dfl_loss		
85/1000 0G 2.01 2.08 1.737 100%    29/29 [00:36<00:00, 1.24s/it]	9	640:
Class Images Instances Box(P mAP50-95): 100%    4/4 [00:04<00:00, 1.01s/it]	R	mAP50
all 112 557 0.231 0.0417	0.206	0.127
Epoch GPU_mem box_loss cls_loss dfl_loss	Instances	Size
86/1000 OG 2.015 2.069 1.77	8	640:
100%    29/29 [00:36<00:00, 1.25s/it] Class Images Instances Box(P	R	mAP50
mAP50-95): 100%    4/4 [00:03<00:00, 1.23it/s]		
all 112 557 0.266	0.226	0.154
0.0574		
Epoch GPU_mem box_loss cls_loss dfl_loss	Instances	Size
87/1000 0G 2.023 2.064 1.765		
100%    29/29 [00:36<00:00, 1.25s/it]	O	040.
Class Images Instances Box(P	R	mAP50
mAP50-95): 100%    4/4 [00:03<00:00, 1.28it/s]		
all 112 557 0.308	0.255	0.212
0.0751		
Epoch GPU_mem box_loss cls_loss dfl_loss	Instances	Size
88/1000 OG 2.071 2.176 1.79		
100%    29/29 [00:36<00:00, 1.25s/it]	-	2-2.
Class Images Instances Box(P mAP50-95): 100%    4/4 [00:03<00:00, 1.20it/s]	R	mAP50

0.0449	all	112	557	0.244	0.201	0.138
89/1000	0G 29/29 [00:3 Class 0%	box_loss 2.039 36<00:00, 1 Images 4/4 [00:03<	2.126 .24s/it] Instances 00:00, 1.2	1.762 Box(P 6it/s]	6 R	640: mAP50
-	0G 29/29 [00:3 Class 0%	Images	2.017 .24s/it] Instances 00:00, 1.2	1.747 Box(P	55 R	640: mAP50
-	0G 29/29 [00:3 Class 0%	Images	2.079 .24s/it] Instances 00:00, 1.3	1.771 Box(P Oit/s]	9 R	640: mAP50
-	0G 29/29 [00:3 Class 0%	Images 4/4 [00:03<	2.084 .24s/it] Instances	1.757 Box(P	5	640: mAP50

Epoch GPU_	mem box_loss	cls_loss	dfl_loss	Instances	Size
93/1000 100%    29/29			1.698	4	640:
Cl mAP50-95): 100%	ass Images   4/4 [00:03			R	mAP50
0.0689	all 112	557	0.308	0.273	0.188
Epoch GPU	mem box_loss	cls loss	dfl loss	Instances	Size
94/1000 100%    29/29	OG 1.972	2.037	_		640:
	ass Images	Instances		R	mAP50
	all 112			0.257	0.189
Epoch GPU_	mem box_loss	cls_loss	dfl_loss	Instances	Size
95/1000 100%    29/29			1.745	3	640:
Cl mAP50-95): 100%	ass Images   4/4 [00:03			R	mAP50
0.0826	all 112	557	0.363	0.233	0.215
Epoch GPU_	mem box_loss	cls_loss	dfl_loss	Instances	Size
96/1000 100%    29/29			1.721	10	640:
	ass Images	Instances		R	mAP50
0.0609	all 112	557	0.319	0.223	0.174

dfl\_loss Instances

Size

Epoch

GPU\_mem

97/1000 OG 2 100%    29/29 [00:36<00:0 Class Im mAP50-95): 100%    4/4 [0	00, 1.25s/it] ages Instances	Box(P		640: mAP50
all 0.0537	112 557	0.267	0.194	0.141
Epoch GPU_mem box_	loss cls_loss	dfl_loss	Instances	Size
98/1000 0G 1 100%    29/29 [00:35<00:0	.992 2.1		8	640:
	ages Instances		R	mAP50
all 0.0579	112 557	0.262	0.223	0.155
Epoch GPU_mem box_	loss cls_loss	dfl_loss	Instances	Size
99/1000 0G 2 100%    29/29 [00:36<00:0		1.74	12	640:
	ages Instances		R	mAP50
all 0.0642	112 557	0.295	0.242	0.175
Epoch GPU_mem box_	loss cls_loss	dfl_loss	Instances	Size
100/1000 OG 1 100%    29/29 [00:35<00:0		1.772	1	640:
	ages Instances		R	mAP50
all 0.0496	112 557	0.249	0.219	0.145
Epoch GPU_mem box_	loss cls_loss	dfl_loss	Instances	Size
101/1000 OG 1				
100%    29/29 [00:35<00:0		1.698	14	640:

0.0451	all	112	557	0.291	0.21	0.136
102/1000	0G 29/29 [00:3 Class 0%	box_loss 1.991 36<00:00, 1 Images 4/4 [00:03<	2.061 .25s/it] Instances 00:00, 1.2	1.74 Box(P 26it/s]	10 R	640: mAP50
-	0G 29/29 [00:3 Class 0%	Images	2.15 .24s/it] Instances 00:00, 1.2	1.723 Box(P 24it/s]	2 R	640: mAP50
Epoch 104/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 0%	Images	2.059 .24s/it] Instances 00:00, 1.2	1.722 Box(P 27it/s]	12	640: mAP50
Epoch 105/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 0%	35<00:00, 1 Images	2.105 .24s/it] Instances 00:00, 1.2	1.742 Box(P 22it/s]	17 R	640: mAP50

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
106/1000 100%    29				1.716	8	640:
mAP50-95): 100%		_		Box(P 26it/s]	R	mAP50
0.0637	all	112	557	0.329	0.215	0.17
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
107/1000 100%    29	/29 [00:3	86<00:00, 1	1.24s/it]			640:
mAP50-95): 100%		_		Box(P 26it/s]	R	mAP50
0.0669	all	112	557	0.333	0.268	0.182
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
108/1000 100%    29		1.904 86<00:00, 1		1.685	2	640:
mAP50-95): 100%		•		Box(P 29it/s]	R	mAP50
0.0478	all	112	557	0.27	0.214	0.144
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
109/1000 100%    29		1.909 35<00:00, 1		1.693	7	640:
mAP50-95): 1005		•		Box(P 26it/s]	R	mAP50
0.0678	all	112	557	0.287	0.258	0.191

dfl\_loss Instances

Size

Epoch

GPU\_mem

110/1000 100%    29/29				1.723	2	640:
Cl mAP50-95): 100%		ages Insta 00:03<00:00,			R	mAP50
0.0637	all	112	557	0.34	0.239	0.187
Epoch GPU_	mem box_	loss cls_	loss df	l_loss	Instances	Size
111/1000 100%    29/29				1.696	7	640:
Cl mAP50-95): 100%		ages Insta 00:03<00:00,			R	mAP50
0.0619	all	112	557	0.311	0.232	0.174
Epoch GPU_	mem box_	loss cls_	loss df	l_loss	Instances	Size
112/1000 100%    29/29				1.695	10	640:
C1 mAP50-95): 100%		ages Insta 00:03<00:00,			R	mAP50
0.0609	all	112	557	0.323	0.232	0.184
Epoch GPU_	mem box_	loss cls_	loss df	l_loss	Instances	Size
113/1000 100%    29/29			.928 .t]	1.669	13	640:
Cl mAP50-95): 100%		ages Insta 00:03<00:00,			R	mAP50
	all	112	557	0.339	0.25	0.2
0.0761						
Epoch GPU_	mem box_	loss cls_	loss df	l_loss	Instances	Size
114/1000 100%    29/29				1.697	3	640:
	ass Im	ages Insta	nces		R	mAP50

0.0855	all	112	557	0.367	0.246	0.219
115/1000	0G 29/29 [00:3 Class 0%	1.88 35<00:00, 1 Images 4/4 [00:03<	1.902 24s/it] Instances	1.648 Box(P	Instances 5 R 0.257	640: mAP50
-	0G 29/29 [00:3 Class 0%	1.945 35<00:00, 1 Images 4/4 [00:03<	1.945 23s/it] Instances	1.68 Box(P	Instances 11 R 0.241	640: mAP50
•	0G 29/29 [00:3 Class 0%	1.889 35<00:00, 1 Images 4/4 [00:03<	1.93 23s/it] Instances	1.672 Box(P		640: mAP50
Epoch 118/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 0%	1.926 35<00:00, 1 Images	1.989 24s/it] Instances	1.678 Box(P		640: mAP50

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
119/1000 100%    2		1.896 36<00:00, 1		1.678	7	640:
mAP50-95): 10		_	Instances <00:00, 1.2		R	mAP50
0.0726	all	112	557	0.314	0.287	0.196
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
120/1000 100%    2			1.93 L.25s/it]	1.663	14	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0719	all	112	557	0.378	0.263	0.191
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
Epoch 121/1000 100%    2	OG	1.926	1.948			Size 640:
121/1000	0G 29/29 [00:3 Class	1.926 36<00:00, 1 Images	1.948 L.26s/it] Instances	1.695 Box(P	10	
121/1000 100%    2	0G 29/29 [00:3 Class 0%	1.926 36<00:00, 1 Images 4/4 [00:03<	1.948 L.26s/it] Instances	1.695 Box(P 27it/s]	10 R	640: mAP50
121/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 0%	1.926 36<00:00, 1 Images 4/4 [00:03<	1.948 1.26s/it] Instances <00:00, 1.2	1.695 Box(P 27it/s]	10 R	640: mAP50
121/1000 100%    2 mAP50-95): 10 0.0749	0G 29/29 [00:3 Class 0%    all	1.926 36<00:00, 1 Images 4/4 [00:03<	1.948 1.26s/it] Instances <00:00, 1.2	1.695 Box(P 27it/s] 0.321	10 R 0.282	640: mAP50 0.196
121/1000 100%    2 mAP50-95): 10 0.0749 Epoch 122/1000	0G 29/29 [00:3 Class 0%    all GPU_mem	1.926 36<00:00, 1 Images 4/4 [00:03<	1.948 1.26s/it] Instances <00:00, 1.2 557 cls_loss 1.965	1.695  Box(P 27it/s]  0.321  dfl_loss	10 R 0.282	640: mAP50 0.196
121/1000 100%    2 mAP50-95): 10 0.0749 Epoch 122/1000	0G 29/29 [00:3 Class 0%    all GPU_mem 0G 29/29 [00:3	1.926 36<00:00, 1 Images 4/4 [00:03< 112 box_loss 1.938 35<00:00, 1	1.948 1.26s/it] Instances 600:00, 1.2 557  cls_loss 1.965 1.23s/it] Instances	1.695  Box(P 27it/s]  0.321  dfl_loss  1.702  Box(P	10 R 0.282 Instances 2	640: mAP50 0.196 Size 640:
121/1000 100%    2 mAP50-95): 10 0.0749 Epoch 122/1000 100%    2	0G 29/29 [00:3 Class 0%    all GPU_mem 0G 29/29 [00:3 Class 0%	1.926 36<00:00, 1 Images 4/4 [00:03< 112 box_loss 1.938 35<00:00, 1 Images 4/4 [00:03<	1.948 1.26s/it] Instances 600:00, 1.2 557  cls_loss 1.965 1.23s/it] Instances	1.695  Box(P 27it/s]  0.321  dfl_loss  1.702  Box(P 29it/s]	10 R 0.282 Instances 2 R	640: mAP50 0.196 Size 640: mAP50

dfl\_loss Instances

Size

Epoch

GPU\_mem

123/1000 0G 1.861 100%    29/29 [00:36<00:00,	1.25s/it] Instances	Box(P		640: mAP50
all 112 0.0713	557	0.301	0.264	0.185
Epoch GPU_mem box_loss	cls_loss	dfl_loss	Instances	Size
124/1000 OG 1.891 100%    29/29 [00:36<00:00,		1.661	19	640:
Class Images mAP50-95): 100%    4/4 [00:03			R	mAP50
all 112 0.0719	557	0.329	0.237	0.191
Epoch GPU_mem box_loss	cls_loss	dfl_loss	Instances	Size
125/1000 OG 1.903 100%    29/29 [00:35<00:00,		1.666	16	640:
Class Images mAP50-95): 100%    4/4 [00:03	Instances		R	mAP50
all 112 0.0752	557	0.315	0.251	0.197
Epoch GPU_mem box_loss	cls_loss	dfl_loss	Instances	Size
126/1000 OG 1.904 100%    29/29 [00:35<00:00,		1.66	4	640:
Class Images mAP50-95): 100%    4/4 [00:03	Instances		R	mAP50
all 112 0.0585	557	0.262	0.232	0.159
Epoch GPU_mem box_loss	cls_loss	dfl_loss	Instances	Size
127/1000 OG 1.879 100%    29/29 [00:35<00:00,		1.651	21	640:
Class Images mAP50-95): 100%    4/4 [00:03	Instances		R	mAP50

0.0507	all	112	557	0.283	0.192	0.153
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.899		1.654	3	640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0818	all	112	557	0.314	0.269	0.223
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
129/1000 100%    2		1.878		1.654	11	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0588	all	112	557	0.276	0.242	0.176
Epoch	GPU mem	box_loss	cls loss	dfl loss	Instances	Size
130/1000	OG	1.888	1.918			640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0577	all	112	557	0.317	0.251	0.173
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
131/1000 100%    2		1.84 35<00:00, 1		1.64	3	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0652	all	112	557	0.308	0.271	0.183

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
132/1000 100%    2				1.614	11	640:
mAP50-95): 100		_		Box(P 30it/s]	R	mAP50
0.0649	all	112	557	0.311	0.215	0.181
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
133/1000 100%    2		1.884 35<00:00.		1.653	8	640:
mAP50-95): 100	Class	Images	Instances	Box(P 29it/s]	R	mAP50
0.0668	all	112	557	0.301	0.242	0.181
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
134/1000 100%    2		1.859		1.655	4	640:
mAP50-95): 100	Class	Images	Instances	Box(P 29it/s]	R	mAP50
0.0567	all	112	557	0.306	0.226	0.165
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
135/1000 100%    2		1.869 35<00:00,		1.67	13	640:
mAP50-95): 100	Class	Images	Instances	Box(P 29it/s]	R	mAP50
0.0774	all	112	557	0.419	0.232	0.223

dfl\_loss Instances

Size

Epoch

GPU\_mem

136/1000 OG 100%    29/29 [00:3 Class mAP50-95): 100%	6<00:00, 1 Images	.25s/it] Instances	Box(P	1 R	
all 0.0675	112	557	0.321	0.233	0.195
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
137/1000 OG 100%    29/29 [00:3			1.646	44	640:
	Images	Instances		R	mAP50
	112	-		0.233	0.212
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
138/1000 OG 100%    29/29 [00:3			1.622	1	640:
	Images	Instances		R	mAP50
all 0.0756	112	557	0.365	0.228	0.201
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
139/1000 OG 100%    29/29 [00:3			1.597	4	640:
	Images	Instances		R	mAP50
all 0.0717	112	557	0.338	0.212	0.199
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
140/1000 OG	1.83	1.808		9	640:
100%    29/29 [00:3 Class mAP50-95): 100%	Images	Instances		R	mAP50

0.0551	all	112	557	0.293	0.223	0.166
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
141/1000 100%    2		1.85 86<00:00, 1		1.633	8	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.0603	all	112	557	0.316	0.21	0.177
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.834		1.619	4	640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
	all	112	557	0.275	0.239	0.165
0.0558						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
143/1000 100%    2		1.803 86<00:00, 1		1.592	11	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.0803	all	112	557	0.333	0.246	0.205
0.0000						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
144/1000	OG	1.89	1.868	1.609	6	640:
100%    2		36<00:00, 1 Images		Roy (P	R	mAP50
mAP50-95): 10		•			10	mm 00
0.0677	all	112	557	0.3	0.28	0.195

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
145/1000 100%    2		1.741 85<00:00, 1		1.538	0	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.0825	all	112	557	0.345	0.253	0.212
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
100%    2	29/29 [00:3		.24s/it]			640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.0685	all	112	557	0.33	0.243	0.195
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
147/1000 100%    2		1.846 85<00:00, 1		1.647	12	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.0678	all	112	557	0.282	0.246	0.188
0.0070						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
148/1000 100%    2		1.8		1.584	3	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0758	all	112	557	0.355	0.248	0.21
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size

149/1000 OG 100%    29/29 [00:35<00 Class mAP50-95): 100%    4/4	:00, 1.24s/it] Images Instances	Box(P		
all 0.0534	112 557	0.247	0.231	0.157
Epoch GPU_mem bo	x_loss cls_loss	dfl_loss	Instances	Size
150/1000 OG 100%    29/29 [00:35<00		1.588	6	640:
	Images Instances		R	mAP50
all 0.0635	112 557	0.346	0.224	0.184
Epoch GPU_mem bo	x_loss cls_loss	dfl_loss	Instances	Size
151/1000 OG 100%    29/29 [00:35<00		1.644	21	640:
	Images Instances		R	mAP50
all 0.0696	112 557	0.372	0.251	0.204
Epoch GPU_mem bo	x_loss cls_loss	dfl_loss	Instances	Size
152/1000 OG 100%    29/29 [00:35<00		1.593	20	640:
	Images Instances		R	mAP50
all 0.0625	112 557	0.31	0.233	0.182
Epoch GPU_mem bo	x_loss cls_loss	dfl_loss	Instances	Size
153/1000 OG 100%    29/29 [00:35<00				
10071 1 78778 100:35500		1.6	11	640:

0.059	all	112	557	0.312	0.232	0.179
154/1000	0G 29/29 [00:3 Class 00%	box_loss 1.811 36<00:00, 1 Images 4/4 [00:03<	1.823 26s/it] Instances	1.594 Box(P 29it/s]	10 R	640: mAP50
-	0G 29/29 [00:3 Class 00%	Images	1.818 34s/it] Instances	1.595 Box(P 23it/s]	16 R	640: mAP50
Epoch  156/1000  100%    2  mAP50-95): 10	0G 29/29 [00:3 Class 00%	Images	1.767 25s/it] Instances	1.58 Box(P 29it/s]	10	640: mAP50
Epoch 157/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 00%	Images	1.754 24s/it] Instances	1.567 Box(P 22it/s]	10 R	640: mAP50

	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
158/1000 100%    2				1.566	10	640:
mAP50-95): 10		_		Box(P 29it/s]	R	mAP50
0.0561	all	112	557	0.287	0.215	0.157
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
159/1000 100%    2			1.773 [.24s/it]	1.593	14	640:
mAP50-95): 10		•		Box(P 29it/s]	R	mAP50
0.0623	all	112	557	0.274	0.239	0.165
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
160/1000 100%    2		1.834 86<00:00 1		1.62	7	640:
	29/29 [00:3	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
mAP50-95): 10	Class	Images	Instances	Box(P 29it/s]	R	mAP50
	Class	Images 4/4 [00:03<	Instances <00:00, 1.2			
mAP50-95): 10	Class	Images 4/4 [00:03<	Instances <00:00, 1.2	29it/s]		
mAP50-95): 10	Class	Images 4/4 [00:03< 112	Instances <00:00, 1.2 557	29it/s]	0.266	0.171
mAP50-95): 10 0.0624 Epoch	Class 00%    all GPU_mem 0G	Images 4/4 [00:03< 112  box_loss 1.813	Instances (00:00, 1.2 557 cls_loss 1.792	0.267 dfl_loss	0.266 Instances	0.171
mAP50-95): 10 0.0624  Epoch 161/1000	Class 00%    all GPU_mem 0G 29/29 [00:3	Images 4/4 [00:03< 112  box_loss 1.813 36<00:00, 1	Instances <pre>(00:00, 1.2 557  cls_loss</pre>	0.267 dfl_loss 1.619 Box(P	0.266 Instances	0.171 Size
mAP50-95): 10 0.0624  Epoch 161/1000 100%    2	Class 00%    all GPU_mem 0G 29/29 [00:3 Class	Images 4/4 [00:03< 112  box_loss 1.813 36<00:00, 1 Images 4/4 [00:03<	Instances <00:00, 1.2 557 cls_loss 1.792 1.24s/it] Instances <00:00, 1.2	0.267 dfl_loss 1.619 Box(P	0.266 Instances 6 R	0.171 Size 640: mAP50
mAP50-95): 10 0.0624  Epoch 161/1000 100%    2 mAP50-95): 10	Class 00%    all GPU_mem 0G 29/29 [00:3 Class	Images 4/4 [00:03< 112  box_loss 1.813 36<00:00, 1 Images 4/4 [00:03<	Instances <00:00, 1.2 557 cls_loss 1.792 1.24s/it] Instances <00:00, 1.2	29it/s] 0.267  dfl_loss 1.619  Box(P	0.266 Instances 6 R	0.171 Size 640: mAP50

dfl\_loss Instances

Size

Epoch

GPU\_mem

162/1000 0G 1.857 1.851 1.602 100%    29/29 [00:36<00:00, 1.25s/it]	9	640:
Class Images Instances Box(P mAP50-95): 100%    4/4 [00:03<00:00, 1.30it/s]	R	mAP50
all 112 557 0.342 0.0691	0.28	0.213
Epoch GPU_mem box_loss cls_loss dfl_loss	Instances	Size
163/1000 0G 1.752 1.757 1.562 100%    29/29 [00:35<00:00, 1.23s/it]	1	640:
Class Images Instances Box(P mAP50-95): 100%    4/4 [00:03<00:00, 1.32it/s]	R	mAP50
all 112 557 0.278 0.0628	0.226	0.172
Epoch GPU_mem box_loss cls_loss dfl_loss	Instances	Size
164/1000 0G 1.777 1.767 1.568 100%    29/29 [00:36<00:00, 1.24s/it]	5	640:
Class Images Instances Box(P mAP50-95): 100%    4/4 [00:03<00:00, 1.27it/s]	R	mAP50
all 112 557 0.294 0.0538	0.211	0.157
Epoch GPU_mem box_loss cls_loss dfl_loss	Instances	Size
165/1000 0G 1.828 1.802 1.601 100%    29/29 [00:35<00:00, 1.23s/it]	12	640:
Class Images Instances Box(P mAP50-95): 100%    4/4 [00:03<00:00, 1.25it/s]	R	mAP50
all 112 557 0.319	0.257	0.204
0.0741		
	т.	<b>~</b> :
Epoch GPU_mem box_loss cls_loss dfl_loss		
100%    29/29 [00:35<00:00, 1.23s/it]	2	
Class Images Instances Box(P mAP50-95): 100%    4/4 [00:03<00:00, 1.23it/s]	R	mAP50

0.0613	all	112	557	0.285	0.285	0.181
_		box_loss			Instances	Size
167/1000 100%    2		1.793 35<00:00, 1		1.599	13	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0632	all	112	557	0.342	0.238	0.189
Epoch	GPU mem	box_loss	cla loss	dfl loss	Instances	Size
_		1.795			5	
100%    2 mAP50-95): 10	29/29 [00:3 Class	35<00:00, 1 Images	.23s/it] Instances	Box(P		mAP50
0.064	all	112	557	0.274	0.262	0.189
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
169/1000 100%    2		1.751 85<00:00 1		1.556	3	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0651	all	112	557	0.335	0.244	0.191
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.765		1.56	2	640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
					0.273	0.23
0.0854						

1/1/1000		1.710		1.011	<b>T</b>	040.
100%    2				D(D	D	ADEO
ADEO OE). 10/		Images			ĸ	mAP50
mAP50-95): 100	J%I I	4/4 [00:03<	.00:00, 1.3	olit/sj		
	all	112	557	0.336	0.309	0.223
0.0807						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
-						
		1.716		1.533	7	640:
100%    2				D (D	_	1550
1750 05) 101		Images			R	mAP50
mAP50-95): 100	0%	4/4 [00:03<	(00:00, 1.3	31it/s]		
	all	112	557	0.356	0.246	0.208
0.0698						
Epoch	$\mathtt{GPU}_{\mathtt{mem}}$	box_loss	cls_loss	dfl_loss	Instances	Size
-						
		1.737			4	640:
100%    2					_	
		Images			R	mAP50
mAP50-95): 100	0%	4/4 L00:03<	(00:00, 1.2)	9it/s]		
	all	112	557	0.275	0.285	0.201
0.0708						
Epoch	GPU mem	box_loss	cls loss	dfl loss	Instances	Size
-	_	_	_	_		
174/1000			1.749	1.568	19	640:
100%    2		36<00:00, 1		,		
	Class	•	Instances		R	mAP50
mAP50-95): 100	0%1 1	4/4 [00:03<	(00:00, 1.3	30it/s]		
	all	112	557	0.409	0.259	0.232
0.0816						
-						
Epoch	GPU mem	box_loss	cls loss	dfl loss	Instances	Size
-r	· · <u>-</u>	<b>-</b>	<del>-</del>	_====		

dfl\_loss Instances

1.544

Size

640:

Epoch

171/1000

GPU\_mem

OG

box\_loss

1.715

cls\_loss

1.696

175/1000 100%    29/29 [0			1.543	22	640:
Cla mAP50-95): 100%	ss Images   4/4 [00:03			R	mAP50
0.0801	11 112	557	0.307	0.293	0.225
Epoch GPU_m	em box loss	cls loss	dfl loss	Instances	Size
176/1000 100%    29/29 [0	OG 1.789	1.774			
	ss Images	Instances		R	mAP50
	11 112			0.282	0.204
				_	
Epoch GPU_m	_	_	_	Instances	Size
100%    29/29 [0		1.24s/it]			640:
Cla mAP50-95): 100%	ss Images   4/4 [00:03			R	mAP50
0.0797	112	557	0.349	0.278	0.223
Epoch GPU_m	em box_loss	cls_loss	dfl_loss	Instances	Size
178/1000 100%    29/29 [0			1.531	1	640:
	ss Images	Instances		R	mAP50
	11 112			0.289	0.226
0.0826					
Epoch GPU_m	em box_loss	cls_loss	dfl_loss	Instances	Size
179/1000 100%    29/29 [0			1.559	3	640:
	ss Images		Box(P	R	mAP50
mAP50-95): 100%	_				

0.0767	all	112	557	0.35	0.246	0.204
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
•		1.764		1.616	1	640:
100%   2 mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0627		112			0.242	0.183
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
181/1000 100%    2		1.76		1.582	3	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0807	all	112	557	0.423	0.244	0.223
Enach	CDII waw	hor logg	ala laga	dfl logg	Ingtoness	C: To
_		box_loss			Instances 6	640:
100%    2	29/29 [00:3	5<00:00, 1	.24s/it]			
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.078	all	112	557	0.381	0.266	0.228
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
183/1000 100%    2		1.78 5<00·00 1		1.586	6	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0766		112			0.28	0.227

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
184/1000 100%    2				1.535	3	640:
mAP50-95): 10		_		Box(P 31it/s]	R	mAP50
0.0752	all	112	557	0.356	0.242	0.197
	apu.			167 7	<b>.</b>	a.
_				dfl_loss	Instances	
185/1000 100%    2	29/29 [00:3	35<00:00,			29	
mAP50-95): 10		•		Box(P 30it/s]	R	mAP50
0.0617	all	112	557	0.336	0.241	0.19
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
186/1000 100%    2			1.67 1.24s/it]	1.525	2	640:
mAP50-95): 10		•		Box(P 27it/s]	R	mAP50
0.0691	all	112	557	0.341	0.264	0.206
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
187/1000 100%    2		1.712 35<00:00,		1.553	2	640:
mAP50-95): 10	Class	Images	Instances	Box(P 32it/s]	R	mAP50
0.065	all	112	557	0.318	0.235	0.183

dfl\_loss Instances

Size

GPU\_mem

box\_loss

Epoch

188/1000 0G 1.709 1.659 1.53 100%    29/29 [00:35<00:00, 1.24s/it] Class Images Instances Box	34 20 (P R	
mAP50-95): 100%    4/4 [00:03<00:00, 1.25it/s]		
all 112 557 0.29	98 0.264	0.185
Epoch GPU_mem box_loss cls_loss dfl_los	ss Instances	Size
189/1000 0G 1.726 1.704 1.54 100%   29/29 [00:35<00:00, 1.23s/it]	19 11	640:
Class Images Instances Box (mAP50-95): 100%   4/4 [00:03<00:00, 1.31it/s]	(P R	mAP50
	7 0 027	0 106
all 112 557 0.35 0.068	0.237	0.196
Epoch GPU_mem box_loss cls_loss dfl_los	ss Instances	Size
190/1000	69	640:
Class Images Instances Box (mAP50-95): 100%   4/4 [00:03<00:00, 1.26it/s]	(P R	mAP50
all 112 557 0.39	96 0.226	0.186
0.0658		
Epoch GPU_mem box_loss cls_loss dfl_los	ss Instances	Size
191/1000 0G 1.641 1.845 1.47	74 0	640:
100%   29/29 [00:36<00:00, 1.24s/it]  Class Images Instances Box	(P R	mAP50
mAP50-95): 100%    4/4 [00:03<00:00, 1.30it/s]		
all 112 557 0.44	19 0.264	0.235
0.086		
Epoch GPU_mem box_loss cls_loss dfl_los		
192/1000 0G 1.719 1.685 1.54 100%   29/29 [00:35<00:00, 1.23s/it]	15 10	640:
Class Images Instances Box	(P R	mAP50
mAP50-95): 100%    4/4 [00:03<00:00, 1.30it/s]		

0.0614	all	112	557	0.274	0.242	0.176
193/1000	0G 29/29 [00:3 Class 00%	box_loss 1.652 36<00:00, 1 Images 4/4 [00:03<	1.63 .24s/it] Instances	1.497 Box(P Boit/s]	10 R	640: mAP50
_	0G 29/29 [00:3 Class 00%	Images	1.692 .22s/it] Instances	1.546 Box(P Blit/s]	7 R	640: mAP50
Epoch 195/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 00%	Images	1.704 .25s/it] Instances	1.53 Box(P Boit/s]	8	640: mAP50
Epoch 196/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class 00%	Images	1.673 .24s/it] Instances	1.483 Box(P 30it/s]	1 R	640: mAP50

-	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
197/1000 100%    2			1.646 23s/it]	1.512	14	640:
mAP50-95): 10		_	Instances (00:00, 1.2)		R	mAP50
0.0759	all	112	557	0.344	0.262	0.222
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
198/1000 100%    2			1.697 23s/it]	1.539	13	640:
mAP50-95): 10		•	Instances (00:00, 1.3		R	mAP50
0.0635	all	112	557	0.314	0.244	0.196
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
199/1000 100%    2		1.701 86<00:00, 1		1.512	6	640:
mAP50-95): 10	Class	Images	Instances	Box (D	R	mAP50
	00%	4/4 [00:03<	00:00, 1.2			
0.0669				?7it/s]		
			(00:00, 1.2	?7it/s]		
0.0669	all	112	(00:00, 1.2	0.354	0.242	0.203
0.0669 Epoch	all GPU_mem OG	112 box_loss 1.689	cls_loss 1.598	0.354 dfl_loss	0.242 Instances	0.203
0.0669 Epoch 200/1000	all GPU_mem 0G 29/29 [00:3 Class	112 box_loss 1.689 35<00:00, 1 Images	cls_loss	0.354 dfl_loss 1.501 Box(P	0.242 Instances	0.203 Size 640:
Epoch 200/1000 100%    2	all GPU_mem 0G 29/29 [00:3 Class 00%	box_loss	cls_loss	0.354 dfl_loss 1.501 Box(P	0.242 Instances 6 R	0.203 Size 640: mAP50
Epoch 200/1000 100%    2 mAP50-95): 10	all GPU_mem 0G 29/29 [00:3 Class 00%	box_loss	cls_loss	0.354 dfl_loss 1.501 Box(P	0.242 Instances 6 R	0.203 Size 640: mAP50

dfl\_loss Instances

Size

Epoch

GPU\_mem

201/1000 OG 100%    29/29 [00:35- Class mAP50-95): 100%    4	<00:00, 1. Images	.23s/it] Instances	Box(P	13 R	
all 0.0686	112	557	0.369	0.219	0.196
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
202/1000 0G 100%    29/29 [00:35			1.534	2	640:
	Images	Instances		R	mAP50
all 0.0741	112	557	0.356	0.269	0.209
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
203/1000 0G 100%    29/29 [00:35-			1.47	15	640:
Class mAP50-95): 100%    4	_			R	mAP50
all 0.0773	112	557	0.382	0.239	0.214
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
204/1000 0G 100%    29/29 [00:36			1.483	5	640:
	Images	Instances		R	mAP50
all 0.0649	112	557	0.311	0.23	0.186
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
205/1000 0G 100%    29/29 [00:35			1.485	2	640:
	Images	Instances		R	mAP50

0.0741	all	112	557	0.356	0.287	0.208
_	0G 29/29 [00:3 Class 00%	Images	1.578 24s/it] Instances	1.478 Box(P 28it/s]	10 R	640: mAP50
-	0G 29/29 [00:3 Class 00%	Images	1.619 23s/it] Instances	1.472 Box(P Boit/s]	14 R	640: mAP50
Epoch 208/1000 100%    2 mAP50-95): 10 0.0637	0G 29/29 [00:3 Class 00%	Images	1.701 24s/it] Instances	1.532 Box(P 25it/s]	3	640: mAP50
Epoch 209/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class	35<00:00, 1 Images	1.61 24s/it] Instances	1.498 Box(P 32it/s]	6 R	640: mAP50

Epoch GPU_mer	n box_loss	cls_loss	dfl_loss	Instances	Size
210/1000 00 100%    29/29 [00			1.439	0	640:
Class mAP50-95): 100%	Images 4/4 [00:03			R	mAP50
0.0638	112	557	0.322	0.259	0.186
Epoch GPU_mer	n box_loss	cls_loss	dfl_loss	Instances	Size
211/1000 00 100%    29/29 [00			1.486	12	640:
	s Images	Instances		R	mAP50
0.0699	112	557	0.371	0.232	0.207
Epoch GPU_mer	box_loss	cls_loss	dfl_loss	Instances	Size
100%    29/29 [00		1.23s/it]			640:
Class mAP50-95): 100%	Images 4/4 [00:03			R	mAP50
0.0758	112	557	0.361	0.268	0.223
Epoch GPU_mer	box_loss	cls_loss	dfl_loss	Instances	Size
213/1000 00 100%    29/29 [00			1.494	4	640:
Class mAP50-95): 100%	Images   4/4 [00:03			R	mAP50
0.0783	112	557	0.398	0.289	0.228

dfl\_loss Instances

Size

Epoch

GPU\_mem

214/1000 100%    29/29			1.462	11	640:
Cl mAP50-95): 100%	ass Image   4/4 [00:0			R	mAP50
0.0763	all 11	2 557	0.41	0.241	0.209
Epoch GPU_	mem box_los	s cls_loss	dfl_loss	Instances	Size
215/1000 100%    29/29			1.406	0	640:
C1 mAP50-95): 100%	ass Image   4/4 [00:0			R	mAP50
0.0736	all 11	2 557	0.367	0.246	0.212
Epoch GPU_	mem box_los	s cls_loss	dfl_loss	Instances	Size
216/1000 100%    29/29				4	640:
Cl mAP50-95): 100%	ass Image   4/4 [00:0			R	mAP50
0.0827	all 11	2 557	0.331	0.285	0.232
Epoch GPU_	mem box_los	s cls_loss	dfl_loss	Instances	Size
217/1000 100%    29/29			1.464	9	640:
Cl mAP50-95): 100%	ass Image   4/4 [00:0			R	mAP50
0.0783	all 11	2 557	0.358	0.289	0.219
Epoch GPU_	mem box_los	s cls_loss	dfl_loss	Instances	Size
218/1000 100%    29/29 [			1.496	6	640:
C1 mAP50-95): 100%	ass Image   4/4 [00:0			R	mAP50

0.0687	all	112	557	0.276	0.287	0.19
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
219/1000 100%    2		1.623		1.461	2	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
MAP50-95). 10		112			0 233	0 195
0.0652	ali	112	551	0.300	0.233	0.195
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.695		1.525	5	640:
100%    2	Class	Images	Instances		R	mAP50
mAP50-95): 10					0.040	0.455
0.0594	all	112	557	0.322	0.242	0.177
Epoch	GPU mem	box_loss	cls loss	dfl loss	Instances	Size
_		1.665				640:
100%    2				D ( D	ח	ADEO
mAP50-95): 10		Images 4/4 [00:03<			ĸ	mAP50
	all	112	557	0.317	0.219	0.169
0.0589						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
222/1000			1.566	1.469	17	640:
100%    2		36<00:00, 1 Images		Box(P	R	mAP50
mAP50-95): 10	0%	4/4 [00:03<	00:00, 1.3	32it/s]		
0.0668	all	112	557	0.318	0.273	0.191

100%   29/29 [00:			1.485	2	640:
	Images		Box (P	R	mAP50
mAP50-95): 100%	_			10	mm 00
	112			0.26	0.181
0.0617	112	557	0.313	0.20	0.161
0.0011					
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
224/1000 OG	1.749	1.606	1.544	6	640:
100%    29/29 [00:					
	Images			R	mAP50
mAP50-95): 100%	4/4 [00:03<	.00:00, 1.3	Slit/S]		
	112	557	0.358	0.26	0.204
0.071					
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
225/1000 OG	1.696	1.596	1.5	4	640:
100%    29/29 [00:					
	Images			R	mAP50
mAP50-95): 100%	4/4 [00:03<	100:00, 1.3	Blit/s]		
all	112	557	0.342	0.215	0.169
0.0587					
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
226/1000 OG	1.643	1.562	1.476	2	640:
100%    29/29 [00:					
Class	Images	Instances	Box(P	R	mAP50
mAP50-95): 100%	4/4 [00:03<	00:00, 1.3	Blit/s]		
all	112	557	0.344	0.257	0.2
0.0753					
Epoch GPU_mem	box loss	cls loss	dfl loss	Instances	Size
	2011_1020	010_1000	411_1000		2120

 Epoch
 GPU\_mem
 box\_loss
 cls\_loss
 dfl\_loss
 Instances
 Size

 223/1000
 0G
 1.654
 1.606
 1.485
 2
 640:

227/1000 0G 1 100%    29/29 [00:35<00:0 Class Ima mAP50-95): 100%    4/4 [0	0, 1.23s/it] ages Instances	Box(P		
all 0.0623	112 557	0.393	0.221	0.185
Epoch GPU_mem box_3	loss cls_loss	dfl_loss	Instances	Size
228/1000 OG 1 100%    29/29 [00:35<00:0		1.474	9	640:
	ages Instances		R	mAP50
	112 557		0.248	0.192
Epoch GPU_mem box_1	loss cls_loss	dfl_loss	Instances	Size
229/1000 0G 1 100%    29/29 [00:36<00:0		1.464	6	640:
	ages Instances		R	mAP50
all 0.075	112 557	0.367	0.259	0.214
Epoch GPU_mem box_3	loss cls_loss	dfl_loss	Instances	Size
230/1000 OG 1 100%    29/29 [00:35<00:0		1.451	6	640:
	ages Instances		R	mAP50
all 0.0721	112 557	0.37	0.273	0.21
Epoch GPU_mem box_3	loss cls_loss	dfl_loss	Instances	Size
231/1000 0G 1		1.483	9	640:
100%   29/29 [00:35<00:0 Class Ima mAP50-95): 100%   4/4 [0	ages Instances		R	mAP50

0.0698	all	112	557	0.356	0.284	0.206
_	0G 29/29 [00:3 Class	Images	1.539 .25s/it] Instances	1.48 Box(P 32it/s]	3 R	640: mAP50
Epoch	0G 29/29 [00:3 Class	Images	1.52 .25s/it] Instances	1.47 Box(P	2	
0.0715		112			0.215	0.203
Epoch 234/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class	Images	1.772 .23s/it] Instances	1.397 Box(P 32it/s]	0	640: mAP50
Epoch 235/1000 100%    2 mAP50-95): 10	0G 29/29 [00:3 Class	Images	1.552 .24s/it] Instances	1.432 Box(P Boit/s]	7 R	640: mAP50

•	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
236/1000 100%    2				1.478	20	640:
mAP50-95): 10		_			R	mAP50
0.0737	all	112	557	0.317	0.273	0.208
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
237/1000 100%    2		1.601 5<00:00, 1		1.447	30	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0677	all	112	557	0.318	0.259	0.193
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
238/1000 100%    2		1.608 5<00:00. 1		1.447	5	640:
	.J/ ZJ [00.0					
mAP50-95): 10	Class	Images			R	mAP50
mAP50-95): 10	Class 0%	Images 4/4 [00:03<	00:00, 1.3	33it/s]	R 0.241	
	Class 0%	Images 4/4 [00:03<	00:00, 1.3	33it/s]		
mAP50-95): 10	Class 0%    all	Images 4/4 [00:03< 112	500:00, 1.3 557	0.355		0.193
mAP50-95): 10 0.0655  Epoch	Class O%    all  GPU_mem OG	Images 4/4 [00:03< 112 box_loss 1.543	cls_loss 1.732	0.355 dfl_loss	0.241 Instances	0.193
mAP50-95): 10 0.0655  Epoch 239/1000	Class 0%    all GPU_mem 0G 29/29 [00:3	Images 4/4 [00:03<	cls_loss	0.355 dfl_loss 1.405 Box(P	0.241 Instances	0.193 Size
mAP50-95): 10 0.0655  Epoch 239/1000 100%    2 mAP50-95): 10	Class 0%    all GPU_mem 0G 29/29 [00:3 Class 0%	Images 4/4 [00:03<	cls_loss	0.355 dfl_loss 1.405 Box(P	0.241 Instances 0 R	0.193 Size 640: mAP50
mAP50-95): 10 0.0655  Epoch 239/1000 100%    2	Class 0%    all GPU_mem 0G 29/29 [00:3 Class 0%	Images 4/4 [00:03<	cls_loss	0.355 dfl_loss 1.405 Box(P	0.241 Instances 0 R	0.193 Size 640: mAP50

dfl\_loss Instances

Size

Epoch

GPU\_mem

240/1000 OG 1 100%    29/29 [00:36<00:0 Class Im mAP50-95): 100%    4/4 [0	00, 1.25s/it] ages Instances	Box(P		
all 0.0679	112 557	0.365	0.276	0.213
Epoch GPU_mem box_	loss cls_loss	dfl_loss	Instances	Size
241/1000		1.469	5	640:
	ages Instances		R	mAP50
all 0.0687	112 557	0.359	0.248	0.206
Epoch GPU_mem box_	loss cls_loss	dfl_loss	Instances	Size
242/1000 0G 1 100%    29/29 [00:36<00:0		1.432	12	640:
	ages Instances		R	mAP50
all 0.0658	112 557	0.327	0.269	0.188
Epoch GPU_mem box_	loss cls_loss	dfl_loss	Instances	Size
243/1000 0G 1 100%    29/29 [00:35<00:0		1.449	11	640:
	ages Instances		R	mAP50
all 0.0712	112 557	0.421	0.224	0.207
Epoch GPU_mem box_	loss cls_loss	dfl_loss	Instances	Size
244/1000 OG 1		1.435	10	640:
100%    29/29 [00:36<00:0 Class Im mAP50-95): 100%    4/4 [0	ages Instances		R	mAP50

0.0629	all	112	557	0.348	0.215	0.178
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
245/1000 100%    2		1.574 35<00:00, 1		1.425	14	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.0635	all	112	557	0.355	0.242	0.193
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.596		1.44	9	640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
	all	112	557	0.368	0.25	0.194
0.0666						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
247/1000 100%    2		1.565 36<00:00, 1		1.402	11	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.0701	all	112	557	0.36	0.26	0.212
000,02						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
248/1000		1.59		1.441	3	640:
100%    2		36<00:00, 1 Images		Box (P	R	mAP50
mAP50-95): 10		•			10	
0.0603	all	112	557	0.329	0.217	0.172

Epoch (	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
249/1000 100%    29/				1.468	2	640:
mAP50-95): 100%		_		Box(P B3it/s]	R	mAP50
0.0747	all	112	557	0.387	0.23	0.201
Epoch (	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
250/1000 100%    29/				1.438	8	640:
mAP50-95): 100%		_		Box(P 28it/s]	R	mAP50
0.0668	all	112	557	0.371	0.257	0.193
Epoch (	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
251/1000 100%    29/				1.415	7	640:
mAP50-95): 100%		•		Box(P B2it/s]	R	mAP50
0.0626	all	112	557	0.292	0.237	0.176
Epoch (	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
252/1000 100%    29/				1.43	20	640:
mAP50-95): 100%		_		Box(P 25it/s]	R	mAP50
0.0629	all	112	557	0.278	0.276	0.185

dfl\_loss Instances

Size

Epoch

GPU\_mem

253/1000 OG 100%    29/29 [00:30 Class mAP50-95): 100%    4	6<00:00, 1 Images	.25s/it] Instances	Box(P	14 R	
all 0.0688	112	557	0.362	0.25	0.193
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
254/1000 OG 100%    29/29 [00:3	1.532	1.705	1.419		640:
	Images	Instances	Box(P	R	mAP50
all 0.0728	112	557	0.4	0.259	0.208
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
255/1000 OG 100%    29/29 [00:30			1.468	7	640:
	Images	Instances		R	mAP50
all 0.0794	112	557	0.437	0.244	0.224
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
256/1000 0G			1.429	9	640:
100%   29/29 [00:38 Class mAP50-95): 100%   4	Images	Instances		R	mAP50
all 0.0748	112	557	0.432	0.235	0.221
Epoch GPU_mem	how loss	cla loga	dfl loss	Instances	Size
257/1000 OG				5	
100%    29/29 [00:36 Class mAP50-95): 100%    4	Images	Instances		R	mAP50

0.07	all	112	557	0.38	0.248	0.203
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
258/1000 100%    2		1.539 6<00:00, 1		1.419	2	640:
mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0728	all	112	557	0.406	0.233	0.206
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.565		1.433	11	640:
100%   2 mAP50-95): 10	Class	Images	Instances		R	mAP50
0.0757	all	112	557	0.369	0.262	0.215
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
260/1000 100%    2		1.551 5<00:00, 1		1.398	15	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
0.0643	all	112	557	0.386	0.206	0.188
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.562		1.408	2	640:
100%    2	Class	Images	Instances		R	mAP50
mAP50-95): 10		4/4 [00:03< 112			U 3E3	O 109
0.0693	all	112	331	0.520	0.203	0.130

Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
262/1000 OG 100%    29/29 [00:			1.396	5	640:
Class mAP50-95): 100%	Images 4/4 [00:03<			R	mAP50
all 0.0674	112	557	0.331	0.276	0.2
Epoch GPU_mem	box loss	cls loss	dfl loss	Instances	Size
263/1000 OG	_	_	_	4	640:
100%    29/29 [00:			-	_	
Class mAP50-95): 100%	Images 4/4 [00:03<			R	mAP50
all 0.056	112	557	0.319	0.233	0.163
0.000					
Epoch GPU_mem	box loss	cls loss	dfl loss	Instances	Size
<u>-</u>	1.561				640:
100%    29/29 [00:	35<00:00, 1 Images		Roy (P	R	mAP50
mAP50-95): 100%	_			16	mai oo
	112	557	0.306	0.287	0.21
0.0691					
Epoch GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
265/1000 OG 100%    29/29 [00:			1.418	7	640:
Class mAP50-95): 100%	Images 4/4 [00:03<			R	mAP50
all 0.0646	112	557	0.333	0.26	0.194
0.0010					

dfl\_loss Instances

Size

Epoch

GPU\_mem

266/1000 0G 1.589 1.486 100%   29/29 [00:35<00:00, 1.24s/it] Class Images Instances	Box(P	25 R	
mAP50-95): 100%    4/4 [00:03<00:00, 1.3 all 112 557 0.0511		0.212	0.152
Epoch GPU_mem box_loss cls_loss	dfl_loss	Instances	Size
267/1000 0G 1.601 1.527 100%    29/29 [00:35<00:00, 1.24s/it]	1.466	6	640:
Class Images Instances mAP50-95): 100%   4/4 [00:03<00:00, 1.3]		R	mAP50
all 112 557 0.0683	0.39	0.233	0.205
Epoch GPU_mem box_loss cls_loss	dfl_loss	Instances	Size
268/1000 0G 1.582 1.494 100%    29/29 [00:36<00:00, 1.25s/it]	1.424	10	640:
Class Images Instances mAP50-95): 100%    4/4 [00:03<00:00, 1.255/1t]		R	mAP50
all 112 557 0.0683	0.344	0.282	0.209
Epoch GPU_mem box_loss cls_loss	dfl_loss	Instances	Size
269/1000 0G 1.528 1.482 100%    29/29 [00:36<00:00, 1.24s/it]	1.4	2	640:
Class Images Instances mAP50-95): 100%    4/4 [00:03<00:00, 1.24\$71t]		R	mAP50
all 112 557 0.06	0.307	0.255	0.183
Epoch GPU_mem box_loss cls_loss	dfl loss	Instances	Size
270/1000 OG 1.531 1.441		5	
100%   29/29 [00:35<00:00, 1.24s/it]  Class Images Instances mAP50-95): 100%   4/4 [00:03<00:00, 1.3		R	mAP50

0.0671	all	112	557	0.343	0.264	0.2
-	0G 29/29 [00:3 Class 0%	Images	1.432 .24s/it] Instances 00:00, 1.3	1.381 Box(P Oit/s]	3 R	640: mAP50
-	0G 29/29 [00:3 Class	Images	1.441 .26s/it] Instances 00:00, 1.3	1.41 Box(P 2it/s]	3 R	640:
-	0G 29/29 [00:3 Class	Images 4/4 [00:03<	1.394 .25s/it] Instances 00:00, 1.3	1.393 Box(P 1it/s]	13	640: mAP50
-	0G 29/29 [00:3 Class	Images	1.404 .23s/it] Instances 00:00, 1.2	1.419 Box(P 6it/s]	2 R	640: mAP50

Epoch GPU_men	n box_loss	cls_loss	dfl_loss	Instances	Size
275/1000 00 100%    29/29 [00			1.449	14	640:
Class mAP50-95): 100%	Images 4/4 [00:03			R	mAP50
0.0707	112	557	0.319	0.285	0.204
Epoch GPU_men	n box_loss	cls_loss	dfl_loss	Instances	Size
276/1000 00 100%    29/29 [00			1.405	5	640:
	s Images	Instances		R	mAP50
0.067	112	557	0.341	0.233	0.194
Epoch GPU_men	box_loss	cls_loss	dfl_loss	Instances	Size
100%    29/29 [00		1.25s/it]			640:
Class mAP50-95): 100%	Images 4/4 [00:03			R	mAP50
0.0649	112	557	0.345	0.26	0.198
Epoch GPU_men	box_loss	cls_loss	dfl_loss	Instances	Size
278/1000 00 100%    29/29 [00			1.433	3	640:
Class mAP50-95): 100%	Images   4/4 [00:03			R	mAP50
0.0699	112	557	0.372	0.257	0.212

cls\_loss

dfl\_loss Instances

Size

GPU\_mem

box\_loss

Epoch

279/1000 OG 100%    29/29 [00:36< Class mAP50-95): 100%    4/	00:00, 1.25s/it] Images Instances	Box(P	9 R	640: mAP50
all 0.0699	112 557	0.369	0.259	0.205
Epoch GPU_mem l	box_loss cls_loss	dfl_loss	Instances	Size
280/1000 OG 100%    29/29 [00:36<			4	640:
Class mAP50-95): 100%    4/	Images Instances 4 [00:03<00:00, 1.3		R	mAP50
all 0.0599	112 557	0.316	0.237	0.171
Epoch GPU_mem h	box_loss cls_loss	dfl_loss	Instances	Size
281/1000 OG 100%    29/29 [00:36<		1.396	1	640:
Class mAP50-95): 100%    4/	Images Instances 4 [00:03<00:00, 1.3		R	mAP50
all 0.0681	112 557	0.372	0.235	0.196
Epoch GPU_mem h	oox_loss cls_loss	dfl_loss	Instances	Size
282/1000 OG 100%    29/29 [00:35<		1.399	6	640:
Class mAP50-95): 100%    4/	Images Instances 4 [00:03<00:00, 1.3		R	mAP50
all 0.0757	112 557	0.381	0.242	0.216
Epoch GPU_mem h	box_loss cls_loss	dfl_loss	Instances	Size
283/1000 OG 100%    29/29 [00:35<		1.38	13	640:
	Images Instances		R	mAP50

0.0725	all	112	557	0.49	0.214	0.2
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.521		1.379	3	640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
		112			0.25	0.199
0.0707						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.541		1.402	5	640:
100%    2 mAP50-95): 10	Class	Images	Instances		R	mAP50
		112			0.276	0.212
0.0747						
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
		1.487		1.364	6	640:
100%    2	Class	Images	Instances		R	mAP50
mAP50-95): 10						
0.0679	all	112	557	0.295	0.293	0.206
п 1	apu			167 7	<b>.</b>	a ·
-	_	box_loss	_	_		
100%    2		1.533 36<00:00, 1		1.405	25	640:
mAP50-95): 10		Images 4/4 [00:03<			R	mAP50
		112			0.278	0.213
0.0747						

Epoch	${\tt GPU\_mem}$	box_loss	cls_loss	dfl_loss	Instances	Size	
288/1000 100%    2		1.562 5<00:00, 1		1.428	8	640:	
mAP50-95): 10	Class	Images	Instances		R	mAP50	
	all	112	557	0.329	0.237	0.177	
0.059							
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
289/1000 100%    2		1.531		1.434	25	640:	
100%    2				Box(P	R	mAP50	
mAP50-95): 10		•					
	all	112	557	0.358	0.269	0.206	
0.0723							
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
		1.536		1.407	4	640:	
100%    2				Box(P	R	mAP50	
mAP50-95): 10		_					
	all	112	557	0.316	0.266	0.189	
0.0701							
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
291/1000	OG	1.448	1.431	1.329	0	640:	
100%    2	9/29 [00:3? Class	5<00:00, 1	.24s/it] Instances	Box(P	R	mAP50	
mAP50-95): 10		4/4 [00:03<			16	mai oo	
	all	112	557	0.415	0.244	0.207	
0.0741							
EarlyStopping: Training stopped early as no improvement observed in							

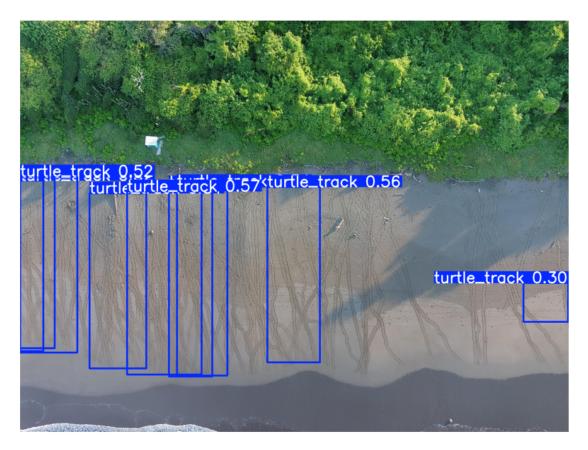
last 100 epochs. Best results observed at epoch 191, best model saved as best.pt.

To update FarlyStopping(patience=100) pass a new patience value i e

To update EarlyStopping(patience=100) pass a new patience value, i.e. `patience=300` or use `patience=0` to disable EarlyStopping.

```
291 epochs completed in 3.191 hours.
     Optimizer stripped from
     C:\Users\Carlos\Desktop\pepe\yolov8_model6\weights\last.pt, 6.3MB
     Optimizer stripped from
     C:\Users\Carlos\Desktop\pepe\yolov8_model6\weights\best.pt, 6.3MB
     Validating C:\Users\Carlos\Desktop\pepe\yolov8_model6\weights\best.pt...
     Ultralytics 8.3.49 Python-3.10.13 torch-2.5.1+cpu CPU (13th Gen Intel Core(TM)
     i9-13900KF)
     Model summary (fused): 168 layers, 3,005,843 parameters, 0 gradients, 8.1 GFLOPs
                                Images Instances
                                                        Box(P
                                                                       R
                      Class
                                                                              mAP50
     mAP50-95): 100%|
                           | 4/4 [00:02<00:00, 1.51it/s]
                                               557
                                                         0.45
                                                                   0.265
                                                                              0.234
                        all
                                   112
     0.0859
     Speed: 0.4ms preprocess, 15.8ms inference, 0.0ms loss, 0.6ms postprocess per
     Results saved to C:\Users\Carlos\Desktop\pepe\yolov8_model6
[11]: # Cargar el modelo entrenado
      modelo = YOLO(r"C:
       →\Users\crome\Desktop\TFM\Modelos_Finales\yolov8_model6\weights\best.pt")
[12]: from ultralytics import YOLO
      import cv2
      import matplotlib.pyplot as plt
      # Ruta a una imagen de prueba
      imagen_prueba = r"C:
       →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\images\108FTASK_MAX_2379.
      # Realizar la predicción
      resultados = modelo(imagen_prueba)
      # Dibujar las predicciones sobre la imagen
      imagen_con_predicciones = resultados[0].plot()
      %matplotlib inline
      # Mostrar la imagen con predicciones
      plt.figure(figsize=(10, 10))
      plt.imshow(cv2.cvtColor(imagen_con_predicciones, cv2.COLOR_BGR2RGB))
      plt.axis("off")
      plt.show()
```

image 1/1 C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\im
ages\108FTASK\_MAX\_2379.JPG: 480x640 9 turtle\_tracks, 61.9ms
Speed: 4.0ms preprocess, 61.9ms inference, 2.0ms postprocess per image at shape
(1, 3, 480, 640)



[15]: # Validar el modelo en el conjunto de validación modelo.val(data=r"C:\Users\crome\Desktop\TFM\Codigo\data.yaml")

Ultralytics 8.3.39 Python-3.10.4 torch-2.1.0+cpu CPU (Intel Core(TM) i7-10750H 2.60GHz)

val: Scanning C:\Users\crome\Desktop\TFM\Dades\osaconservation\Data
set\_Organizado\val\labels... 112 images, 0 backgrounds, 0 corrupt:
100%| | 112/112 [00:00<00:00, 499.22it/s]</pre>

val: New cache created: C:\Users\crome\Desktop\TFM\Dades\osaconserv
ation\Dataset\_Organizado\val\labels.cache

Class Images Instances Box(P R mAP50 mAP50-95): 100%| | 7/7 [00:08<00:00, 1.22s/it] all 112 557 0.45 0.265 0.234

0.0859

Speed: 1.1ms preprocess, 57.5ms inference, 0.0ms loss, 1.5ms postprocess per image

Results saved to runs\detect\val9

## [15]: ultralytics.utils.metrics.DetMetrics object with attributes:

ap\_class\_index: array([0]) box: ultralytics.utils.metrics.Metric object confusion matrix: <ultralytics.utils.metrics.ConfusionMatrix object at 0x000002B441B312A0> curves: ['Precision-Recall(B)', 'F1-Confidence(B)', 'Precision-Confidence(B)', 'Recall-Confidence(B)' curves\_results: [[array([ Ο, 0.001001, 0.002002, 0.003003, 0.004004, 0.005005, 0.006006, 0.007007, 0.008008, 0.009009, 0.01001, 0.011011, 0.012012, 0.013013, 0.014014, 0.015015, 0.016016, 0.017017, 0.018018, 0.019019, 0.02002, 0.021021, 0.022022, 0.023023, 0.024024, 0.025025, 0.026026, 0.027027, 0.028028, 0.03003, 0.031031, 0.032032, 0.033033, 0.029029, 0.034034, 0.035035, 0.036036, 0.037037, 0.038038, 0.039039, 0.04004, 0.041041, 0.042042, 0.043043, 0.044044, 0.045045, 0.046046, 0.047047, 0.048048, 0.049049, 0.05005, 0.051051, 0.052052, 0.053053, 0.054054, 0.055055, 0.056056, 0.057057, 0.058058, 0.059059, 0.06006, 0.061061, 0.062062, 0.063063, 0.064064, 0.065065, 0.066066, 0.067067, 0.068068, 0.069069, 0.07007, 0.071071, 0.072072, 0.073073, 0.074074, 0.075075, 0.076076, 0.077077, 0.078078, 0.079079, 0.08008, 0.081081, 0.082082, 0.083083, 0.084084, 0.085085, 0.088088, 0.086086, 0.087087, 0.091091, 0.089089, 0.09009, 0.092092, 0.093093, 0.094094, 0.095095, 0.096096, 0.097097, 0.098098, 0.099099, 0.1001, 0.1011, 0.1021, 0.1031, 0.1041, 0.10511, 0.10611, 0.10711, 0.10811, 0.10911, 0.11011, 0.11111, 0.11211, 0.11311, 0.11411, 0.11512, 0.11612, 0.11712, 0.11812, 0.11912, 0.12012, 0.12112, 0.12212, 0.12312, 0.12412, 0.12613, 0.12713, 0.12813, 0.12913, 0.13013, 0.12513, 0.13413, 0.13113, 0.13213, 0.13313, 0.13514, 0.13614, 0.13714, 0.13814, 0.13914, 0.14014, 0.14114, 0.14214, 0.14314, 0.14414, 0.14515, 0.14615, 0.14715, 0.14815, 0.14915, 0.15015, 0.15115, 0.15315, 0.15215, 0.15415, 0.15516, 0.15616, 0.15716, 0.15816, 0.15916, 0.16016, 0.16116, 0.16216, 0.16316, 0.16416, 0.16517, 0.16617,

0.16717,					
	0.16817,	0.16917,	0.17017,	0.17117,	0.17217,
0.17317,	0.17417,	0.17518,	0.17618,	0.17718,	0.17818,
0.17918,	0.18018,	0.18118,	0.18218,	0.18318,	0.18418,
0.18519,	0.18619,	0.18719,	0.18819,	0.18919,	0.19019,
0.19119,					
	0.19219,	0.19319,	0.19419,	0.1952,	0.1962,
0.1972,	0.1982,	0.1992,	0.2002,	0.2012,	0.2022,
0.2032,	0.2042,	0.20521,	0.20621,	0.20721,	0.20821,
0.20921,	0.21021,	0.21121,	0.21221,	0.21321,	0.21421,
0.21522,					
	0.21622,	0.21722,	0.21822,	0.21922,	0.22022,
0.22122,	0.22222,	0.22322,	0.22422,	0.22523,	0.22623,
0.22723,	0.22823,	0.22923,	0.23023,	0.23123,	0.23223,
0.23323,	0.23423,	0.23524,	0.23624,	0.23724,	0.23824,
0.23924,					
	0.24024,	0.24124,	0.24224,	0.24324,	0.24424,
0.24525,	0.24625,	0.24725,	0.24825,	0.24925,	0.25025,
0.25125,	0.25225,	0.25325,	0.25425,	0.25526,	0.25626,
0.25726,	0.25826,	0.25926,	0.26026,	0.26126,	0.26226,
0.26326,					
	0.26426,	0.26527,	0.26627,	0.26727,	0.26827,
0.26927,	0.27027,	0.27127,	0.27227,	0.27327,	0.27427,
0.27528,	0.27628,	0.27728,	0.27828,	0.27928,	0.28028,
0.28128,	0.28228,	0.28328,	0.28428,	0.28529,	0.28629,
0.28729,					
	0.28829,	0.28929,	0.29029,	0.29129,	0.29229,
0.29329,	0.29429,	0.2953,	0.2963,	0.2973,	0.2983,
0.2993,	0.3003,	0.3013,	0.3023,	0.3033,	0.3043,
0.30531,	0.30631,	0.30731,	0.30831,	0.30931,	0.31031,
0.31131,					
	0.31231,	0.31331,	0.31431,	0.31532,	0.31632,
0.31732,	0.31832,	0.31932,	0.32032,	0.32132,	0.32232,
0.32332,	0.32432,	0.32533,	0.32633,	0.32733,	0.32833,
0.32933,	0.33033,	0.33133,	0.33233,	0.33333,	0.33433,
0.33534,					
	0.33634,	0.33734,	0.33834,	0.33934,	0.34034,
0.34134,	0.34234,	0.34334,	0.34434,	0.34535,	0.34635,
0.34735,	0.34835,	0.34935,	0.35035,	0.35135,	0.35235,
0.35335,	0.35435,	0.35536,	0.35636,	0.35736,	0.35836,
0.35936,	0.0000	0.00155	0.0000	0 0	0.0010-
	0.36036,	0.36136,	0.36236,	0.36336,	0.36436,
0.36537,	0.36637,	0.36737,	0.36837,	0.36937,	0.37037,
0.37137,	0.37237,	0.37337,	0.37437,	0.37538,	0.37638,
0.37738,	0.37838,	0.37938,	0.38038,	0.38138,	0.38238,
0.38338,	0.00400	0.00500	0.0000	0 00700	0.0000
	0.38438,	0.38539,	0.38639,	0.38739,	0.38839,

0.38939, 0.3954,	0.39039, 0.3964,	0.39139, 0.3974,	0.39239, 0.3984,	0.39339, 0.3994,	0.39439, 0.4004,
0.4014, 0.40741,	0.4024,	0.4034,	0.4044,	0.40541,	0.40641,
·	0.40841,	0.40941,	0.41041,	0.41141,	0.41241,
0.41341,	0.41441,	0.41542,	0.41642,	0.41742,	0.41842,
0.41942,	0.42042,	0.42142,	0.42242,	0.42342,	0.42442,
0.42543,	0.42643,	0.42743,	0.42843,	0.42943,	0.43043,
0.43143,					
	0.43243,	0.43343,	0.43443,	0.43544,	0.43644,
0.43744,	0.43844,	0.43944,	0.44044,	0.44144,	0.44244,
0.44344,	0.44444,	0.44545,	0.44645,	0.44745,	0.44845,
0.44945,	0.45045,	0.45145,	0.45245,	0.45345,	0.45445,
0.45546,					
0 10110	0.45646,	0.45746,	0.45846,	0.45946,	0.46046,
0.46146,	0.46246,	0.46346,	0.46446,	0.46547,	0.46647,
0.46747,	0.46847,	0.46947,	0.47047,	0.47147,	0.47247,
0.47347,	0.47447,	0.47548,	0.47648,	0.47748,	0.47848,
0.47948,	0 40040	0 40140	0 40040	0 40240	0 40440
0.48549,	0.48048,	0.48148,	0.48248,	0.48348,	0.48448,
	0.48649, 0.49249,	0.48749,	0.48849,	0.48949,	0.49049,
0.49149, 0.4975,	0.49249,	0.49349, 0.4995,	0.49449, 0.5005,	0.4955, 0.5015,	0.4965, 0.5025,
0.4975,	0.4300,	0.4990,	0.5005,	0.5015,	0.3023,
0.0000,	0 5045	0.50551,	0.50651,	0.50751,	0.50851,
0.50951.	0.5045, 0.51051.				
0.50951, 0.51552.	0.51051,	0.51151,	0.51251,	0.51351,	0.51451,
0.51552,	0.51051, 0.51652,	0.51151, 0.51752,	0.51251, 0.51852,	0.51351, 0.51952,	0.51451, 0.52052,
0.51552, 0.52152,	0.51051,	0.51151,	0.51251,	0.51351,	0.51451,
0.51552,	0.51051, 0.51652,	0.51151, 0.51752, 0.52352,	0.51251, 0.51852, 0.52452,	0.51351, 0.51952, 0.52553,	0.51451, 0.52052, 0.52653,
0.51552, 0.52152,	0.51051, 0.51652, 0.52252,	0.51151, 0.51752,	0.51251, 0.51852,	0.51351, 0.51952,	0.51451, 0.52052,
0.51552, 0.52152, 0.52753,	0.51051, 0.51652, 0.52252,	0.51151, 0.51752, 0.52352, 0.52953,	0.51251, 0.51852, 0.52452,	0.51351, 0.51952, 0.52553,	0.51451, 0.52052, 0.52653,
0.51552, 0.52152, 0.52753, 0.53353,	0.51051, 0.51652, 0.52252, 0.52853, 0.53453,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554,	0.51251, 0.51852, 0.52452, 0.53053, 0.53654,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954,	0.51051, 0.51652, 0.52252, 0.52853, 0.53453, 0.54054,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554, 0.54154,	0.51251, 0.51852, 0.52452, 0.53053, 0.53654, 0.54254,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555,	0.51051, 0.51652, 0.52252, 0.52853, 0.53453, 0.54054,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554, 0.54154,	0.51251, 0.51852, 0.52452, 0.53053, 0.53654, 0.54254,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555,	0.51051, 0.51652, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755,	0.51251, 0.51852, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155,	0.51051, 0.51652, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755,	0.51251, 0.51852, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155,	0.51051, 0.51652, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956,	0.51251, 0.51852, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.55656, 0.56256,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155,	0.51051, 0.51652, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856, 0.56456,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956, 0.56557,	0.51251, 0.51852, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056, 0.56657,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955, 0.56156, 0.56156, 0.56757,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.55656, 0.56256, 0.56857,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155, 0.55756, 0.56356, 0.56957,	0.51051, 0.51652, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856, 0.56456,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956, 0.56557,	0.51251, 0.51852, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056, 0.56657,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955, 0.56156, 0.56156, 0.56757,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.55656, 0.56256, 0.56857,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155, 0.55756, 0.56356, 0.56957,	0.51051, 0.51652, 0.52252, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856, 0.56456, 0.57057,	0.51151, 0.51752, 0.52352, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956, 0.56557, 0.57157,	0.51251, 0.51852, 0.52452, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056, 0.56056, 0.56657, 0.57257,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955, 0.56156, 0.56156, 0.56757, 0.57357,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.56656, 0.56256, 0.56857, 0.57457,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155, 0.56356, 0.56356, 0.56957, 0.57558,	0.51051, 0.51652, 0.52252, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856, 0.56456, 0.57057,	0.51151, 0.51752, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956, 0.56557, 0.57157,	0.51251, 0.51852, 0.52452, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056, 0.56657, 0.57257,	0.51351, 0.51952, 0.52553, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955, 0.56156, 0.56156, 0.56757, 0.57357, 0.57958, 0.58559, 0.59159,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.56256, 0.56256, 0.56857, 0.57457,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155, 0.55756, 0.56356, 0.56957, 0.57558, 0.58158, 0.58759, 0.59359,	0.51051, 0.51652, 0.52252, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856, 0.56456, 0.57057, 0.57658, 0.58258,	0.51151, 0.51752, 0.52352, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956, 0.56557, 0.57157,	0.51251, 0.51852, 0.52452, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056, 0.56056, 0.56657, 0.57257, 0.57858, 0.58458,	0.51351, 0.51952, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955, 0.56156, 0.56757, 0.57357,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.56256, 0.56256, 0.56857, 0.57457,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155, 0.55756, 0.56356, 0.56957, 0.57558,	0.51051, 0.51652, 0.52252, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856, 0.56456, 0.57057, 0.57658, 0.58258, 0.58258, 0.58859, 0.59459,	0.51151, 0.51752, 0.52352, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956, 0.56557, 0.57157, 0.57758, 0.58358, 0.58959, 0.5956,	0.51251, 0.51852, 0.52452, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056, 0.56657, 0.57257, 0.57858, 0.58458, 0.59059, 0.5966,	0.51351, 0.51952, 0.52553, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955, 0.56156, 0.56156, 0.56757, 0.57357, 0.57958, 0.58559, 0.59159, 0.5976,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.56256, 0.56256, 0.56857, 0.57457, 0.58058, 0.58659, 0.59259, 0.5986,
0.51552, 0.52152, 0.52753, 0.53353, 0.53354, 0.54555, 0.55155, 0.56356, 0.56356, 0.56957, 0.57558, 0.58158, 0.58759, 0.59359, 0.5996,	0.51051, 0.51652, 0.52252, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856, 0.56456, 0.57057, 0.57658, 0.58258, 0.58258, 0.58859, 0.59459,	0.51151, 0.51752, 0.52352, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956, 0.56557, 0.57157, 0.57758, 0.58358, 0.58959, 0.5956,	0.51251, 0.51852, 0.52452, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056, 0.56657, 0.57257, 0.57858, 0.58458, 0.59059, 0.5966,	0.51351, 0.51952, 0.52553, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955, 0.56156, 0.56757, 0.57357, 0.57958, 0.58559, 0.59159, 0.5976,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.56256, 0.56256, 0.56857, 0.57457, 0.58058, 0.58659, 0.59259, 0.5926,
0.51552, 0.52152, 0.52753, 0.53353, 0.53954, 0.54555, 0.55155, 0.55756, 0.56356, 0.56957, 0.57558, 0.58158, 0.58759, 0.59359,	0.51051, 0.51652, 0.52252, 0.52252, 0.52853, 0.53453, 0.54054, 0.54655, 0.55255, 0.55856, 0.56456, 0.57057, 0.57658, 0.58258, 0.58258, 0.58859, 0.59459,	0.51151, 0.51752, 0.52352, 0.52352, 0.52953, 0.53554, 0.54154, 0.54755, 0.55355, 0.55956, 0.56557, 0.57157, 0.57758, 0.58358, 0.58959, 0.5956,	0.51251, 0.51852, 0.52452, 0.52452, 0.53053, 0.53654, 0.54254, 0.54855, 0.56056, 0.56657, 0.57257, 0.57858, 0.58458, 0.59059, 0.5966,	0.51351, 0.51952, 0.52553, 0.52553, 0.53153, 0.53754, 0.54354, 0.54955, 0.56156, 0.56156, 0.56757, 0.57357, 0.57958, 0.58559, 0.59159, 0.5976,	0.51451, 0.52052, 0.52653, 0.53253, 0.53854, 0.54454, 0.55055, 0.56256, 0.56256, 0.56857, 0.57457, 0.58058, 0.58659, 0.59259, 0.5986,

0.61762, 0.62362,	0.61862,	0.61962,	0.62062,	0.62162,	0.62262,
0.62963,	0.62462, 0.63063,	0.62563, 0.63163,	0.62663, 0.63263,	0.62763, 0.63363,	0.62863, 0.63463,
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0.87588,	0.87688,	0.87788,	0.87888,	0.87988,	0.88088,
0.88188,	0.88288,	0.88388,	0.88488,	0.88589,	0.88689,
0.88789,					
	0.88889,	0.88989,	0.89089,	0.89189,	0.89289,
0.89389,	0.89489,	0.8959,	0.8969,	0.8979,	0.8989,
0.8999,	0.9009,	0.9019,	0.9029,	0.9039,	0.9049,
0.90591,	0.90691,	0.90791,	0.90891,	0.90991,	0.91091,
0.91191,					
	0.91291,	0.91391,	0.91491,	0.91592,	0.91692,
0.91792,	0.91892,	0.91992,	0.92092,	0.92192,	0.92292,
0.92392,	0.92492,	0.92593,	0.92693,	0.92793,	0.92893,
0.92993,	0.93093,	0.93193,	0.93293,	0.93393,	0.93493,
0.93594,					
	0.93694,	0.93794,	0.93894,	0.93994,	0.94094,
0.94194,	0.94294,	0.94394,	0.94494,	0.94595,	0.94695,
0.94795,	0.94895,	0.94995,	0.95095,	0.95195,	0.95295,
0.95395,	0.95495,	0.95596,	0.95696,	0.95796,	0.95896,
0.95996,					
	0.96096,	0.96196,	0.96296,	0.96396,	0.96496,
0.96597,	0.96697,	0.96797,	0.96897,	0.96997,	0.97097,
0.97197,	0.97297,	0.97397,	0.97497,	0.97598,	0.97698,
0.97798,	0.97898,	0.97998,	0.98098,	0.98198,	0.98298,
0.98398,					
	0.98498,	0.98599,	0.98699,	0.98799,	0.98899,
0.98999,	0.99099,	0.99199,	0.99299,	0.99399,	0.99499,
0.996,	0.997,	0.998,	0.999,		rray([[
0.03013,	0.030143,	0.039055,	0.046731,	0.053453,	
0.065657,	0.071127,	0.076038,	0.080541,	0.085267,	0.08993,
0.092917,	0.09632,	0.09895,	0.10202,	0.10396,	0.1066,
0.11018,	0.11318,	0.11655,	0.1198,	0.12358,	
0.4455-	0.12696,	0.13039,	0.13457,	0.13807,	0.14135,
0.14398,	0.1462,	0.14868,	0.15162,	0.15545,	0.15782,
0.16094,	0.16349,	0.16566,	0.16647,	0.16946,	0.17303,
0.17411,	0.17663,	0.17795,	0.18079,	0.18223,	0.18427,

	0.18583,	0.18914,	0.18931,	0.19289,	0.194,
0.19748,	0.20009,	0.20309,	0.20345,	0.20497,	0.20745,
0.20672,	0.20854,	0.21005,	0.21176,	0.21405,	0.2163,
0.21854,	0.21893,	0.22129,	0.22252,	0.22279,	0.2243,
	0.22547,	0.22771,	0.23018,	0.23157,	0.23343,
0.2362,	0.2375,	0.23862,	0.24164,	0.24262,	0.24441,
0.24493,	0.24823,	0.24815,	0.24829,	0.24974,	0.25201,
0.25398,	0.25638,	0.25789,	0.2597,	0.2622,	0.26385,
	0.26238,	0.2637,	0.26567,	0.26779,	0.27021,
0.27118,	0.27046,	0.27182,	0.27129,	0.26947,	0.27166,
0.2727,	0.27403,	0.27509,	0.27589,	0.27692,	0.27744,
0.27938,	0.27982,	0.27993,	0.28104,	0.27938,	0.28116,
	0.28251,	0.28321,	0.28642,	0.28841,	0.28921,
0.29063,	0.28977,	0.29092,	0.29293,	0.29359,	0.29605,
0.29836,	0.29797,	0.29788,	0.29913,	0.30016,	0.30076,
0.30058,	0.30184,	0.30449,	0.30566,	0.30706,	0.30729,
	0.30842,	0.30935,	0.31024,	0.30974,	0.31119,
0.31259,	0.31322,	0.31492,	0.31628,	0.31549,	0.31263,
0.31341,	0.31456,	0.31526,	0.31557,	0.31716,	0.31775,
0.31888,	0.32051,	0.32132,	0.32216,	0.32303,	0.32341,
	0.32278,	0.32179,	0.32216,	0.32204,	0.32309,
0.32358,	0.32465,	0.32518,	0.32564,	0.32226,	0.32294,
0.32464,	0.3262,	0.32542,	0.32302,	0.32238,	0.32287,
0.32347,	0.32242,	0.32305,	0.3217,	0.32214,	0.32371,
	0.32134,	0.32186,	0.32336,	0.32405,	0.3249,
0.32518,	0.32541,	0.32724,	0.32449,	0.32486,	0.32553,
0.32436,	0.32374,	0.32204,	0.32264,	0.32313,	0.32367,
0.32412,	0.3245,	0.32509,	0.32604,	0.32676,	0.32616,
	0.32778,	0.3266,	0.32631,	0.32652,	0.32541,
0.32622,	0.32666,	0.3272,	0.32578,	0.32553,	0.32561,
0.32626,	0.32711,	0.32827,	0.32872,	0.32949,	0.32927,
0.32707,	0.32574,	0.32603,	0.32685,	0.32702,	0.32797,
	0.33007,	0.32708,	0.32725,	0.32762,	0.32652,
0.32699,	0.32811,	0.32822,	0.32832,	0.32849,	0.32939,
0.33125,	0.32854,	0.32924,	0.33072,	0.33247,	0.33297,
0.33397,	0.33276,	0.33346,	0.33196,	0.33263,	0.33118,
	0.3319,	0.33334,	0.33361,	0.33392,	0.33312,
0.33169,	0.33262,	0.33323,	0.33403,	0.3342,	0.33433,
0.33446,	0.33386,	0.33322,	0.33259,	0.33414,	0.33265,
0.33423,	0.33446,	0.33344,	0.33363,	0.33419,	0.33481,
	0.33346,	0.33363,	0.33414,	0.33422,	0.3343,
0.33438,	0.33446,	0.33542,	0.33565,	0.33367,	0.33228,
0.33229,	0.33254,	0.33071,	0.33097,	0.33141,	0.33157,
0.33172,	0.32972,	0.32835,	0.32863,	0.32886,	0.32739,
	0.32762,	0.32787,	0.32809,	0.3285,	0.32752,
0.32659,	0.32703,	0.32745,	0.32784,	0.32819,	0.32895,
0.32912,	0.32928,	0.32916,	0.32831,	0.32803,	0.32712,

0.32622,	0.32535,	0.32455,	0.3247,	0.32488,	0.32571,
	0.32642,	0.32292,	0.32352,	0.3219,	0.3223,
0.32271,	0.32266,	0.32129,	0.32132,	0.3187,	0.31368,
0.31141,	0.31168,	0.31211,	0.31262,	0.31289,	0.31308,
0.31326,	0.31414,	0.31427,	0.3144,	0.31504,	0.31555,
	0.31575,	0.31586,	0.31597,	0.31533,	0.31441,
0.31558,	0.31518,	0.31382,	0.314,	0.31399,	0.31131,
0.30815,	0.30476,	0.30349,	0.30094,	0.29963,	0.29776,
0.2926,	0.29143,	0.29105,	0.2913,	0.29144,	0.29158,
	0.2918,	0.2921,	0.29223,	0.29237,	0.29134,
0.28936,	0.28829,	0.28849,	0.28864,	0.28869,	0.28751,
0.28712,	0.28762,	0.28771,	0.2878,	0.2879,	0.28774,
0.28571,	0.28551,	0.28531,	0.28511,	0.2849,	0.2847,
	0.2845,	0.2843,	0.28409,	0.28389,	0.28369,
0.28349,	0.28194,	0.28146,	0.28213,	0.2797,	0.27805,
0.27819,	0.27832,	0.27844,	0.27869,	0.27912,	0.27696,
0.27657,	0.27619,	0.2758,	0.27541,	0.27502,	0.27511,
	0.27317,	0.27177,	0.27185,	0.27194,	0.27203,
0.27213,	0.27017,	0.27057,	0.27027,	0.26652,	0.2658,
0.26545,	0.26509,	0.26474,	0.26439,	0.26404,	0.26377,
0.26401,	0.26429,	0.2628,	0.25971,	0.25987,	0.26003,
	0.25778,	0.25794,	0.25569,	0.25596,	0.25645,
0.25575,	0.25434,	0.25433,	0.25448,	0.25352,	0.25277,
0.25073,	0.25082,	0.25091,	0.251,	0.24994,	0.24855,
0.24757,	0.2466,	0.24663,	0.24684,	0.24506,	0.24257,
	0.24268,	0.2428,	0.24009,	0.23921,	0.23834,
0.237,	0.23552,	0.2364,	0.23664,	0.23413,	0.23427,
0.23442,	0.23444,	0.23398,	0.23351,	0.23305,	0.23258,
0.23195,	0.23077,	0.22967,	0.23,	0.23015,	0.23031,
	0.22976,	0.22917,	0.22857,	0.22798,	0.22779,
0.22788,	0.22796,	0.22805,	0.2282,	0.22837,	0.22439,
0.21807,	0.21567,	0.21577,	0.21586,	0.21595,	0.21539,
0.21461,	0.21384,	0.21338,	0.21352,	0.21371,	0.2128,
	0.21123,	0.20871,	0.20892,	0.20924,	0.20937,
0.20949,	0.20959,	0.20965,	0.20971,	0.20977,	0.20983,
0.20988,	0.21014,	0.21032,	0.21046,	0.20939,	0.20684,
0.20354,	0.20192,	0.20116,	0.2004,	0.19965,	0.1991,
	0.19855,	0.198,	0.19745,	0.19699,	0.1972,
0.19479,	0.19179,	0.19199,	0.19218,	0.19235,	0.19169,
0.19096,	0.19023,	0.18925,	0.1868,	0.18619,	0.18557,
0.18496,	0.18434,	0.18414,	0.18432,	0.18476,	0.1828,
	0.18254,	0.17986,	0.17722,	0.17497,	0.17448,
0.17452,	0.17456,	0.1746,	0.17464,	0.17468,	0.17472,
0.1748,	0.17441,				
0.17245,	0.17223,	0.172,	0.17123,	0.17046,	0.16969,
	0 4000	0 10000	0 16072	0 10070	0 40045
0.167,	0.1696, 0.16717,	0.16966, 0.16723,	0.16973, 0.16728,	0.16979, 0.16733,	0.16815, 0.16737,

0.16435, 0.16346, 0.16288, 0.16193, 0.16201, 0.1621, 0.15209, 0.16081, 0.15888, 0.15767, 0.15625, 0.15318, 0.14308, 0.14765, 0.14721, 0.14678, 0.14635, 0.144591, 0.14548, 0.14518, 0.14526, 0.14563, 0.13458, 0.14511, 0.1443, 0.14548, 0.14518, 0.14526, 0.14563, 0.13451, 0.14433, 0.13569, 0.13548, 0.13507, 0.13465, 0.13424, 0.13383, 0.13296, 0.1311, 0.13055, 0.13062, 0.13068, 0.13074, 0.13081, 0.13083, 0.13102, 0.13126, 0.13103, 0.12941, 0.12834, 0.12848, 0.12721, 0.12595, 0.12508, 0.12036, 0.1193, 0.12933, 0.12274, 0.12209, 0.12123, 0.12036, 0.1195, 0.1159, 0.11539, 0.11488, 0.11437, 0.1038, 0.10374, 0.10383, 0.10374, 0.10384, 0.11276, 0.11194, 0.11113, 0.11031, 0.10333, 0.10807, 0.10681, 0.10617, 0.10656, 0.10441, 0.10208, 0.10175, 0.10411, 0.10018, 0.1075, 0.10614, 0.10042, 0.098062, 0.096569, 0.095731, 0.094893, 0.094078, 0.093644, 0.09321, 0.092776, 0.092342, 0.074966, 0.074966, 0.074976, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.074966, 0.075014, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.058644, 0.066865, 0.066326, 0.065766, 0.065247, 0.061823, 0.066864, 0.066866, 0.065267, 0.068481, 0.067404, 0.066866, 0.065266, 0.065766, 0.065247, 0.063129, 0.058614, 0.058664, 0.058674, 0.058624, 0.058694, 0.058694, 0.058694, 0.058694, 0.058694, 0.058694, 0.058694, 0.058694, 0.058694, 0.058664, 0.045089, 0.045231, 0.023615, 0.023661, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023615, 0.023616, 0.023616, 0.023615, 0.023616, 0.023616, 0.023616, 0.023616, 0.023616, 0.	0.16742,	0.16748,	0.1676,	0.16771,	0.16659,	0.16538,
0.15209,         0.151,         0.15087,         0.15348,         0.14792,         0.14801,         0.14803,         0.14792,         0.14801,         0.14801,         0.14655,         0.14651,         0.14651,         0.14651,         0.14651,         0.14651,         0.14651,         0.14651,         0.14651,         0.14651,         0.14651,         0.14651,         0.14511,         0.14434,         0.14511,         0.14434,         0.14511,         0.14434,         0.14511,         0.14434,         0.13085,         0.13062,         0.13085,         0.13076,         0.13085,         0.13062,         0.13085,         0.13074,         0.12834,         0.13085,         0.13062,         0.13036,         0.12941,           0.12849,         0.12331,         0.12333,         0.12271,         0.12595,         0.12508,           0.12449,         0.11334,         0.11276,         0.11194,         0.11133,         0.11273,           0.1233,         0.1067,         0.11681,         0.11148,         0.11437,         0.11361,           0.1236,         0.11334,         0.11276,         0.11194,         0.11113,         0.11031,           0.1044,         0.10391,         0.10341,         0.10308,         0.10275,           0.1041,         0.10265,						
0.15209,         0.151,         0.15087,         0.14935,         0.14792,         0.14805,         0.14565,         0.14721,         0.14678,         0.14635,         0.14591,         0.14508,         0.14518,         0.14526,         0.14343,         0.14511,         0.14433,         0.13488,         0.13267,         0.14063,         0.13755,         0.1363,           0.13296,         0.1311,         0.13055,         0.13062,         0.13068,         0.13074,           0.13081,         0.13088,         0.13102,         0.13126,         0.13103,         0.12941,           0.12449,         0.12834,         0.12848,         0.12721,         0.12299,         0.12250,           0.12449,         0.12391,         0.12333,         0.12274,         0.12209,         0.12123,           0.1236,         0.1195,         0.1159,         0.11539,         0.11488,         0.11477,           0.11366,         0.1134,         0.11276,         0.11194,         0.11113,         0.11031,           0.10504,         0.1047,         0.10391,         0.10341,         0.10141,         0.10108,         0.10275,           0.1042,         0.098062,         0.096569,         0.095731,         0.094933,         0.090456,           0.09144, <td>0.10100,</td> <td></td> <td></td> <td></td> <td></td> <td></td>	0.10100,					
0.14808,         0.14765,         0.14721,         0.14678,         0.14635,         0.14518,         0.14526,         0.14634,         0.14511,         0.14431,         0.14368,         0.14267,         0.14063,         0.13755,         0.1363,           0.13589,         0.13548,         0.13507,         0.13465,         0.13024,         0.13333,           0.13296,         0.1311,         0.13055,         0.13062,         0.13068,         0.13074,           0.13031,         0.12834,         0.12846,         0.12721,         0.12259,         0.12508,           0.12449,         0.12391,         0.12333,         0.12274,         0.12209,         0.12123,           0.12036,         0.1195,         0.1159,         0.11559,         0.11689,         0.11488,         0.11437,           0.11386,         0.11334,         0.11276,         0.1194,         0.11113,         0.11031,           0.10447,         0.10391,         0.10681,         0.10617,         0.1056,           0.10504,         0.10447,         0.10391,         0.10341,         0.10308,         0.10275,           0.10441,         0.10208,         0.095731,         0.094993,         0.09405,           0.094078,         0.096569,         0.095731,	0 15209					
0.14548,         0.14518,         0.14267,         0.14034,         0.14267,         0.14063,         0.13755,         0.1363,           0.13589,         0.13548,         0.13507,         0.13465,         0.13444,         0.1333,           0.13296,         0.1311,         0.13055,         0.13062,         0.13068,         0.13074,           0.13081,         0.13088,         0.13102,         0.12721,         0.12595,         0.12508,           0.12449,         0.12391,         0.12333,         0.12271,         0.12595,         0.12508,           0.12036,         0.1195,         0.1159,         0.11539,         0.11488,         0.11437,           0.11386,         0.11334,         0.11276,         0.11194,         0.11113,         0.11031,           0.10504,         0.10447,         0.10391,         0.1081,         0.10617,         0.1063,           0.10042,         0.098062,         0.096659,         0.095731,         0.09493,         0.094075,           0.091908,         0.091474,         0.091039,         0.08649,         0.09321,         0.09232,           0.075253,         0.074966,         0.074971,         0.074809,         0.074809,         0.074801,         0.074931,           0.07504,	-					
0.14348,         0.14267,         0.14063,         0.13755,         0.1363,           0.13589,         0.13548,         0.13507,         0.13465,         0.13424,         0.13383,           0.13296,         0.1311,         0.13055,         0.13062,         0.13063,         0.13074,           0.13081,         0.13088,         0.13102,         0.13126,         0.13103,         0.12941,           0.12449,         0.12331,         0.12333,         0.12274,         0.12209,         0.12123,           0.12036,         0.1193,         0.1159,         0.11539,         0.11488,         0.11437,           0.11384,         0.11276,         0.11194,         0.11113,         0.11031,           0.11933,         0.10807,         0.10681,         0.10617,         0.1056,           0.10504,         0.10447,         0.10341,         0.10308,         0.10275,           0.10421,         0.10208,         0.0175,         0.1041,         0.10108,         0.10775,           0.10424,         0.090802,         0.09659,         0.095731,         0.094983,         0.090455,           0.074503,         0.094078,         0.091039,         0.08469,         0.08412,         0.092942,           0.075253, <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>						
0.13589,         0.13548,         0.13507,         0.13465,         0.13444,         0.13383,           0.13296,         0.1311,         0.13065,         0.13062,         0.13068,         0.13074,           0.13081,         0.13084,         0.12102,         0.13126,         0.13103,         0.12941,           0.12449,         0.12391,         0.12333,         0.12274,         0.12209,         0.12132,           0.12036,         0.1195,         0.1159,         0.11539,         0.11488,         0.11437,           0.11386,         0.11334,         0.11276,         0.11194,         0.11113,         0.11031,           0.1041,         0.10933,         0.10807,         0.10681,         0.10617,         0.1056,           0.10504,         0.10447,         0.10391,         0.10341,         0.10308,         0.10275,           0.10042,         0.098662,         0.095649,         0.095731,         0.094893,         0.094075,           0.07402,         0.098062,         0.093644,         0.09321,         0.092776,         0.092342,           0.091908,         0.091474,         0.091039,         0.08649,         0.08442,         0.08391,           0.075253,         0.074734,         0.074781,         0.074869,<	0.14040,					
0.13296,         0.1311,         0.13055,         0.13062,         0.13068,         0.13074,           0.13081,         0.13088,         0.13102,         0.13126,         0.13103,         0.12908,           0.12449,         0.12391,         0.12384,         0.12233,         0.12274,         0.12209,         0.12123,           0.12036,         0.1195,         0.1159,         0.11539,         0.11488,         0.11437,           0.11386,         0.1334,         0.11276,         0.11194,         0.11113,         0.1056,           0.10504,         0.10447,         0.10391,         0.10681,         0.10617,         0.1056,           0.10504,         0.10447,         0.10391,         0.10341,         0.10308,         0.10275,           0.10241,         0.10208,         0.10175,         0.10141,         0.10108,         0.10075,           0.1042,         0.098062,         0.096589,         0.09321,         0.09483,         0.094075,           0.091908,         0.091474,         0.094078,         0.09321,         0.09242,           0.091908,         0.09473,         0.074966,         0.074966,         0.074966,         0.074966,           0.075054,         0.075054,         0.074961,         0.074966, <td>0 13589</td> <td>•</td> <td></td> <td></td> <td></td> <td></td>	0 13589	•				
0.13081,         0.13088,         0.13102,         0.13126,         0.13103,         0.12941,           0.12449,         0.12331,         0.12833,         0.12774,         0.12595,         0.12133,           0.12036,         0.1195,         0.1159,         0.1159,         0.1159,         0.1159,         0.11488,         0.11437,           0.11386,         0.11334,         0.11276,         0.11194,         0.11113,         0.11031,           0.10504,         0.10447,         0.10391,         0.10341,         0.10038,         0.10275,           0.10421,         0.10208,         0.10175,         0.10141,         0.10108,         0.10075,           0.10421,         0.098062,         0.096569,         0.095731,         0.094893,         0.09075,           0.091474,         0.091039,         0.08231,         0.092776,         0.092342,           0.091474,         0.091474,         0.091479,         0.081858,         0.078322,           0.075253,         0.074734,         0.074772,         0.074809,         0.074861,         0.075322,           0.07504,         0.075054,         0.075068,         0.07508,         0.07432,         0.073519,           0.075055,         0.07179,         0.076083,         0						
0.12449,         0.12391,         0.12333,         0.12274,         0.12299,         0.12123,           0.12036,         0.1195,         0.1159,         0.11539,         0.11488,         0.11437,           0.11386,         0.11334,         0.11276,         0.11194,         0.11113,         0.11056,           0.10504,         0.10447,         0.10391,         0.10681,         0.10308,         0.10275,           0.10241,         0.10208,         0.10175,         0.1041,         0.10308,         0.00275,           0.1042,         0.098062,         0.096569,         0.095731,         0.09493,         0.094055,           0.094078,         0.093344,         0.09321,         0.092776,         0.092342,           0.091908,         0.091474,         0.091039,         0.08449,         0.08237,         0.092776,         0.092342,           0.075253,         0.074734,         0.074772,         0.074809,         0.074861,         0.075025,           0.07504,         0.075054,         0.075069,         0.07583,         0.074381,         0.075011,         0.075025,           0.075404,         0.066865,         0.066326,         0.0658623,         0.058633,         0.058633,         0.058634,           0.058654,		· · · · · · · · · · · · · · · · · · ·				
0.12449,         0.12391,         0.12333,         0.12274,         0.12209,         0.12123,           0.12036,         0.1195,         0.1159,         0.11539,         0.11488,         0.11437,           0.11386,         0.10933,         0.10807,         0.10681,         0.10117,         0.1056,           0.10504,         0.10447,         0.10391,         0.10341,         0.10308,         0.10275,           0.10241,         0.10208,         0.01075,         0.10141,         0.10108,         0.10075,           0.1042,         0.098062,         0.096669,         0.095731,         0.09483,         0.094075,           0.091474,         0.091039,         0.09649,         0.08442,         0.08391,           0.0834,         0.08289,         0.082379,         0.081869,         0.074861,         0.073322,           0.075054,         0.074961,         0.074809,         0.074861,         0.074931,           0.072655,         0.074966,         0.075069,         0.075083,         0.074382,         0.075519,           0.076265,         0.07179,         0.076083,         0.069576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.058624,         0.058694,	0.10001,					
0.12036,         0.1195,         0.1159,         0.1159,         0.1193,         0.11276,         0.11194,         0.11113,         0.11031,           0.10933,         0.10807,         0.10681,         0.10617,         0.1056,           0.10504,         0.10447,         0.10391,         0.10341,         0.10308,         0.10275,           0.10241,         0.10208,         0.10175,         0.10141,         0.10108,         0.10075,           0.1042,         0.098062,         0.096569,         0.095731,         0.09493,         0.094055,           0.09108,         0.091074,         0.091039,         0.086469,         0.08442,         0.08391,           0.0834,         0.08289,         0.082379,         0.081369,         0.081358,         0.073832,           0.075054,         0.075064,         0.074981,         0.074996,         0.074861,         0.074931,           0.067044,         0.066865,         0.066326,         0.065783,         0.074861,         0.075025,           0.067404,         0.066865,         0.066326,         0.065786,         0.066841,         0.058703,           0.058654,         0.058664,         0.058662,         0.058623,         0.058694,         0.058703,           0.058655,	0 12449	· ·				
0.11386,         0.11334,         0.11276,         0.11194,         0.11011,         0.1056,           0.10504,         0.10447,         0.10391,         0.10341,         0.10308,         0.10275,           0.10241,         0.10208,         0.10175,         0.10141,         0.10108,         0.10075,           0.10042,         0.098062,         0.096569,         0.095731,         0.094893,         0.094055,           0.091474,         0.091039,         0.086469,         0.092776,         0.092342,           0.091474,         0.091039,         0.081869,         0.08442,         0.08391,           0.075253,         0.074734,         0.074772,         0.074809,         0.074861,         0.074923,           0.07504,         0.075064,         0.075069,         0.075083,         0.074381,         0.075041,         0.075055,           0.07504,         0.075064,         0.075069,         0.075083,         0.074861,         0.074381,           0.072655,         0.07179,         0.070683,         0.06576,         0.06841,         0.067942,           0.067404,         0.058664,         0.058674,         0.058634,         0.058694,         0.058786,           0.0587513,         0.058699,         0.058694,         0.05						
0.10504,         0.10447,         0.10391,         0.10341,         0.10308,         0.10275,           0.10241,         0.10208,         0.10175,         0.10141,         0.10308,         0.10275,           0.10042,         0.098062,         0.096569,         0.095731,         0.094893,         0.094055,           0.0914078,         0.093644,         0.09321,         0.092776,         0.092342,           0.091908,         0.091474,         0.091039,         0.086469,         0.08442,         0.08391,           0.0834,         0.08289,         0.082379,         0.081869,         0.081358,         0.074931,           0.075045,         0.074966,         0.074971,         0.074809,         0.075011,         0.075025,           0.07504,         0.075054,         0.075069,         0.075083,         0.074861,         0.075025,           0.072655,         0.07179,         0.070683,         0.069576,         0.068481,         0.067422,           0.058654,         0.058664,         0.058623,         0.058633,         0.058634,         0.058694,         0.058703,           0.058713,         0.058689,         0.058768,         0.058704,         0.058703,         0.058703,         0.058704,         0.058703, <t< td=""><td></td><td></td><td></td><td></td><td></td><td>· · · · · · · · · · · · · · · ·</td></t<>						· · · · · · · · · · · · · · · ·
0.10504,         0.10447,         0.10391,         0.10341,         0.10308,         0.10075,           0.10241,         0.10208,         0.10175,         0.10141,         0.10108,         0.10075,           0.10042,         0.098062,         0.096669,         0.095731,         0.094893,         0.099242,           0.091908,         0.091474,         0.091039,         0.08669,         0.08442,         0.08391,           0.0755253,         0.074734,         0.074772,         0.074809,         0.074861,         0.074931,           0.07504,         0.075064,         0.075069,         0.075011,         0.07505,           0.072655,         0.07179,         0.070683,         0.069576,         0.068481,         0.067942,           0.06193,         0.060255,         0.058623,         0.058633,         0.058644,         0.058644,           0.058654,         0.058664,         0.058674,         0.058684,         0.058694,         0.058731,           0.058655,         0.066193,         0.058623,         0.058694,         0.058694,         0.058694,           0.058713,         0.058689,         0.058262,         0.057409,         0.056982,           0.058555,         0.056128,         0.04528,         0.045294, <t< td=""><td>0.11000,</td><td></td><td></td><td></td><td></td><td></td></t<>	0.11000,					
0.10241,         0.10208,         0.10175,         0.10141,         0.10108,         0.10075,           0.10042,         0.098062,         0.096569,         0.095731,         0.094893,         0.094055,           0.09108,         0.091474,         0.091039,         0.086469,         0.08442,         0.09321,           0.0834,         0.08289,         0.082379,         0.081869,         0.081358,         0.078322,           0.075253,         0.074734,         0.074772,         0.074809,         0.074861,         0.074931,           0.07504,         0.075054,         0.075069,         0.075083,         0.074382,         0.073519,           0.072655,         0.07179,         0.076683,         0.06576,         0.068481,         0.067942,           0.07504,         0.066865,         0.066326,         0.06576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.058623,         0.058633,         0.058644,           0.058654,         0.058664,         0.058674,         0.058684,         0.058689,         0.058262,           0.056555,         0.056128,         0.058701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,	0 10504					
0.10042, 0.098062, 0.096569, 0.095731, 0.094893, 0.094055, 0.094078, 0.093644, 0.09321, 0.092776, 0.092342, 0.091908, 0.091474, 0.091039, 0.086469, 0.08442, 0.08391, 0.0834, 0.08289, 0.082379, 0.081869, 0.081358, 0.074931, 0.074966, 0.074966, 0.074981, 0.074996, 0.075011, 0.075025, 0.07504, 0.075064, 0.075069, 0.075083, 0.074382, 0.073519, 0.072655, 0.07179, 0.070683, 0.065276, 0.068481, 0.067942, 0.066326, 0.06526, 0.065247, 0.063129, 0.058644, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058664, 0.058665, 0.065262, 0.057836, 0.057409, 0.056982, 0.056555, 0.056128, 0.0655701, 0.053714, 0.048414, 0.047639, 0.045237, 0.045282, 0.045284, 0.058664, 0.046089, 0.0452313, 0.045223, 0.045283, 0.045284, 0.039314, 0.034718, 0.034043, 0.0333367, 0.032691, 0.032015, 0.028195, 0.03641, 0.028169, 0.028176, 0.028182, 0.028189, 0.03641, 0.028169, 0.028176, 0.028182, 0.028189, 0.028647, 0.028169, 0.028187, 0.028169, 0.028041, 0.02377, 0.023114, 0.02285, 0.028182, 0.028189, 0.022059, 0.021795, 0.021272, 0.021086, 0.022586, 0.022323, 0.014226, 0.014236, 0.014236, 0.014236, 0.014236, 0.014236, 0.014234, 0.014244, 0.014245, 0.014246, 0.014246, 0.014247, 0.014248, 0.014244, 0.014245, 0.014246, 0.014246, 0.014247, 0.014248, 0.014244, 0.014245, 0.014246, 0.014246, 0.014247, 0.014248, 0.014244, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014245, 0.014246, 0.014251, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.014248, 0.01						-
0.094078,         0.093644,         0.09321,         0.092776,         0.092342,           0.0834,         0.091474,         0.091039,         0.086469,         0.08442,         0.08391,           0.0834,         0.08289,         0.082379,         0.074809,         0.074861,         0.074931,           0.075253,         0.074734,         0.074972,         0.074809,         0.075011,         0.075025,           0.07504,         0.075054,         0.075069,         0.075083,         0.074382,         0.073519,           0.072655,         0.07179,         0.070683,         0.06576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.065786,         0.065247,         0.063129,           0.058654,         0.058664,         0.058674,         0.058633,         0.058633,         0.058694,           0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.056982,           0.05875,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045283,         0.045233,         0.045233,         0.045233,         0.045234,           0.03914,         0.034718,         0.045288,		· · · · · · · · · · · · · · · · · · ·				
0.091908,         0.091474,         0.091039,         0.086469,         0.08442,         0.08391,           0.0834,         0.08289,         0.082379,         0.081869,         0.081358,         0.078322,           0.075253,         0.074734,         0.074772,         0.074809,         0.075011,         0.075025,           0.07504,         0.075069,         0.075083,         0.074382,         0.073519,           0.072655,         0.07179,         0.070683,         0.069576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.065786,         0.065247,         0.063129,           0.058654,         0.058664,         0.058674,         0.058683,         0.058633,         0.058694,           0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.058692,           0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045256,         0.045223,         0.045223,           0.045275,         0.045281,         0.045283,         0.045283,         0.045283,           0.045275,         0.045283,         0.045283,         0.045283, <td>0.10042,</td> <td></td> <td></td> <td></td> <td></td> <td></td>	0.10042,					
0.0834,         0.08289,         0.082379,         0.081869,         0.081358,         0.078322,           0.075253,         0.074734,         0.074772,         0.074809,         0.074861,         0.074931,           0.07504,         0.075054,         0.075069,         0.075083,         0.074382,         0.073519,           0.072655,         0.07179,         0.070683,         0.069576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.065786,         0.065247,         0.063129,           0.058654,         0.058664,         0.058674,         0.058623,         0.058693,         0.058703,           0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.05892,           0.046864,         0.058691,         0.058714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045214,         0.04523,         0.045223,           0.045275,         0.045282,         0.04528,         0.045294,         0.04528,         0.04523,           0.028195,         0.028201,         0.028169,         0.028176,         0.028182,         0.028189,           0.022467,         0.028201,         0.028206,	0 091908					
0.075253,         0.074934,         0.074971,         0.074809,         0.074861,         0.075025,           0.07504,         0.075054,         0.075069,         0.075083,         0.074382,         0.073519,           0.072655,         0.07179,         0.070683,         0.069576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.065786,         0.065247,         0.063129,           0.058654,         0.058664,         0.058664,         0.058863,         0.058693,         0.058694,         0.058694,           0.058713,         0.058689,         0.055262,         0.057836,         0.057409,         0.058692,           0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045231,         0.04523,         0.04523,           0.045275,         0.045282,         0.045286,         0.045294,         0.04528,         0.045294,           0.028195,         0.028201,         0.028169,         0.028176,         0.028182,         0.028189,           0.024527,         0.028201,         0.028206,         0.028212,         0.028218,         0.024528,           0.02487, <td></td> <td></td> <td>· · · · · · · · · · · · · · · ·</td> <td>•</td> <td></td> <td>,</td>			· · · · · · · · · · · · · · · ·	•		,
0.074966,         0.074981,         0.074996,         0.075011,         0.075025,           0.07504,         0.075054,         0.075069,         0.075083,         0.074382,         0.073519,           0.072655,         0.07179,         0.070683,         0.069576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.058623,         0.058633,         0.058644,           0.058654,         0.058664,         0.058674,         0.058684,         0.058694,         0.058703,           0.058713,         0.058689,         0.055701,         0.053714,         0.048414,         0.047639,           0.056555,         0.056128,         0.04527,         0.04523,         0.04523,         0.04523,           0.045237,         0.045243,         0.04525,         0.045256,         0.045223,         0.04523,           0.045275,         0.045282,         0.045286,         0.045294,         0.032619,         0.045269,           0.028195,         0.034718,         0.034043,         0.033367,         0.032691,         0.032015,           0.028195,         0.028201,         0.028206,         0.02812,         0.028182,         0.024318,           0.026487,         0.02538,         0.02494,						
0.07504,         0.075054,         0.075069,         0.075083,         0.074382,         0.073519,           0.072655,         0.07179,         0.070683,         0.069576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.065786,         0.065247,         0.063129,           0.058654,         0.058664,         0.058674,         0.058683,         0.058694,         0.058703,           0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.056982,           0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045256,         0.045223,         0.04523,           0.045275,         0.045282,         0.045286,         0.045294,         0.04528,         0.045194,           0.039314,         0.034718,         0.034043,         0.033367,         0.032691,         0.032189,           0.028195,         0.028201,         0.028206,         0.028176,         0.028182,         0.028189,           0.026487,         0.025538,         0.024694,         0.024167,         0.023904,           0.022059,         0.021795,         0.021531,<	0.070200,				·	
0.072655,         0.07179,         0.070683,         0.069576,         0.068481,         0.067942,           0.067404,         0.066865,         0.066326,         0.065786,         0.065247,         0.063129,           0.058654,         0.058664,         0.058674,         0.058684,         0.058694,         0.058703,           0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.056982,           0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045256,         0.045223,         0.045269,           0.045275,         0.045282,         0.045286,         0.045294,         0.045328,         0.045194,           0.039314,         0.034718,         0.034043,         0.033367,         0.032691,         0.0328189,           0.028195,         0.028201,         0.028206,         0.028176,         0.028182,         0.028189,           0.026487,         0.02538,         0.024431,         0.024167,         0.023904,           0.023641,         0.023377,         0.02159,         0.02159,         0.02159,         0.02159,         0.02256,         0.02256,         0.022256,         0.022	0 07504					
0.067404,         0.066865,         0.066326,         0.065786,         0.065247,         0.063129,           0.058654,         0.058664,         0.058674,         0.058684,         0.058694,         0.058703,           0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.056982,           0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045256,         0.045223,         0.045269,           0.045237,         0.045243,         0.04525,         0.045266,         0.045263,         0.045269,           0.045275,         0.045282,         0.045288,         0.045294,         0.045328,         0.045194,           0.039314,         0.034718,         0.034043,         0.03367,         0.032691,         0.032015,           0.028195,         0.028201,         0.028169,         0.028176,         0.028182,         0.028189,           0.026487,         0.02538,         0.024694,         0.024131,         0.024167,         0.023904,           0.023641,         0.023377,         0.02114,         0.02285,         0.022586,         0.022586,         0.022233,           0.019794, </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
0.06193,         0.060255,         0.058623,         0.058633,         0.058644,           0.058654,         0.058664,         0.058674,         0.058684,         0.058694,         0.058703,           0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.056982,           0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045256,         0.045263,         0.045269,           0.045275,         0.045282,         0.045288,         0.045294,         0.045328,         0.045194,           0.039314,         0.030541,         0.038169,         0.028176,         0.032691,         0.032015,           0.028195,         0.028201,         0.028206,         0.02812,         0.028182,         0.027436,           0.026487,         0.025338,         0.024694,         0.024431,         0.024167,         0.023904,           0.023641,         0.023377,         0.0211795,         0.021531,         0.021267,         0.021247,           0.021256,         0.021272,         0.021086,         0.02258,         0.022258,           0.019794,         0.019362,         0.018931,         0.018499						
0.058654,         0.058664,         0.058674,         0.058684,         0.058694,         0.058703,           0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.056982,           0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045256,         0.045263,         0.045269,           0.045275,         0.045282,         0.045288,         0.045294,         0.032691,         0.032015,           0.039314,         0.034718,         0.034043,         0.033367,         0.032691,         0.032015,           0.028195,         0.028201,         0.028206,         0.028122,         0.028182,         0.027436,           0.026487,         0.025538,         0.024694,         0.024431,         0.024167,         0.023904,           0.023641,         0.023377,         0.023114,         0.02285,         0.022586,         0.022536,           0.019794,         0.019362,         0.018931,         0.018499,         0.018068,         0.017604,           0.017062,         0.01652,         0.015978,         0.015436,         0.014293,         0.014351,           0.014244,         0.01424,	0.001101,					
0.058713,         0.058689,         0.058262,         0.057836,         0.057409,         0.056982,           0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045256,         0.045263,         0.045269,           0.045275,         0.045282,         0.045288,         0.045294,         0.032691,         0.032015,           0.039314,         0.034718,         0.034043,         0.033367,         0.032691,         0.028189,           0.028195,         0.028201,         0.028206,         0.028212,         0.028218,         0.027436,           0.026487,         0.025538,         0.024694,         0.024431,         0.024167,         0.023904,           0.023641,         0.023377,         0.023114,         0.02285,         0.022586,         0.022323,           0.021256,         0.021265,         0.021272,         0.021086,         0.02266,         0.022586,         0.022225,           0.019794,         0.019362,         0.018931,         0.018499,         0.018068,         0.017604,           0.017062,         0.01652,         0.015978,         0.015436,         0.014238,         0.014239,           0.01424,<	0.058654.					
0.056555,         0.056128,         0.055701,         0.053714,         0.048414,         0.047639,           0.045237,         0.045243,         0.04525,         0.045256,         0.045263,         0.045269,           0.045275,         0.045282,         0.045288,         0.045294,         0.045328,         0.045194,           0.039314,         0.034718,         0.034043,         0.033367,         0.032691,         0.032015,           0.030541,         0.028169,         0.028176,         0.028182,         0.028189,           0.026487,         0.02538,         0.024694,         0.024431,         0.024167,         0.023904,           0.023641,         0.023377,         0.023114,         0.02285,         0.022586,         0.022323,           0.022059,         0.021795,         0.021531,         0.021267,         0.021247,           0.012256,         0.021265,         0.021272,         0.021086,         0.020656,         0.020225,           0.019794,         0.019362,         0.018931,         0.018499,         0.018068,         0.017604,           0.01424,         0.014236,         0.014237,         0.014238,         0.014239,           0.01424,         0.01424,         0.01424,         0.01424,         0.01424,	-	-	· · · · · · · · · · · · · · · · · · ·		-	
0.046864,       0.046089,       0.045313,       0.045223,       0.04523,         0.045237,       0.045243,       0.04525,       0.045256,       0.045263,       0.045269,         0.045275,       0.045282,       0.045288,       0.045294,       0.045328,       0.045194,         0.039314,       0.034718,       0.034043,       0.033367,       0.032691,       0.032015,         0.028195,       0.028201,       0.028206,       0.02812,       0.028182,       0.027436,         0.026487,       0.025538,       0.024694,       0.024431,       0.024167,       0.023904,         0.023641,       0.023377,       0.023114,       0.02285,       0.022586,       0.022323,         0.022059,       0.021795,       0.021531,       0.021267,       0.021247,         0.012256,       0.021265,       0.021272,       0.021086,       0.020656,       0.020225,         0.019794,       0.019362,       0.018931,       0.018499,       0.018068,       0.017604,         0.014236,       0.014236,       0.014237,       0.014238,       0.014239,         0.01424,       0.01424,       0.01424,       0.01424,       0.01424,       0.01424,       0.01424,       0.01424,       0.01424,       0.01424,	-				•	
0.045237,       0.045243,       0.04525,       0.045256,       0.045263,       0.045269,         0.045275,       0.045282,       0.045288,       0.045294,       0.045328,       0.045194,         0.039314,       0.034718,       0.034043,       0.033367,       0.032691,       0.032015,         0.028195,       0.028201,       0.028206,       0.028212,       0.028218,       0.027436,         0.026487,       0.025538,       0.024694,       0.024431,       0.024167,       0.023904,         0.023641,       0.023377,       0.023114,       0.02285,       0.022586,       0.022323,         0.022059,       0.021795,       0.021531,       0.021267,       0.021247,         0.01256,       0.021265,       0.021272,       0.021086,       0.020656,       0.020225,         0.019794,       0.019362,       0.018931,       0.018499,       0.018068,       0.017604,         0.017062,       0.01652,       0.015978,       0.015436,       0.014238,       0.014239,         0.01424,       0.01424,       0.014241,       0.014242,       0.01423,       0.014243,         0.01424,       0.01424,       0.014246,       0.014246,       0.014247,       0.014248,         0.014248,	,					
0.045275,       0.045282,       0.045288,       0.045294,       0.045328,       0.045194,         0.039314,       0.034718,       0.034043,       0.033367,       0.032691,       0.032015,         0.030541,       0.028169,       0.028176,       0.028182,       0.028189,         0.028195,       0.028201,       0.028206,       0.028212,       0.028218,       0.027436,         0.026487,       0.025538,       0.024694,       0.024431,       0.024167,       0.023904,         0.023641,       0.023377,       0.023114,       0.02285,       0.022586,       0.022323,         0.021259,       0.021795,       0.021531,       0.021267,       0.021247,         0.021256,       0.021265,       0.021272,       0.021086,       0.020656,       0.020225,         0.019794,       0.019362,       0.018931,       0.018499,       0.018068,       0.017604,         0.017062,       0.01652,       0.015978,       0.015436,       0.014238,       0.014239,         0.01424,       0.014236,       0.014237,       0.014238,       0.014239,         0.01424,       0.014241,       0.014242,       0.014243,       0.014243,         0.014248,       0.014249,       0.01425,       0.014251,	0.045237.					
0.039314,       0.034718,       0.034043,       0.033367,       0.032691,       0.032015,         0.028195,       0.028201,       0.028206,       0.028212,       0.028218,       0.027436,         0.026487,       0.025538,       0.024694,       0.024431,       0.024167,       0.023904,         0.023641,       0.023377,       0.023114,       0.02285,       0.022586,       0.022323,         0.021256,       0.021265,       0.021272,       0.021086,       0.020656,       0.020225,         0.019794,       0.019362,       0.018931,       0.018499,       0.018068,       0.017604,         0.017062,       0.01652,       0.015978,       0.015436,       0.014238,       0.014239,         0.01424,       0.014241,       0.014242,       0.014243,       0.014243,         0.014244,       0.014245,       0.014246,       0.014246,       0.014247,       0.014248,         0.014248,       0.014249,       0.01425,       0.014251,       0.014251,       0.014251,       0.014251,       0.014251,			•	•	-	
0.030541,0.028169,0.028176,0.028182,0.028189,0.028195,0.028201,0.028206,0.028212,0.028218,0.027436,0.026487,0.025538,0.024694,0.024431,0.024167,0.023904,0.023641,0.023377,0.023114,0.02285,0.022586,0.022323,0.021256,0.021059,0.021795,0.021531,0.021267,0.021247,0.021256,0.021265,0.021272,0.021086,0.020656,0.020225,0.019794,0.019362,0.018931,0.018499,0.018068,0.017604,0.017062,0.01652,0.015978,0.015436,0.014283,0.014351,0.014236,0.014236,0.014237,0.014238,0.014239,0.01424,0.014241,0.014242,0.014243,0.014243,0.014244,0.014245,0.014246,0.014246,0.014247,0.014248,0.014248,0.014249,0.01425,0.014251,0.014251,0.014251,0.014252,	· · · · · · · · · · · · · · · · · · ·					
0.028195,       0.028201,       0.028206,       0.028212,       0.028218,       0.027436,         0.026487,       0.025538,       0.024694,       0.024431,       0.024167,       0.023904,         0.023641,       0.023377,       0.023114,       0.02285,       0.022586,       0.022323,         0.021256,       0.021265,       0.021272,       0.021086,       0.020656,       0.020225,         0.019794,       0.019362,       0.018931,       0.018499,       0.018068,       0.017604,         0.017062,       0.01652,       0.015978,       0.015436,       0.014283,       0.014351,         0.014236,       0.014236,       0.014237,       0.014238,       0.014239,         0.014244,       0.014241,       0.014242,       0.014243,       0.014243,         0.014248,       0.014249,       0.01425,       0.014251,       0.014251,       0.014251,	,					
0.026487,       0.025538,       0.024694,       0.024431,       0.024167,       0.023904,         0.023641,       0.023377,       0.023114,       0.02285,       0.022586,       0.022323,         0.022059,       0.021795,       0.021531,       0.021267,       0.021247,         0.021256,       0.021265,       0.021272,       0.021086,       0.020656,       0.020225,         0.019794,       0.019362,       0.018931,       0.018499,       0.018068,       0.017604,         0.017062,       0.01652,       0.015978,       0.015436,       0.014893,       0.014351,         0.014236,       0.014236,       0.014237,       0.014238,       0.014239,         0.014244,       0.014241,       0.014242,       0.014243,       0.014243,         0.014248,       0.014249,       0.01425,       0.014251,       0.014251,       0.014251,	0.028195,	•				•
0.023641,       0.023377,       0.023114,       0.02285,       0.022586,       0.022323,         0.022059,       0.021795,       0.021531,       0.021267,       0.021247,         0.021256,       0.021265,       0.021272,       0.021086,       0.020656,       0.020225,         0.019794,       0.019362,       0.018931,       0.018499,       0.018068,       0.017604,         0.017062,       0.01652,       0.015978,       0.015436,       0.014893,       0.014351,         0.014236,       0.014236,       0.014237,       0.014238,       0.014239,         0.014244,       0.014241,       0.014242,       0.014243,       0.014243,         0.014244,       0.014246,       0.014246,       0.014247,       0.014248,         0.014248,       0.014249,       0.01425,       0.014251,       0.014251,       0.014252,						
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0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371,	0.67868, 0.68468, 0.69069, 0.6967, 0.7027,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037,	0.68068, 0.68669, 0.69269, 0.6987, 0.7047,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771,	0.67868, 0.68468, 0.69069, 0.6967, 0.7027, 0.70871, 0.71471,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572,	0.68068, 0.68669, 0.69269, 0.6987, 0.7047, 0.71071, 0.71672,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972,	0.67868, 0.68468, 0.69069, 0.6967, 0.7027, 0.70871, 0.71471,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572,	0.68068, 0.68669, 0.69269, 0.6987, 0.7047, 0.71071, 0.71672,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972,	0.67868, 0.68468, 0.69069, 0.6967, 0.7027, 0.70871, 0.71471,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72173,	0.68068, 0.68669, 0.69269, 0.6987, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72973,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173,	0.67868, 0.68468, 0.69069, 0.6967, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373,	0.68068, 0.68669, 0.69269, 0.6987, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873, 0.73473,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72973, 0.73574,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073, 0.73674,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173, 0.73774,	0.67868, 0.68468, 0.69069, 0.6967, 0.7027, 0.70871, 0.71471,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72173,	0.68068, 0.68669, 0.69269, 0.6987, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72973,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173,	0.67868, 0.68468, 0.69069, 0.6967, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273, 0.73874,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373, 0.73974,	0.68068, 0.68669, 0.69269, 0.6987, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873, 0.73473, 0.74074,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72372, 0.72973, 0.73574, 0.74174,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073, 0.73674, 0.74274,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173, 0.73174, 0.74374,	0.67868, 0.68468, 0.69069, 0.6967, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273, 0.73874,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373, 0.73974,	0.68068, 0.68669, 0.69269, 0.6987, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873, 0.73473, 0.74074,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72973, 0.73574, 0.74174,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073, 0.73674, 0.74274,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173, 0.73774, 0.74374,	0.67868, 0.68468, 0.69069, 0.69067, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273, 0.73874, 0.74474, 0.75075,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373, 0.73974, 0.74575, 0.75175,	0.68068, 0.68669, 0.69269, 0.69269, 0.7047, 0.71071, 0.71672, 0.72272, 0.72272, 0.72873, 0.73473, 0.74074,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72372, 0.72973, 0.73574, 0.74174,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073, 0.73674, 0.74274,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173, 0.73774, 0.74374, 0.74975, 0.75576,	0.67868, 0.68468, 0.69069, 0.69067, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273, 0.73273, 0.73874, 0.75075, 0.75075,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373, 0.73974, 0.74575, 0.75175, 0.75776,	0.68068, 0.68669, 0.69269, 0.69269, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873, 0.73473, 0.74074, 0.74675, 0.75275, 0.75876,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72372, 0.72973, 0.73574, 0.74174, 0.74775, 0.75375, 0.75376,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073, 0.73674, 0.74274, 0.74274,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173, 0.73174, 0.74374, 0.74374, 0.75576, 0.76176,	0.67868, 0.68468, 0.69069, 0.69067, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273, 0.73874, 0.74474, 0.75075,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373, 0.73974, 0.74575, 0.75175,	0.68068, 0.68669, 0.69269, 0.69269, 0.7047, 0.71071, 0.71672, 0.72272, 0.72272, 0.72873, 0.73473, 0.74074,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72372, 0.72973, 0.73574, 0.74174, 0.74775, 0.75375, 0.75376,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073, 0.73674, 0.74274,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173, 0.73774, 0.74374, 0.74975, 0.75576,	0.67868, 0.68468, 0.69069, 0.69067, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273, 0.73273, 0.73874, 0.75075, 0.75075, 0.75676, 0.76276,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373, 0.73974, 0.74575, 0.75175, 0.75776, 0.76376,	0.68068, 0.68669, 0.69269, 0.69269, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873, 0.73473, 0.74074, 0.74675, 0.75275, 0.75275, 0.75876, 0.76476,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72973, 0.73574, 0.74174, 0.74775, 0.75375, 0.75976, 0.76577,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.73073, 0.73674, 0.74274, 0.74274, 0.75475, 0.76076, 0.76677,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173, 0.73774, 0.74374, 0.74975, 0.75576, 0.76176, 0.76777,	0.67868, 0.68468, 0.69069, 0.69067, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273, 0.73273, 0.73874, 0.75075, 0.75676, 0.76276,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373, 0.73974, 0.74575, 0.75175, 0.75776, 0.76376,	0.68068, 0.68669, 0.69269, 0.69269, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873, 0.73473, 0.74074, 0.74675, 0.75275, 0.75876, 0.76476,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72973, 0.73574, 0.74174, 0.74775, 0.75375, 0.75376, 0.76577,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.72472, 0.73073, 0.73674, 0.74274, 0.74274, 0.75475, 0.76076, 0.76677,
0.67768, 0.68368, 0.68969, 0.6957, 0.7017, 0.70771, 0.71371, 0.71972, 0.72573, 0.73173, 0.73174, 0.74374, 0.74374, 0.75576, 0.76176,	0.67868, 0.68468, 0.69069, 0.69067, 0.7027, 0.70871, 0.71471, 0.72072, 0.72673, 0.73273, 0.73273, 0.73874, 0.75075, 0.75676, 0.76276,	0.67968, 0.68569, 0.69169, 0.6977, 0.7037, 0.70971, 0.71572, 0.72172, 0.72773, 0.73373, 0.73974, 0.74575, 0.75175, 0.75776, 0.76376, 0.76977, 0.77578,	0.68068, 0.68669, 0.69269, 0.69269, 0.7047, 0.71071, 0.71672, 0.72272, 0.72873, 0.73473, 0.74074, 0.74675, 0.75275, 0.75275, 0.75876, 0.76476,	0.68168, 0.68769, 0.69369, 0.6997, 0.70571, 0.71171, 0.71772, 0.72372, 0.72973, 0.73574, 0.74174, 0.74775, 0.75375, 0.75976, 0.76577,	0.68268, 0.68869, 0.69469, 0.7007, 0.70671, 0.71271, 0.71872, 0.73073, 0.73674, 0.74274, 0.74274, 0.75475, 0.76076, 0.76677,

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0.7978,	0.7988,	0.7998,	0.8008,	0.8018,	0.8028,
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0.82182,	0.82282,	0.82382,	0.82482,	0.82583,	0.82683,
0.82783,	0.82883,	0.82983,	0.83083,	0.83183,	0.83283,
0.83383,	0.83483,	0.83584,	0.83684,	0.83784,	0.83884,
0.83984,	,	,	,	,	,
ŕ	0.84084,	0.84184,	0.84284,	0.84384,	0.84484,
0.84585,	0.84685,	0.84785,	0.84885,	0.84985,	0.85085,
0.85185,	0.85285,	0.85385,	0.85485,	0.85586,	0.85686,
0.85786,	0.85886,	0.85986,	0.86086,	0.86186,	0.86286,
0.86386,	·	•	ŕ	•	•
·	0.86486,	0.86587,	0.86687,	0.86787,	0.86887,
0.86987,	0.87087,	0.87187,	0.87287,	0.87387,	0.87487,
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0.88188,	0.88288,	0.88388,	0.88488,	0.88589,	0.88689,
0.88789,					
	0.88889,	0.88989,	0.89089,	0.89189,	0.89289,
0.89389,	0.89489,	0.8959,	0.8969,	0.8979,	0.8989,
0.8999,	0.9009,	0.9019,	0.9029,	0.9039,	0.9049,
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0.91191,					
	0.91291,	0.91391,	0.91491,	0.91592,	0.91692,
0.91792,	0.91892,	0.91992,	0.92092,	0.92192,	0.92292,
0.92392,	0.92492,	0.92593,	0.92693,	0.92793,	0.92893,
0.92993,	0.93093,	0.93193,	0.93293,	0.93393,	0.93493,
0.93594,					
	0.93694,	0.93794,	0.93894,	0.93994,	0.94094,
0.94194,	0.94294,	0.94394,	0.94494,	0.94595,	0.94695,
0.94795,	0.94895,	0.94995,	0.95095,	0.95195,	0.95295,
0.95395,	0.95495,	0.95596,	0.95696,	0.95796,	0.95896,
0.95996,					
	0.96096,	0.96196,	0.96296,	0.96396,	0.96496,
0.96597,	0.96697,	0.96797,	0.96897,	0.96997,	0.97097,
0.97197,	0.97297,	0.97397,	0.97497,	0.97598,	0.97698,
0.97798,	0.97898,	0.97998,	0.98098,	0.98198,	0.98298,
0.98398,					
	0.98498,	0.98599,	0.98699,	0.98799,	0.98899,
0.98999,	0.99099,	0.99199,	0.99299,	0.99399,	0.99499,
0.996,	0.997,	0.998,	0.999,		array([[
0.015408,	0.015415,	0.020122,	0.024245,	0.02791,	
0.034716,	0.03782,	0.040643,	0.043276,	0.04604,	0.04877,

0.050602,	0.052659,	0.054302,	0.056194,	0.057493,	0.059177,
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	0.072293,	0.074565,	0.077353,	0.079712,	0.081956,
0.083872,	0.085541,	0.087351,	0.089505,	0.092186,	0.09399,
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	0.11705,	0.11968,	0.12035,	0.12325,	0.12445,
0.12732,	0.1295,	0.13203,	0.13282,	0.1343,	0.13643,
0.13652,	0.13831,	0.13983,	0.14156,	0.14382,	0.14586,
0.14791,	0.14872,	0.15091,	0.15254,	0.15355,	0.15499,
	0.15638,	0.15854,	0.16094,	0.1626,	0.16444,
0.16721,	0.16882,	0.17029,	0.17337,	0.17473,	0.1766,
0.1775,	0.18102,	0.18166,	0.1826,	0.18458,	0.18707,
0.18925,	0.19193,	0.19408,	0.19614,	0.19901,	0.20091,
	0.20069,	0.20224,	0.20457,	0.2071,	0.21001,
0.21145,	0.21143,	0.21335,	0.21361,	0.21314,	0.2159,
0.21722,	0.21955,	0.22091,	0.22195,	0.22329,	0.22434,
0.2272,	0.2285,	0.22938,	0.23088,	0.23013,	0.23254,
	0.23439,	0.23536,	0.23982,	0.24263,	0.24462,
0.24676,	0.24629,	0.24796,	0.2509,	0.25279,	0.25646,
0.25995,	0.2602,	0.26122,	0.26316,	0.26476,	0.26569,
0.26647,	0.26845,	0.27268,	0.27456,	0.27683,	0.27837,
-	0.28024,	0.28177,	0.28325,	0.28366,	0.28609,
0.28848,	0.28954,	0.29247,	0.29482,	0.29478,	0.29334,
0.29527,	0.29732,	0.29856,	0.29912,	0.30199,	0.30307,
0.30513,	0.30812,	0.30962,	0.31118,	0.31282,	0.31352,
ŕ	0.31403,	0.31366,	0.31478,	0.3158,	0.31782,
0.31875,	0.32085,	0.32188,	0.32278,	0.32072,	0.32271,
0.32614,	0.3293,	0.32926,	0.32804,	0.32904,	0.33008,
0.33132,	0.33109,	0.33243,	0.33149,	0.33253,	0.33589,
,	0.33494,	0.33608,	0.33937,	0.34089,	0.34276,
0.34339,	0.34391,	0.34812,	0.34638,	0.34721,	0.34874,
0.34842,	0.34838,	0.34781,	0.34923,	0.35037,	0.35163,
0.35271,	0.35361,	0.35501,	0.35728,	0.35902,	0.36016,
,	0.36414,	0.36391,	0.36593,	0.36729,	0.36635,
0.3685,	0.36964,	0.37101,	0.37025,	0.37092,	0.37275,
0.37447,	0.37671,	0.3798,	0.38101,	0.38309,	0.38432,
0.38306,	0.3819,	0.38327,	0.38554,	0.38602,	0.38867,
,	0.39462,	0.39298,	0.39353,	0.39461,	0.39499,
0.39638,	0.3997,	0.4,	0.4003,	0.4008,	0.40351,
0.40915,	0.40819,	0.41084,	0.41546,	0.42105,	0.42265,
0.42588,	0.42591,	0.42859,	0.42805,	0.43113,	0.43,
0.12000,	0.43242,	0.43733,	0.43827,	0.43933,	0.44,
0.44127,	0.44456,	0.44678,	0.44963,	0.45025,	0.45073,
0.44127,	0.45068,	0.45012,	0.44955,	0.45531,	0.4551,
0.46106,		0.46222,	0.4644,		
0.40100,	0.46196,			0.46658,	0.46902,
	0.46799,	0.47022,	0.47227,	0.47259,	0.47291,

0.47324, 0.47356, 0.47739, 0.47839, 0.47662, 0.47537, 0.47603, 0.47661, 0.47662, 0.47537, 0.48038, 0.48068, 0.47789, 0.4811, 0.48207, 0.48118, 0.48348, 0.48455, 0.48552, 0.48756, 0.48668, 0.48582, 0.48756, 0.48668, 0.48921, 0.49143, 0.49302, 0.496474, 0.49722, 0.49797, 0.49949, 0.49872, 0.49993, 0.4991, 0.50017, 0.50409, 0.5075, 0.50664, 0.50961, 0.50017, 0.50409, 0.51398, 0.51538, 0.51411, 0.51554, 0.51506, 0.51192, 0.50864, 0.50998, 0.51231, 0.51506, 0.51653, 0.51754, 0.53308, 0.53371, 0.53351, 0.53499, 0.5244, 0.53308, 0.53371, 0.53351, 0.53499, 0.5244, 0.53308, 0.53371, 0.53351, 0.53499, 0.52484, 0.5284, 0.5313, 0.53484, 0.53284, 0.53385, 0.53365, 0.53238, 0.53244, 0.53368, 0.53458, 0.53238, 0.53468, 0.53281, 0.53368, 0.53458, 0.53468, 0.53484, 0.5348, 0.53418, 0.54422, 0.54308, 0.54375, 0.54441, 0.54476, 0.54476, 0.54476, 0.54476, 0.54476, 0.54476, 0.54476, 0.54476, 0.55264, 0.55265, 0	0 47004	0 47056	0 47700	0 47000	0 47000	0 47507
0.48103,         0.48068,         0.47989,         0.4811,         0.48207,         0.48118,           0.48548,         0.48782,         0.48971,         0.49133,         0.49376,         0.48668,           0.49722,         0.49797,         0.49949,         0.49872,         0.49993,         0.4991,           0.49828,         0.49896,         0.49858,         0.49931,         0.50017,         0.50409,           0.51398,         0.51538,         0.51411,         0.51556,         0.50991,         0.51192,           0.50854,         0.50998,         0.51231,         0.51506,         0.51653,         0.51754,           0.51398,         0.52339,         0.52212,         0.52484,         0.5284,         0.5313,           0.51856,         0.52339,         0.52212,         0.52484,         0.5284,         0.5313,           0.52751,         0.52364,         0.5230,         0.5336,         0.53351,         0.53365,         0.53239,         0.5293,         0.5203,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5304,           0.52751,         0.52364,         0.52677,         0.52839,         0.5293,         0.5304,           0.5321,         0.53368,<			· · · · · · · · · · · · · · · · · · ·			
0.48588,         0.48782,         0.48971,         0.49143,         0.49302,         0.49647,           0.49722,         0.49797,         0.49949,         0.49872,         0.49993,         0.4991,           0.49722,         0.49797,         0.49949,         0.49872,         0.49993,         0.4991,           0.5075,         0.50664,         0.50961,         0.50991,         0.51192,           0.51398,         0.51538,         0.51411,         0.51554,         0.51663,         0.51754,           0.50854,         0.50998,         0.51231,         0.51666,         0.51653,         0.51754,           0.51856,         0.52339,         0.52412,         0.52484,         0.5284,         0.5313,           0.54184,         0.54316,         0.5421,         0.54321,         0.5408,         0.5315,           0.53855,         0.5353,         0.53408,         0.5337,         0.5368,         0.53458,         0.53238,         0.53064,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.53281,         0.53369,         0.53506,         0.53458,         0.53468,         0.53468,           0.54271,         0.54221,         0.54369,         0.54061	0.47701,	0.47805,	0.4768,	0.47789,	0.47976,	0.48039,
0.48588,         0.48782,         0.48971,         0.49132,         0.49972,         0.49972,         0.49932,         0.49830,         0.49914,         0.49872,         0.49930,         0.49917,         0.50017,         0.50409,           0.49828,         0.49886,         0.49886,         0.49831,         0.50017,         0.50409,           0.5075,         0.50664,         0.50961,         0.50991,         0.51192,           0.5138,         0.51411,         0.51554,         0.51506,         0.51653,         0.51754,           0.51866,         0.52339,         0.52412,         0.5244,         0.5284,         0.5313,           0.53448,         0.53308,         0.53371,         0.53351,         0.53499,           0.54184,         0.54316,         0.5421,         0.54321,         0.5408,         0.5317,           0.532751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.53281,         0.53368,         0.53458,         0.5348,         0.5348,         0.5348,           0.53281,         0.53369,         0.5325,         0.5361,         0.5388,         0.5348,           0.53281,         0.5360,         0.53458,         0.5348,         0.5348,         0.5348	0.48103,	0.48068,	0.47989,	0.4811,	0.48207,	0.48118,
0.49722,         0.49797,         0.49849,         0.49872,         0.49993,         0.4991,           0.49828,         0.49866,         0.49858,         0.49931,         0.50017,         0.50409,           0.51398,         0.51538,         0.51411,         0.51506,         0.51506,         0.51036,           0.50854,         0.50998,         0.51231,         0.5106,         0.51653,         0.51754,           0.51866,         0.52339,         0.52412,         0.52484,         0.52335,         0.5313,           0.53144,         0.53308,         0.53371,         0.53351,         0.53499,           0.52751,         0.52634,         0.52412,         0.54321,         0.54408,         0.54155,           0.53855,         0.5353,         0.53408,         0.53366,         0.53238,         0.53049,           0.52751,         0.52634,         0.52677,         0.52839,         0.5233,         0.5302,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53283,         0.54242,         0.54308,         0.54275,         0.54441,         0.54418,           0.54045,         0.5418,         0.5418,         0.5418,         0.54168, <t< td=""><td></td><td>0.48348,</td><td>0.48455,</td><td>0.48552,</td><td>0.48756,</td><td>0.48668,</td></t<>		0.48348,	0.48455,	0.48552,	0.48756,	0.48668,
0.49828,         0.49896,         0.49858,         0.49931,         0.50017,         0.50409,           0.5075,         0.50664,         0.50961,         0.50991,         0.51192,         0.5138,         0.51411,         0.51554,         0.51066,         0.51036,           0.50854,         0.50998,         0.51231,         0.51565,         0.51653,         0.51754,           0.51856,         0.52339,         0.52412,         0.52484,         0.53351,         0.53351,         0.53349,           0.54184,         0.54316,         0.5421,         0.54321,         0.54408,         0.54155,           0.5385,         0.53308,         0.53365,         0.53238,         0.53054,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.53281,         0.53368,         0.53488,         0.53484,         0.5348,         0.53284,         0.5302,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53281,         0.53368,         0.53458,         0.55484,         0.5347,           0.53281,         0.5336,         0.53475,         0.54441,         0.54476,           0.54221,         0.545	0.48588,	0.48782,	0.48971,	0.49143,	0.49302,	0.49647,
0.5075,         0.50664,         0.50961,         0.50991,         0.51192,           0.5138,         0.51538,         0.51411,         0.51554,         0.51506,         0.51036,           0.50854,         0.50998,         0.51231,         0.51506,         0.51653,         0.51754,           0.51856,         0.52339,         0.52412,         0.52484,         0.5284,         0.5313,           0.54184,         0.54316,         0.5421,         0.54321,         0.54408,         0.53351,           0.53855,         0.5353,         0.53408,         0.53365,         0.53238,         0.53054,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.5317,         0.53368,         0.53458,         0.5348,         0.5348,         0.53881,         0.53761,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.54021,         0.5423,         0.5429,         0.54141,         0.54476,           0.54045,         0.54026,         0.54521,         0.54036,         0.54036,	0.49722,	0.49797,	0.49949,	0.49872,	0.49993,	0.4991,
0.5075,         0.50664,         0.50961,         0.50991,         0.51192,           0.5138,         0.51538,         0.51411,         0.51554,         0.51506,         0.51036,           0.50854,         0.50998,         0.51231,         0.51506,         0.51653,         0.51754,           0.51856,         0.52339,         0.52412,         0.52484,         0.5284,         0.5313,           0.54184,         0.54316,         0.5421,         0.54321,         0.54408,         0.53351,           0.53855,         0.5353,         0.53408,         0.53365,         0.53238,         0.53054,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.5317,         0.53368,         0.53458,         0.5348,         0.5348,         0.53881,         0.53761,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.54021,         0.5423,         0.5429,         0.54141,         0.54476,           0.54045,         0.54026,         0.54521,         0.54036,         0.54036,	0.49828,	0.49896,	0.49858,	0.49931,	0.50017,	0.50409,
0.51398,         0.51538,         0.51411,         0.51554,         0.51506,         0.51036,           0.50854,         0.50998,         0.51231,         0.51506,         0.51653,         0.51754,           0.51856,         0.52339,         0.52412,         0.52484,         0.53361,         0.53313,           0.53364,         0.53308,         0.53371,         0.53351,         0.53499,           0.54184,         0.54316,         0.5421,         0.54321,         0.54408,         0.54155,           0.52651,         0.52634,         0.52677,         0.52839,         0.5293,         0.5306,           0.52751,         0.52634,         0.53560,         0.53458,         0.5348,         0.5348,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53283,         0.54202,         0.53408,         0.54375,         0.54418,         0.54176,           0.54271,         0.54251,         0.5423,         0.54209,         0.54189,         0.54166,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54344,           0.54045,         0.55286,         0.55225,         0.55185,         0.55145,         0		0.5075,	0.50664,	0.50961,	0.50991,	0.51192,
0.50854,         0.50998,         0.51231,         0.51506,         0.51653,         0.51754,           0.51856,         0.52339,         0.52412,         0.52484,         0.5284,         0.5313,           0.54184,         0.53244,         0.53308,         0.53371,         0.53351,         0.53499,           0.53855,         0.5353,         0.53408,         0.53365,         0.53238,         0.53054,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.5317,         0.53368,         0.53458,         0.53848,         0.5346,         0.53761,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53283,         0.54026,         0.53427,         0.54441,         0.54476,         0.54271,         0.54251,         0.54338,         0.54275,         0.54486,         0.54066,         0.54026,         0.54229,         0.54189,         0.54168,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54434,         0.55268,         0.55225,         0.55185,	0.51398.	0.51538.		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
0.51856,         0.52339,         0.52412,         0.52484,         0.53361,         0.53313,           0.54184,         0.54316,         0.5421,         0.54321,         0.54408,         0.54155,           0.53855,         0.5385,         0.5385,         0.53636,         0.53365,         0.53238,         0.53054,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.5317,         0.53368,         0.53458,         0.53548,         0.5348,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53893,         0.54222,         0.54308,         0.54209,         0.54189,         0.54766,           0.54271,         0.54251,         0.5422,         0.5406,         0.54066,         0.54066,           0.54045,         0.53886,         0.54026,         0.54229,         0.55148,         0.54476,           0.54045,         0.53886,         0.54026,         0.54321,         0.54373,         0.54434,           0.54045,         0.55286,         0.55285,         0.55185,         0.55145,         0.55246,           0.55306,         0.55265,         0.55289,         0.55285,         0.55	· · · · · · · · · · · · · · · · · · ·		· ·			
0.54184,         0.53244,         0.53308,         0.53371,         0.53351,         0.53499,           0.54184,         0.54316,         0.5421,         0.54321,         0.54408,         0.54155,           0.53855,         0.5353,         0.53408,         0.53365,         0.53238,         0.53054,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53893,         0.54242,         0.54308,         0.54375,         0.54418,         0.54168,           0.54271,         0.54251,         0.5423,         0.54209,         0.54189,         0.54168,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54086,         0.54066,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54086,         0.54086,         0.54034,           0.55217,         0.55388,         0.54521,         0.54373,         0.54086,         0.54034,         0.54922,         0.55258,         0.55246,           0.55306,         0.55265,         0.55225,         0.55185,         0.55185,		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			
0.54184,         0.54316,         0.5421,         0.54321,         0.54408,         0.5365,           0.53855,         0.5363,         0.53408,         0.53365,         0.5238,         0.53054,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.5317,         0.53368,         0.53458,         0.53548,         0.5348,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.5348,           0.53893,         0.54242,         0.54308,         0.5427,         0.54141,         0.54476,           0.54271,         0.54251,         0.5423,         0.54209,         0.54189,         0.54168,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54481,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54373,         0.54373,         0.54086,           0.54041,         0.54636,         0.54731,         0.54922,         0.55258,         0.55465,           0.55212,         0.55889,         0.55963,         0.55048,         0.56109,           0.56198,         0.56228,         0.56641,         0.56361,         0.5617	,					
0.53855,         0.53634,         0.52677,         0.52839,         0.5293,         0.5302,           0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53893,         0.54242,         0.54308,         0.54375,         0.54441,         0.54476,           0.54271,         0.54251,         0.5423,         0.54209,         0.54189,         0.54168,           0.54045,         0.53386,         0.54026,         0.54521,         0.54373,         0.54086,         0.54065,           0.54341,         0.54636,         0.54731,         0.54922,         0.55258,         0.55346,           0.55306,         0.55265,         0.55225,         0.55185,         0.56194,         0.56136,         0.56109,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56119,           0.56323,         0.56286,         0.56248,         0.56173,         0.56476,         0.56476,         0.56472,           0.58201,         0.56518,         0.56678,         0.56576,         0.56842,         0.57324,           0.58201,	0 54184					
0.52751,         0.52634,         0.52677,         0.52839,         0.5293,         0.5302,           0.53281,         0.53369,         0.53502,         0.53458,         0.53881,         0.53761,           0.53893,         0.54242,         0.54308,         0.54375,         0.54441,         0.54476,           0.54271,         0.54251,         0.5423,         0.54209,         0.54189,         0.54168,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54085,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54343,           0.54541,         0.54636,         0.54731,         0.54922,         0.55258,         0.55346,           0.55306,         0.55265,         0.55225,         0.55185,         0.55145,         0.55277,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56619,           0.56321,         0.56628,         0.56678,         0.5627,         0.56476,         0.56625,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56224,           0.57404,         0.57249,         0.57372,         0.57528, <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td></t<>						
0.5317,         0.53368,         0.53458,         0.53548,         0.5348,           0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53893,         0.54242,         0.54308,         0.54375,         0.54441,         0.54476,           0.54271,         0.54251,         0.5423,         0.54209,         0.54189,         0.54168,           0.54045,         0.53886,         0.54026,         0.54821,         0.54086,         0.54065,           0.54541,         0.54636,         0.54731,         0.54922,         0.55258,         0.55346,           0.55306,         0.55265,         0.55289,         0.55185,         0.55145,         0.55277,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56619,           0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56462,         0.56678,         0.56576,         0.56842,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58421,         0.58428, <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>						
0.53281,         0.53369,         0.53502,         0.5361,         0.53881,         0.53761,           0.53893,         0.54242,         0.54308,         0.54375,         0.54441,         0.54476,           0.54271,         0.54281,         0.5423,         0.54209,         0.54189,         0.54168,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54434,           0.54541,         0.54636,         0.54731,         0.54922,         0.55258,         0.55246,           0.55306,         0.55265,         0.55225,         0.55185,         0.55145,         0.55277,           0.55212,         0.55889,         0.55963,         0.56036,         0.56109,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56310,           0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56172,           0.57404,         0.57249,         0.567372,         0.57528,         0.57324,         0.57324,           0.58201,         0.58298,         0.58394,         0.58421,         0.58428,         0.58029,           0.5877,         0.58451,         0.59369,         0.59125,         0.58949,         <	0.02701,	,				
0.53893,         0.54242,         0.54308,         0.54375,         0.54441,         0.54476,           0.54271,         0.54251,         0.5423,         0.54209,         0.54189,         0.54168,           0.54045,         0.54386,         0.54127,         0.54106,         0.54086,         0.54065,           0.54041,         0.54636,         0.54026,         0.54521,         0.54373,         0.54434,           0.55306,         0.55265,         0.55225,         0.55185,         0.55145,         0.55277,           0.55212,         0.55889,         0.55963,         0.56036,         0.56109,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56311,           0.56323,         0.56628,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56628,         0.56626,         0.56327,         0.56476,         0.56625,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58421,         0.58949,         0.59094,           0.58271,         0.58451,         0.58969,         0.59125,         0.58948,	0 F2001					
0.54271,         0.54251,         0.5423,         0.54209,         0.54189,         0.54168,           0.54148,         0.54127,         0.54106,         0.54086,         0.54065,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54434,           0.54541,         0.54636,         0.54731,         0.54922,         0.55258,         0.55346,           0.55306,         0.55265,         0.55225,         0.55185,         0.56145,         0.55277,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56361,           0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56109,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.56518,         0.56678,         0.56576,         0.56842,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58491,         0.58428,         0.58623,           0.5877,         0.58851,         0.59369,         0.59125,         0.58925,         0.58925,						
0.54148,         0.54127,         0.54106,         0.54086,         0.54065,           0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54434,           0.54541,         0.54636,         0.54731,         0.54922,         0.55258,         0.55346,           0.55306,         0.55265,         0.55225,         0.55185,         0.55145,         0.55277,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56109,           0.56323,         0.566842,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.56518,         0.56678,         0.56576,         0.56440,         0.57324,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58421,         0.58428,         0.58623,           0.59231,         0.59369,         0.59125,         0.59025,         0.58925,           0.5877,         0.58851,         0.59963,         0.60277,         0.60033,         0.60224, <td></td> <td>· · · · · · · · · · · · · · · · · · ·</td> <td></td> <td></td> <td></td> <td></td>		· · · · · · · · · · · · · · · · · · ·				
0.54045,         0.53886,         0.54026,         0.54521,         0.54373,         0.54434,           0.54541,         0.54636,         0.54731,         0.54922,         0.55258,         0.55346,           0.55306,         0.55265,         0.55225,         0.55185,         0.55145,         0.55277,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56361,           0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.56391,         0.56642,         0.56678,         0.56527,         0.56476,         0.56625,           0.56391,         0.56642,         0.56678,         0.56527,         0.56426,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58428,         0.58929,           0.5877,         0.58851,         0.59369,         0.59125,         0.59025,         0.58925,           0.5877,         0.58851,         0.59963,         0.60277,         0.60033,         <	0.54271,		,			
0.54541,         0.54636,         0.54731,         0.54922,         0.55258,         0.55346,           0.55306,         0.55265,         0.55225,         0.55185,         0.55145,         0.55277,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56361,           0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.56518,         0.56678,         0.56576,         0.56842,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.588491,         0.58428,         0.58029,           0.5877,         0.59369,         0.59125,         0.59025,         0.58925,           0.5877,         0.58851,         0.59963,         0.6075,         0.60033,         0.60224,           0.60415,         0.60863,         0.60809,         0.6075,         0.60701,         0.60648,           0.60574,         0.60436,         0.61031,         0.60783,         0.61005,         0.61022,			0.54127,		0.54086,	0.54065,
0.55306,         0.55265,         0.55225,         0.55185,         0.55145,         0.55277,           0.55212,         0.55889,         0.55963,         0.56036,         0.56109,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56361,           0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.56518,         0.56678,         0.56576,         0.56842,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58491,         0.58428,         0.58623,           0.58514,         0.58405,         0.58578,         0.58821,         0.58949,         0.59094,           0.59231,         0.59369,         0.59125,         0.59025,         0.58925,           0.5877,         0.58851,         0.59963,         0.60277,         0.60033,         0.60224,           0.60415,         0.60836,         0.60809,         0.60755,         0.60701,         0.60648,           0.6	0.54045,	0.53886,	0.54026,	0.54521,	0.54373,	0.54434,
0.55212,         0.55889,         0.55963,         0.56036,         0.56109,           0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56361,           0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58491,         0.58428,         0.58623,           0.58514,         0.58405,         0.58578,         0.58821,         0.58949,         0.59094,           0.59231,         0.59963,         0.60277,         0.60033,         0.60224,           0.60415,         0.60863,         0.60809,         0.60755,         0.60701,         0.60648,           0.60574,         0.60436,         0.60331,         0.60783,         0.61005,         0.61228,           0.61138,         0.61263,         0.61388,         0.6161,         0.6186,         0.61432,           0.6113,         0.60858,         0.61008,         0.61159,         0.61309,         0.61271,	0.54541,	0.54636,	0.54731,	0.54922,	0.55258,	0.55346,
0.56198,         0.56288,         0.56641,         0.56835,         0.56438,         0.56361,           0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58491,         0.58428,         0.58623,           0.58514,         0.58405,         0.58578,         0.58821,         0.58949,         0.59094,           0.59231,         0.59963,         0.60277,         0.60033,         0.60224,           0.60415,         0.60863,         0.60809,         0.60755,         0.60701,         0.60648,           0.60574,         0.60436,         0.60331,         0.60783,         0.61005,         0.61228,           0.61138,         0.61263,         0.61388,         0.6161,         0.6186,         0.61432,           0.6113,         0.60858,         0.61008,         0.61159,         0.61309,         0.61271,           0.61729,         0.61513,         0.61885,         0.62452,         0.62691,	0.55306,	0.55265,	0.55225,	0.55185,	0.55145,	0.55277,
0.56323,         0.56286,         0.56248,         0.5621,         0.56173,         0.56172,           0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.56518,         0.56678,         0.56576,         0.56842,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58491,         0.58428,         0.58623,           0.58514,         0.58405,         0.58578,         0.58821,         0.58949,         0.59094,           0.5877,         0.58851,         0.59963,         0.60277,         0.60033,         0.60224,           0.60415,         0.60863,         0.60809,         0.60755,         0.60701,         0.60488,           0.60574,         0.60436,         0.60331,         0.60783,         0.61005,         0.61228,           0.61138,         0.61263,         0.61388,         0.61035,         0.60966,         0.61012,           0.6113,         0.60858,         0.61008,         0.61159,         0.61309,         0.61271,           0.61729,         0.61513,         0.61885,         0.62452,         0.62691,		0.55212,	0.55889,	0.55963,	0.56036,	0.56109,
0.56391,         0.56642,         0.56626,         0.56327,         0.56476,         0.56625,           0.56518,         0.56678,         0.56576,         0.56842,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58491,         0.58428,         0.58623,           0.58514,         0.58405,         0.58578,         0.58821,         0.58949,         0.59094,           0.59231,         0.59369,         0.59125,         0.59025,         0.58925,           0.5877,         0.58851,         0.59963,         0.60277,         0.60033,         0.60224,           0.60415,         0.60863,         0.60809,         0.60755,         0.60701,         0.60648,           0.60574,         0.60436,         0.60331,         0.6073,         0.61005,         0.61228,           0.61175,         0.61105,         0.61035,         0.60966,         0.61012,           0.61138,         0.61263,         0.6138,         0.6161,         0.6186,         0.61432,           0.61176,         0.6108,         0.61095,         0.61323,         0.61643,         0.61221,           0.62898	0.56198,	0.56288,	0.56641,	0.56835,	0.56438,	0.56361,
0.56518,         0.56678,         0.56576,         0.56842,         0.57324,           0.57404,         0.57249,         0.57372,         0.57528,         0.57481,         0.58029,           0.58201,         0.58298,         0.58394,         0.58491,         0.58428,         0.58623,           0.58514,         0.58405,         0.58578,         0.58821,         0.58949,         0.59094,           0.59231,         0.59369,         0.59125,         0.59025,         0.58925,           0.5877,         0.58851,         0.59963,         0.60277,         0.60033,         0.60224,           0.60415,         0.60863,         0.60809,         0.60755,         0.60701,         0.60648,           0.60574,         0.60436,         0.60331,         0.60783,         0.61005,         0.61228,           0.61175,         0.61105,         0.61035,         0.60966,         0.61012,           0.61138,         0.61263,         0.61388,         0.6161,         0.6186,         0.61432,           0.61176,         0.6108,         0.61095,         0.61323,         0.61643,         0.61271,           0.62898,         0.63084,         0.63191,         0.63297,         0.63404,         0.6351,           0.6395	0.56323,	0.56286,	0.56248,	0.5621,	0.56173,	0.56172,
0.57404,       0.57249,       0.57372,       0.57528,       0.57481,       0.58029,         0.58201,       0.58298,       0.58394,       0.58491,       0.58428,       0.58623,         0.58514,       0.58405,       0.58578,       0.58821,       0.58949,       0.59094,         0.59231,       0.59369,       0.59125,       0.59025,       0.58925,         0.5877,       0.58851,       0.59963,       0.60277,       0.60033,       0.60224,         0.60415,       0.60863,       0.60809,       0.60755,       0.60701,       0.60648,         0.60574,       0.60436,       0.60331,       0.60783,       0.61005,       0.61228,         0.61175,       0.61105,       0.61035,       0.60966,       0.61012,         0.61138,       0.61263,       0.61388,       0.6161,       0.6186,       0.61432,         0.6113,       0.60858,       0.61008,       0.61159,       0.61309,       0.61271,         0.61176,       0.6108,       0.61095,       0.61323,       0.61643,       0.61924,         0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.6395,       0.63746,       0.63649,       0.63551,       0.63455,	0.56391,	0.56642,	0.56626,	0.56327,	0.56476,	0.56625,
0.58201,       0.58298,       0.58394,       0.58491,       0.58428,       0.58623,         0.58514,       0.58405,       0.58578,       0.58821,       0.58949,       0.59094,         0.59231,       0.59369,       0.59125,       0.59025,       0.58925,         0.5877,       0.58851,       0.59963,       0.60277,       0.60033,       0.60224,         0.60415,       0.60863,       0.60809,       0.60755,       0.60701,       0.60648,         0.60574,       0.60436,       0.60331,       0.60783,       0.61005,       0.61228,         0.61175,       0.61105,       0.61035,       0.60966,       0.61012,         0.61138,       0.61263,       0.61388,       0.6161,       0.6186,       0.61432,         0.6113,       0.60858,       0.61008,       0.61159,       0.61309,       0.61271,         0.61176,       0.6108,       0.61095,       0.61323,       0.61643,       0.61924,         0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.6395,       0.63746,       0.63649,       0.63551,       0.63455,       0.63384,         0.63401,       0.63023,       0.63455,       0.63864,       0.64256,		0.56518,	0.56678,	0.56576,	0.56842,	0.57324,
0.58201,       0.58298,       0.58394,       0.58491,       0.58428,       0.58623,         0.58514,       0.58405,       0.58578,       0.58821,       0.58949,       0.59094,         0.59231,       0.59369,       0.59125,       0.59025,       0.58925,         0.5877,       0.58851,       0.59963,       0.60277,       0.60033,       0.60224,         0.60415,       0.60863,       0.60809,       0.60755,       0.60701,       0.60648,         0.60574,       0.60436,       0.60331,       0.60783,       0.61005,       0.61228,         0.61175,       0.61105,       0.61035,       0.60966,       0.61012,         0.61138,       0.61263,       0.61388,       0.6161,       0.6186,       0.61432,         0.6113,       0.60858,       0.61008,       0.61159,       0.61309,       0.61271,         0.61176,       0.6108,       0.61095,       0.61323,       0.61643,       0.61924,         0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.6395,       0.63746,       0.63649,       0.6351,       0.63455,       0.63384,         0.63401,       0.63023,       0.63455,       0.63864,       0.64256,	0.57404,	0.57249,	0.57372,	0.57528,	0.57481,	0.58029,
0.59231,         0.59369,         0.59125,         0.59025,         0.58925,           0.5877,         0.58851,         0.59963,         0.60277,         0.60033,         0.60224,           0.60415,         0.60863,         0.60809,         0.60755,         0.60701,         0.60648,           0.60574,         0.60436,         0.60331,         0.60783,         0.61005,         0.61228,           0.61175,         0.61105,         0.61035,         0.60966,         0.61012,           0.61138,         0.61263,         0.61388,         0.6161,         0.6186,         0.61432,           0.6113,         0.60858,         0.61008,         0.61159,         0.61309,         0.61271,           0.61176,         0.6108,         0.61095,         0.61323,         0.61643,         0.61924,           0.61729,         0.61513,         0.61885,         0.62452,         0.62691,           0.63288,         0.63084,         0.63191,         0.63297,         0.63404,         0.6351,           0.6395,         0.63746,         0.63649,         0.63551,         0.63455,         0.63384,           0.63401,         0.63023,         0.63455,         0.63864,         0.64256,         0.64196,           0.64098,	0.58201,	0.58298,	0.58394,	0.58491,	0.58428,	0.58623,
0.59231,         0.59369,         0.59125,         0.59025,         0.58925,           0.5877,         0.58851,         0.59963,         0.60277,         0.60033,         0.60224,           0.60415,         0.60863,         0.60809,         0.60755,         0.60701,         0.60648,           0.60574,         0.60436,         0.60331,         0.60783,         0.61005,         0.61228,           0.61175,         0.61105,         0.61035,         0.60966,         0.61012,           0.61138,         0.61263,         0.61388,         0.6161,         0.6186,         0.61432,           0.6113,         0.60858,         0.61008,         0.61159,         0.61309,         0.61271,           0.61176,         0.6108,         0.61095,         0.61323,         0.61643,         0.61924,           0.61729,         0.61513,         0.61885,         0.62452,         0.62691,           0.63288,         0.63084,         0.63191,         0.63297,         0.63404,         0.6351,           0.6395,         0.63746,         0.63649,         0.63551,         0.63455,         0.63384,           0.63401,         0.63023,         0.63455,         0.63864,         0.64256,         0.64196,           0.64098,	0.58514,	0.58405,	0.58578,	0.58821,	0.58949,	0.59094,
0.5877,       0.58851,       0.59963,       0.60277,       0.60033,       0.60224,         0.60415,       0.60863,       0.60809,       0.60755,       0.60701,       0.60648,         0.60574,       0.60436,       0.60331,       0.60783,       0.61005,       0.61228,         0.61175,       0.61105,       0.61035,       0.60966,       0.61012,         0.61138,       0.61263,       0.61388,       0.6161,       0.6186,       0.61432,         0.6113,       0.60858,       0.61008,       0.61159,       0.61309,       0.61271,         0.61176,       0.6108,       0.61095,       0.61323,       0.61643,       0.61924,         0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.63616,       0.64088,       0.64423,       0.64689,       0.64676,       0.64364,         0.6395,       0.63746,       0.63241,       0.6317,       0.63156,       0.63574,         0.63401,       0.63023,       0.63455,       0.63864,       0.63538,       0.63453,       0.63368,         0.64098,       0.64001,       0.63869,       0.63538,       0.63453,       0.63368,	•	•		•	0.59025.	
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0.61175,       0.61105,       0.61035,       0.60966,       0.61012,         0.61138,       0.61263,       0.61388,       0.6161,       0.6186,       0.61432,         0.6113,       0.60858,       0.61008,       0.61159,       0.61309,       0.61271,         0.61176,       0.6108,       0.61095,       0.61323,       0.61643,       0.61924,         0.61729,       0.61513,       0.61885,       0.62452,       0.62691,         0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.63616,       0.64088,       0.64423,       0.64689,       0.64676,       0.63384,         0.6395,       0.63746,       0.63649,       0.63551,       0.63455,       0.63574,         0.63401,       0.63023,       0.63455,       0.63864,       0.64256,       0.64196,         0.64098,       0.64001,       0.63869,       0.63538,       0.63453,       0.63368,		•				
0.61138,       0.61263,       0.61388,       0.6161,       0.6186,       0.61432,         0.6113,       0.60858,       0.61008,       0.61159,       0.61309,       0.61271,         0.61176,       0.6108,       0.61095,       0.61323,       0.61643,       0.61924,         0.61729,       0.61513,       0.61885,       0.62452,       0.62691,         0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.63616,       0.64088,       0.64423,       0.64689,       0.64676,       0.64364,         0.6395,       0.63746,       0.63649,       0.63551,       0.63455,       0.63384,         0.63401,       0.63023,       0.63455,       0.63864,       0.64256,       0.64196,         0.64098,       0.64001,       0.63869,       0.63538,       0.63453,       0.63368,				· · · · · · · · · · · · · · ·		
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0.61176,       0.6108,       0.61095,       0.61323,       0.61643,       0.61924,         0.61729,       0.61513,       0.61885,       0.62452,       0.62691,         0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.63616,       0.64088,       0.64423,       0.64689,       0.64676,       0.64364,         0.6395,       0.63746,       0.63649,       0.63551,       0.63455,       0.63384,         0.63313,       0.63241,       0.6317,       0.63156,       0.63574,         0.63401,       0.63023,       0.63455,       0.63864,       0.64256,       0.64196,         0.64098,       0.64001,       0.63869,       0.63538,       0.63453,       0.63368,		•		· ·	-	-
0.61729,       0.61513,       0.61885,       0.62452,       0.62691,         0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.63616,       0.64088,       0.64423,       0.64689,       0.64676,       0.64364,         0.6395,       0.63746,       0.63649,       0.63551,       0.63455,       0.63384,         0.63313,       0.63241,       0.6317,       0.63156,       0.63574,         0.63401,       0.63023,       0.63455,       0.63864,       0.64256,       0.64196,         0.64098,       0.64001,       0.63869,       0.63538,       0.63453,       0.63368,	•					· ·
0.62898,       0.63084,       0.63191,       0.63297,       0.63404,       0.6351,         0.63616,       0.64088,       0.64423,       0.64689,       0.64676,       0.64364,         0.6395,       0.63746,       0.63649,       0.63551,       0.63455,       0.63384,         0.63313,       0.63241,       0.6317,       0.63156,       0.63574,         0.63401,       0.63023,       0.63455,       0.63864,       0.64256,       0.64196,         0.64098,       0.64001,       0.63869,       0.63538,       0.63453,       0.63368,	0.01170,					
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'Confidence', 'Recall']]
fitness: 0.1006941605113048
keys: ['metrics/precision(B)', 'metrics/recall(B)', 'metrics/mAP50(B)',
'metrics/mAP50-95(B)']
maps: array([
                 0.085857])
names: {0: 'turtle track'}
plot: True
results_dict: {'metrics/precision(B)': 0.45011624411097634, 'metrics/recall(B)':
0.26452890363421977, 'metrics/mAP50(B)': 0.23422943002325464,
'metrics/mAP50-95(B)': 0.08585690834331036, 'fitness': 0.1006941605113048}
```

```
save_dir: WindowsPath('runs/detect/val9')
speed: {'preprocess': 1.1174529790878296, 'inference': 57.51746892929077,
'loss': 0.0, 'postprocess': 1.4801046677998133}
task: 'detect'
```

## Implementación de U-Net

Porque la detección de huellas de tortugas es un problema de segmentación de instancias, se puede utilizar una arquitectura de red neuronal convolucional (CNN) llamada U-Net. U-Net es una red neuronal convolucional profunda que se utiliza para la segmentación de imágenes. La arquitectura de U-Net consta de un codificador y un decodificador. El codificador es una pila de capas convolucionales que se utilizan para extraer características de la imagen de entrada. El decodificador es una pila de capas convolucionales que se utilizan para generar una máscara de segmentación de la imagen de entrada.

## 1. Introducción

Este notebook implementa y entrena un modelo U-Net para segmentación de huellas. Sigue los pasos detallados para cargar, preprocesar los datos, definir la arquitectura, entrenar el modelo y evaluarlo.

## 2. Preparación Inicial

```
[1]: # Importar librerías necesarias
import os
import numpy as np
import tensorflow as tf
from tensorflow.keras.layers import Input, Conv2D, MaxPooling2D, UpSampling2D,
concatenate
from tensorflow.keras.models import Model
from tensorflow.keras.optimizers import Adam
import cv2
import matplotlib.pyplot as plt

# Configuración inicial
IMAGE_SIZE = 256 # Tamaño al que redimensionaremos las imágenes y máscaras
BATCH_SIZE = 20 # Tamaño del lote
EPOCHS = 50 # Número de épocas
LEARNING_RATE = 1e-4 # Tasa de aprendizaje
```

```
JSON DIR = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Para Etiquetar Huellas\json"
MASCARAS_DIR = r"C:
 →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\masks"
# Crear carpeta para las máscaras si no existe
os.makedirs(MASCARAS_DIR, exist_ok=True)
def crear_mascaras(imagenes_dir, json_dir, mascaras_dir, tamaño=(256, 256)):
    Genera máscaras en escala de grises a partir de archivos JSON.
    for json_file in os.listdir(json_dir):
        if json_file.endswith(".json"):
            ruta_json = os.path.join(json_dir, json_file)
            ruta_imagen = os.path.join(imagenes_dir, json_file.replace(".json", __
 →".jpg"))
            # Leer el archivo JSON
            with open(ruta_json, 'r') as f:
                datos = json.load(f)
            # Leer dimensiones de la imagen
            imagen = cv2.imread(ruta_imagen)
            altura, ancho, _ = imagen.shape
            # Crear una máscara vacía
            mascara = np.zeros((altura, ancho), dtype=np.uint8)
            # Dibujar las líneas o formas en la máscara
            for shape in datos.get("shapes", []):
                if shape["shape_type"] == "linestrip":
                    puntos = np.array(shape["points"], dtype=np.int32)
                    cv2.polylines(mascara, [puntos], isClosed=False, color=255,_
 ⇔thickness=5)
            # Redimensionar la máscara al tamaño deseado
            mascara = cv2.resize(mascara, tamaño, interpolation=cv2.
 →INTER_NEAREST)
            # Guardar la máscara
            ruta_mascara = os.path.join(mascaras_dir, json_file.replace(".

¬json", ".png"))
            cv2.imwrite(ruta_mascara, mascara)
# Generar máscaras
```

```
crear_mascaras(IMAGENES_DIR, JSON_DIR, MASCARAS_DIR, tamaño=(256, 256))
print(f"Máscaras generadas en: {MASCARAS_DIR}")
```

Máscaras generadas en:

C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\masks

```
[25]: # poner maskara en train y val
      import os
      import shutil
      # Configuración de directorios
      MASCARAS_DIR = r"C:
       →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\masks"
      TRAIN_MASKS = r"C:
       →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset Organizado\train\masks"
      VAL MASKS = r"C:
       →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\val\masks"
      # Crear directorios para las máscaras en train y val
      os.makedirs(TRAIN_MASKS, exist_ok=True)
      os.makedirs(VAL_MASKS, exist_ok=True)
      # Mover las máscaras a train y val
      mascaras = os.listdir(MASCARAS_DIR)
      for i, mascara in enumerate(mascaras):
          if i % 5 == 0:
              shutil.move(os.path.join(MASCARAS_DIR, mascara), os.path.
       →join(VAL_MASKS, mascara))
          else:
              shutil.move(os.path.join(MASCARAS_DIR, mascara), os.path.
       →join(TRAIN_MASKS, mascara))
      print(f"Máscaras movidas a: {TRAIN_MASKS} y {VAL_MASKS}")
```

Máscaras movidas a:

C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\train\masks
y C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\val\masks

```
VAL_DIR = os.path.join(DATASET_DIR, "val")
# Crear carpetas de entrenamiento y validación
os.makedirs(os.path.join(TRAIN_DIR, "images"), exist_ok=True)
os.makedirs(os.path.join(TRAIN_DIR, "masks"), exist_ok=True)
os.makedirs(os.path.join(VAL_DIR, "images"), exist_ok=True)
os.makedirs(os.path.join(VAL_DIR, "masks"), exist_ok=True)
# Listar imágenes y máscaras
imagenes = os.listdir(IMAGENES_DIR)
mascaras = os.listdir(MASCARAS DIR)
# Ordenar y dividir aleatoriamente
random.seed(42)
datos = list(zip(imagenes, mascaras))
random.shuffle(datos)
# Dividir en 80% entrenamiento y 20% validación
split_index = int(len(datos) * 0.8)
train_data = datos[:split_index]
val_data = datos[split_index:]
# Copiar datos
def copiar_datos(datos, destino_imagenes, destino_mascaras):
   for img_file, mask_file in datos:
        shutil.copy(os.path.join(IMAGENES_DIR, img_file), os.path.
 →join(destino_imagenes, img_file))
        shutil.copy(os.path.join(MASCARAS_DIR, mask_file), os.path.
 →join(destino_mascaras, mask_file))
copiar_datos(train_data, os.path.join(TRAIN_DIR, "images"), os.path.
 ⇒join(TRAIN DIR, "masks"))
copiar_datos(val_data, os.path.join(VAL_DIR, "images"), os.path.join(VAL_DIR,__

¬"masks"))
print("Datos organizados en:")
print(f"- Entrenamiento: {TRAIN_DIR}")
print(f"- Validación: {VAL_DIR}")
```

## Datos organizados en:

- Entrenamiento:
- C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\train
- Validación:
- C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\val
  - 3. Cargar y Preprocesar los Datos

```
[1]: import os
     import cv2
     import numpy as np
     IMAGE_SIZE = 256 # Tamaño de las imágenes
     TRAIN_DIR = r"C:
      →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\train"
     VAL DIR = r"C:
      →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\val"
     def load_data(image_path, mask_path):
         Carga y preprocesa las imágenes y máscaras.
         images = []
         masks = []
         # Iterar sobre las imágenes en la carpeta
         for img_file in os.listdir(image_path):
             # Construir la ruta de la imagen
             img_path = os.path.join(image_path, img_file)
             # Leer la imagen
             if not os.path.exists(img_path):
                 print(f"Imagen no encontrada: {img_path}")
                 continue
             img = cv2.imread(img_path, cv2.IMREAD_COLOR)
             if img is None:
                 print(f"Error al cargar la imagen: {img_path}")
                 continue
             # Construir el nombre y la ruta de la máscara correspondiente
             mask_file = img_file.replace(".jpg", ".png").replace(".jpeg", ".png").

¬replace(".JPG", ".png")
             mask_path_full = os.path.join(mask_path, mask_file)
             # Leer la máscara
             if not os.path.exists(mask_path_full):
                 print(f"Máscara no encontrada: {mask_path_full}")
                 continue
             mask = cv2.imread(mask_path_full, cv2.IMREAD_GRAYSCALE | cv2.
      →IMREAD ANYDEPTH)
             if mask is None:
                 print(f"Error al cargar la máscara: {mask_path_full}")
                 continue
```

```
# Redimensionar y normalizar las imágenes y máscaras
                img = cv2.resize(img, (IMAGE_SIZE, IMAGE_SIZE)) / 255.0
                mask = cv2.resize(mask, (IMAGE_SIZE, IMAGE_SIZE)) / 255.0
                 # Expandir la dimensión de la máscara para que sea compatible
                mask = np.expand_dims(mask, axis=-1)
                 # Agregar la imagen y la máscara a las listas
                images.append(img)
                masks.append(mask)
        return np.array(images), np.array(masks)
 # Cargar datos
 train_images, train_masks = load_data(TRAIN_DIR + "/images", TRAIN_DIR + "/
   →masks")
 val_images, val_masks = load_data(VAL_DIR + "/images", VAL_DIR + "/masks")
 # Mostrar forma de los datos cargados
 print(f"Imágenes de entrenamiento: {train images.shape}, Máscaras de la companiento del companiento de la companiento del companiento de la companiento de l

→entrenamiento: {train_masks.shape}")
 print(f"Imágenes de validación: {val_images.shape}, Máscaras de validación: [u]

√{val_masks.shape}")

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\label{thm:local_masksloss} $$ Mascara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\val/masks\106FTASK_IRX_1869.png
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Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\113FTASK\_IRX\_3438.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\114FTASK\_IRX\_3532.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\114FTASK\_IRX\_3555.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\114FTASK\_IRX\_3628.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\114FTASK\_IRX\_3679.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\114FTASK\_IRX\_3726.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\114FTASK\_IRX\_3863.png

```
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\116FTASK_IRX_3956.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\116FTASK_IRX_4032.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\116FTASK_IRX_4139.png
```

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\116FTASK\_IRX\_4146.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\117FTASK\_IRX\_1926.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\117FTASK\_IRX\_1933.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\117FTASK\_IRX\_1965.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\117FTASK\_IRX\_1966.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\val/masks\117FTASK\_IRX\_2053.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\val/masks\117FTASK\_IRX\_4482.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\117FTASK\_IRX\_4497.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\119FTASK\_IRX\_2138.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\119FTASK\_IRX\_2151.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\119FTASK\_IRX\_2264.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\119FTASK\_IRX\_2276.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_Organizado\val/masks\119FTASK\_IRX\_2327.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\119FTASK\_IRX\_2384.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\119FTASK\_IRX\_2397.png

 $\label{thm:local_masks_like} $$ Mascara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\val/masks\119FTASK_IRX_4735.png$ 

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\119FTASK\_IRX\_4845.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\119FTASK\_IRX\_4893.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\120FTASK\_IRX\_5007.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\120FTASK\_IRX\_5070.png

Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset\_ Organizado\val/masks\120FTASK\_IRX\_5141.png

```
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\121FTASK_IRX_2473.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\122FTASK_IRX_2524.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\122FTASK_IRX_2527.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\122FTASK_IRX_2689.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\122FTASK_IRX_2717.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\123FTASK_IRX_2819.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\123FTASK_IRX_2833.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_2874.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_2884.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK IRX 2925.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_2964.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_2970.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_2987.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\124FTASK_IRX_2989.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\124FTASK_IRX_2998.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_3011.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\124FTASK_IRX_3013.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset
Organizado\val/masks\124FTASK_IRX_3015.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_3029.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_3054.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
Organizado\val/masks\124FTASK_IRX_3055.png
Máscara no encontrada: C:\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_
```

Imágenes de entrenamiento: (360, 256, 256, 3), Máscaras de entrenamiento: (360,

Imágenes de validación: (24, 256, 256, 3), Máscaras de validación: (24, 256,

Organizado\val/masks\125FTASK\_IRX\_3124.png

256, 256, 1)

256, 1)

4. Definir la Arquitectura U-Net

```
[3]: #Desfasaco
     def build_unet(input_size=(256, 256, 3)):
         Construye el modelo U-Net.
         inputs = Input(input_size)
         # Encoder
         c1 = Conv2D(64, (3, 3), activation='relu', padding='same')(inputs)
         c1 = Conv2D(64, (3, 3), activation='relu', padding='same')(c1)
         p1 = MaxPooling2D((2, 2))(c1)
         c2 = Conv2D(128, (3, 3), activation='relu', padding='same')(p1)
         c2 = Conv2D(128, (3, 3), activation='relu', padding='same')(c2)
         p2 = MaxPooling2D((2, 2))(c2)
         c3 = Conv2D(256, (3, 3), activation='relu', padding='same')(p2)
         c3 = Conv2D(256, (3, 3), activation='relu', padding='same')(c3)
         p3 = MaxPooling2D((2, 2))(c3)
         c4 = Conv2D(512, (3, 3), activation='relu', padding='same')(p3)
         c4 = Conv2D(512, (3, 3), activation='relu', padding='same')(c4)
         p4 = MaxPooling2D((2, 2))(c4)
         # Bottleneck
         c5 = Conv2D(1024, (3, 3), activation='relu', padding='same')(p4)
         c5 = Conv2D(1024, (3, 3), activation='relu', padding='same')(c5)
         # Decoder
         u6 = UpSampling2D((2, 2))(c5)
         u6 = concatenate([u6, c4])
         c6 = Conv2D(512, (3, 3), activation='relu', padding='same')(u6)
         c6 = Conv2D(512, (3, 3), activation='relu', padding='same')(c6)
         u7 = UpSampling2D((2, 2))(c6)
         u7 = concatenate([u7, c3])
         c7 = Conv2D(256, (3, 3), activation='relu', padding='same')(u7)
         c7 = Conv2D(256, (3, 3), activation='relu', padding='same')(c7)
         u8 = UpSampling2D((2, 2))(c7)
         u8 = concatenate([u8, c2])
         c8 = Conv2D(128, (3, 3), activation='relu', padding='same')(u8)
         c8 = Conv2D(128, (3, 3), activation='relu', padding='same')(c8)
         u9 = UpSampling2D((2, 2))(c8)
```

Model: "model"

\_\_\_\_\_

```
Layer (type)
                          Output Shape
                                         Param # Connected to
______
=============
input_1 (InputLayer)
                          [(None, 256, 256, 3 0
                                                       Г٦
                          )]
conv2d (Conv2D)
                           (None, 256, 256, 64 1792
['input_1[0][0]']
                           )
conv2d_1 (Conv2D)
                           (None, 256, 256, 64 36928
['conv2d[0][0]']
                           )
max_pooling2d (MaxPooling2D)
                           (None, 128, 128, 64 0
['conv2d_1[0][0]']
                           )
conv2d_2 (Conv2D)
                           (None, 128, 128, 12 73856
['max_pooling2d[0][0]']
                           8)
conv2d_3 (Conv2D)
                           (None, 128, 128, 12 147584
['conv2d_2[0][0]']
                           8)
max_pooling2d_1 (MaxPooling2D) (None, 64, 64, 128) 0
```

```
['conv2d_3[0][0]']
conv2d_4 (Conv2D)
                             (None, 64, 64, 256) 295168
['max_pooling2d_1[0][0]']
conv2d_5 (Conv2D)
                             (None, 64, 64, 256) 590080
['conv2d_4[0][0]']
Layer (type)
                             Output Shape
                                                Param #
                                                           Connected to
______
===========
input_1 (InputLayer)
                             [(None, 256, 256, 3 0
                                                            )]
conv2d (Conv2D)
                             (None, 256, 256, 64 1792
['input_1[0][0]']
                             )
conv2d_1 (Conv2D)
                             (None, 256, 256, 64 36928
['conv2d[0][0]']
                             )
max_pooling2d (MaxPooling2D)
                             (None, 128, 128, 64 0
['conv2d_1[0][0]']
                             )
                             (None, 128, 128, 12 73856
conv2d_2 (Conv2D)
['max_pooling2d[0][0]']
                             8)
conv2d_3 (Conv2D)
                             (None, 128, 128, 12 147584
['conv2d_2[0][0]']
                             8)
max_pooling2d_1 (MaxPooling2D) (None, 64, 64, 128) 0
['conv2d_3[0][0]']
conv2d_4 (Conv2D)
                             (None, 64, 64, 256) 295168
['max_pooling2d_1[0][0]']
conv2d_5 (Conv2D)
                             (None, 64, 64, 256) 590080
['conv2d_4[0][0]']
max_pooling2d_2 (MaxPooling2D) (None, 32, 32, 256) 0
['conv2d_5[0][0]']
```

```
conv2d_6 (Conv2D)
                                 (None, 32, 32, 512)
                                                      1180160
['max_pooling2d_2[0][0]']
conv2d_7 (Conv2D)
                                 (None, 32, 32, 512)
                                                      2359808
['conv2d_6[0][0]']
max_pooling2d_3 (MaxPooling2D)
                                 (None, 16, 16, 512) 0
['conv2d_7[0][0]']
conv2d_8 (Conv2D)
                                 (None, 16, 16, 1024 4719616
['max_pooling2d_3[0][0]']
                                 )
conv2d_9 (Conv2D)
                                 (None, 16, 16, 1024 9438208
['conv2d_8[0][0]']
                                )
up_sampling2d (UpSampling2D)
                                 (None, 32, 32, 1024 0
['conv2d_9[0][0]']
                                )
                                 (None, 32, 32, 1536 0
concatenate (Concatenate)
['up_sampling2d[0][0]',
                                 )
'conv2d_7[0][0]']
conv2d_10 (Conv2D)
                                 (None, 32, 32, 512)
                                                      7078400
['concatenate[0][0]']
conv2d_11 (Conv2D)
                                 (None, 32, 32, 512)
                                                      2359808
['conv2d_10[0][0]']
up_sampling2d_1 (UpSampling2D)
                                 (None, 64, 64, 512)
['conv2d_11[0][0]']
concatenate_1 (Concatenate)
                                 (None, 64, 64, 768) 0
['up_sampling2d_1[0][0]',
'conv2d_5[0][0]']
conv2d_12 (Conv2D)
                                 (None, 64, 64, 256)
                                                      1769728
['concatenate_1[0][0]']
conv2d_13 (Conv2D)
                                 (None, 64, 64, 256)
                                                      590080
['conv2d_12[0][0]']
up_sampling2d_2 (UpSampling2D)
                                 (None, 128, 128, 25 0
['conv2d_13[0][0]']
                                 6)
```

```
['up_sampling2d_2[0][0]',
                                    4)
    'conv2d_3[0][0]']
     conv2d 14 (Conv2D)
                                    (None, 128, 128, 12 442496
    ['concatenate_2[0][0]']
                                    8)
     conv2d_15 (Conv2D)
                                    (None, 128, 128, 12 147584
    ['conv2d_14[0][0]']
                                    8)
     up_sampling2d_3 (UpSampling2D)
                                    (None, 256, 256, 12 0
    ['conv2d_15[0][0]']
                                    8)
     concatenate_3 (Concatenate)
                                    (None, 256, 256, 19 0
    ['up_sampling2d_3[0][0]',
                                    2)
    'conv2d_1[0][0]']
     conv2d_16 (Conv2D)
                                    (None, 256, 256, 64 110656
    ['concatenate_3[0][0]']
                                    )
     conv2d_17 (Conv2D)
                                    (None, 256, 256, 64 36928
    ['conv2d_16[0][0]']
                                    )
     conv2d_18 (Conv2D)
                                    (None, 256, 256, 1) 65
    ['conv2d_17[0][0]']
    ______
    Total params: 31,378,945
    Trainable params: 31,378,945
    Non-trainable params: 0
[4]: #Nuevo modelo con arquitecura U-Net:
     from keras.layers import Input, Conv2D, MaxPooling2D, UpSampling2D,
      ⇔concatenate, Dropout, BatchNormalization, Add, Multiply, ⊔
      →GlobalAveragePooling2D, Dense, Reshape
     from keras.models import Model
```

(None, 128, 128, 38 0

concatenate\_2 (Concatenate)

```
from keras.optimizers import Adam
from keras import backend as K
# Función de pérdida personalizada (Dice Loss)
def perdida_dice(y_real, y_pred):
   numerador = 2 * K.sum(y_real * y_pred)
   denominador = K.sum(y_real + y_pred)
   return 1 - (numerador + 1) / (denominador + 1)
# Bloque Residual
def bloque_residual(x, filtros):
   salto = Conv2D(filtros, (1, 1), activation='relu', padding='same')(x) #__
 →Asegurar que la forma coincida
   x = Conv2D(filtros, (3, 3), activation='relu', padding='same')(x)
   x = BatchNormalization()(x)
   x = Conv2D(filtros, (3, 3), activation='relu', padding='same')(x)
   x = BatchNormalization()(x)
   return Add()([x, salto])
# Bloque de Atención
def bloque atencion(tensor entrada, tensor gating):
   forma = tensor_entrada.shape[-1]
   atencion = GlobalAveragePooling2D()(tensor_entrada)
   atencion = Dense(forma // 2, activation='relu')(atencion)
   atencion = Dense(forma, activation='sigmoid')(atencion)
   atencion = Reshape((1, 1, forma))(atencion)
   return Multiply()([tensor_entrada, atencion])
# Construcción del modelo U-Net
def construir_unet(tamano_entrada=(256, 256, 3)):
    entradas = Input(tamano_entrada)
    # Ajustar la entrada al número de filtros del primer bloque residual
   inicial = Conv2D(64, (1, 1), activation='relu', padding='same')(entradas)
   # Codificador (Encoder)
   c1 = bloque_residual(inicial, 64)
   p1 = MaxPooling2D((2, 2))(c1)
   c2 = bloque_residual(p1, 128)
   p2 = MaxPooling2D((2, 2))(c2)
   c3 = bloque_residual(p2, 256)
   p3 = MaxPooling2D((2, 2))(c3)
    c4 = bloque_residual(p3, 512)
   p4 = MaxPooling2D((2, 2))(c4)
```

```
# Bottleneck (cuello de botella)
    c5 = Conv2D(1024, (3, 3), activation='relu', padding='same')(p4)
    c5 = BatchNormalization()(c5)
    c5 = Dropout(0.5)(c5) # Dropout para reducir sobreajuste
    c5 = Conv2D(1024, (3, 3), activation='relu', padding='same')(c5)
    c5 = BatchNormalization()(c5)
    # Decodificador (Decoder)
    u6 = UpSampling2D((2, 2))(c5) # Aumentar tamaño
    u6 = bloque_atencion(u6, c4) # Aplicar atención
    u6 = concatenate([u6, c4]) # Concatenar con la salida del codificador
    c6 = bloque_residual(u6, 512)
    u7 = UpSampling2D((2, 2))(c6)
    u7 = bloque_atencion(u7, c3)
    u7 = concatenate([u7, c3])
    c7 = bloque_residual(u7, 256)
    u8 = UpSampling2D((2, 2))(c7)
    u8 = bloque_atencion(u8, c2)
    u8 = concatenate([u8, c2])
    c8 = bloque_residual(u8, 128)
    u9 = UpSampling2D((2, 2))(c8)
    u9 = bloque atencion(u9, c1)
    u9 = concatenate([u9, c1])
    c9 = bloque_residual(u9, 64)
    # Salida del modelo
    salidas = Conv2D(1, (1, 1), activation='sigmoid')(c9)
    modelo = Model(entradas, salidas)
    return modelo
# Construcción y compilación del modelo
TASA APRENDIZAJE = 0.001
modelo = construir_unet()
modelo.compile(optimizer=Adam(learning_rate=TASA_APRENDIZAJE),_
 →loss=perdida_dice, metrics=['accuracy'])
# Resumen del modelo
modelo.summary()
```

```
Model: "model_1"
```

\_\_\_\_\_\_

-----

```
Layer (type)
                           Output Shape
                                             Param #
                                                       Connected to
______
input_2 (InputLayer)
                           [(None, 256, 256, 3 0
                                                        1(
conv2d_19 (Conv2D)
                           (None, 256, 256, 64 256
['input_2[0][0]']
conv2d_21 (Conv2D)
                           (None, 256, 256, 64 36928
['conv2d_19[0][0]']
                           )
batch_normalization (BatchNorm (None, 256, 256, 64 256
['conv2d_21[0][0]']
alization)
                           )
conv2d_22 (Conv2D)
                           (None, 256, 256, 64 36928
['batch normalization[0][0]']
Layer (type)
                           Output Shape
                                             Param #
                                                       Connected to
______
                           [(None, 256, 256, 3 0
                                                       input_2 (InputLayer)
conv2d_19 (Conv2D)
                           (None, 256, 256, 64 256
['input_2[0][0]']
conv2d_21 (Conv2D)
                           (None, 256, 256, 64 36928
['conv2d_19[0][0]']
                           )
batch_normalization (BatchNorm (None, 256, 256, 64 256
['conv2d_21[0][0]']
alization)
                           )
conv2d_22 (Conv2D)
                           (None, 256, 256, 64 36928
['batch_normalization[0][0]']
batch_normalization_1 (BatchNo (None, 256, 256, 64 256
['conv2d_22[0][0]']
rmalization)
                           )
```

```
conv2d_20 (Conv2D)
                                (None, 256, 256, 64 4160
['conv2d_19[0][0]']
                                )
add (Add)
                                (None, 256, 256, 64 0
['batch_normalization_1[0][0]',
'conv2d_20[0][0]']
max_pooling2d_4 (MaxPooling2D)
                                (None, 128, 128, 64 0
                                                                  ['add[0][0]']
                                )
conv2d_24 (Conv2D)
                                (None, 128, 128, 12 73856
['max_pooling2d_4[0][0]']
                                8)
batch_normalization_2 (BatchNo (None, 128, 128, 12 512
['conv2d_24[0][0]']
rmalization)
                                8)
conv2d_25 (Conv2D)
                                (None, 128, 128, 12 147584
['batch_normalization_2[0][0]']
                                8)
batch_normalization_3 (BatchNo (None, 128, 128, 12 512
['conv2d_25[0][0]']
rmalization)
                                8)
                                (None, 128, 128, 12 8320
conv2d_23 (Conv2D)
['max_pooling2d_4[0][0]']
                                8)
add_1 (Add)
                                (None, 128, 128, 12 0
['batch_normalization_3[0][0]',
                                8)
'conv2d_23[0][0]']
max_pooling2d_5 (MaxPooling2D)
                                 (None, 64, 64, 128) 0
                                                                  ['add_1[0][0]']
conv2d_27 (Conv2D)
                                 (None, 64, 64, 256)
                                                      295168
['max_pooling2d_5[0][0]']
batch_normalization_4 (BatchNo (None, 64, 64, 256)
['conv2d_27[0][0]']
rmalization)
conv2d_28 (Conv2D)
                                 (None, 64, 64, 256)
                                                      590080
['batch_normalization_4[0][0]']
```

```
batch_normalization_5 (BatchNo (None, 64, 64, 256)
                                                       1024
['conv2d_28[0][0]']
rmalization)
conv2d 26 (Conv2D)
                                (None, 64, 64, 256)
                                                      33024
['max_pooling2d_5[0][0]']
add 2 (Add)
                                (None, 64, 64, 256)
['batch_normalization_5[0][0]',
'conv2d_26[0][0]']
max_pooling2d_6 (MaxPooling2D)
                                 (None, 32, 32, 256) 0
                                                                  ['add_2[0][0]']
conv2d_30 (Conv2D)
                                 (None, 32, 32, 512)
                                                      1180160
['max_pooling2d_6[0][0]']
batch_normalization_6 (BatchNo (None, 32, 32, 512)
                                                       2048
['conv2d_30[0][0]']
rmalization)
conv2d 31 (Conv2D)
                                 (None, 32, 32, 512)
                                                      2359808
['batch_normalization_6[0][0]']
batch_normalization_7 (BatchNo (None, 32, 32, 512)
                                                       2048
['conv2d_31[0][0]']
rmalization)
conv2d_29 (Conv2D)
                                (None, 32, 32, 512)
                                                      131584
['max_pooling2d_6[0][0]']
add_3 (Add)
                                 (None, 32, 32, 512) 0
['batch_normalization_7[0][0]',
'conv2d_29[0][0]']
max_pooling2d_7 (MaxPooling2D) (None, 16, 16, 512) 0
                                                                  ['add_3[0][0]']
conv2d 32 (Conv2D)
                                 (None, 16, 16, 1024 4719616
['max_pooling2d_7[0][0]']
                                )
batch_normalization_8 (BatchNo (None, 16, 16, 1024 4096
['conv2d_32[0][0]']
                                )
rmalization)
dropout (Dropout)
                                (None, 16, 16, 1024 0
['batch_normalization_8[0][0]']
                                )
```

```
conv2d_33 (Conv2D)
                                (None, 16, 16, 1024 9438208
['dropout[0][0]']
                                )
batch_normalization_9 (BatchNo (None, 16, 16, 1024 4096
['conv2d_33[0][0]']
rmalization)
                                )
up_sampling2d_4 (UpSampling2D) (None, 32, 32, 1024 0
['batch_normalization_9[0][0]']
                                )
global_average_pooling2d (Glob (None, 1024)
                                                      0
['up_sampling2d_4[0][0]']
alAveragePooling2D)
dense (Dense)
                                 (None, 512)
                                                      524800
['global_average_pooling2d[0][0]'
                                                                  ٦
dense 1 (Dense)
                                (None, 1024)
                                                                  ['dense[0][0]']
                                                      525312
reshape (Reshape)
                                (None, 1, 1, 1024)
['dense_1[0][0]']
multiply (Multiply)
                                (None, 32, 32, 1024 0
['up_sampling2d_4[0][0]',
                                )
'reshape[0][0]']
concatenate_4 (Concatenate)
                                (None, 32, 32, 1536 0
['multiply[0][0]',
                                )
                                                                   'add_3[0][0]']
conv2d_35 (Conv2D)
                                (None, 32, 32, 512)
                                                     7078400
['concatenate_4[0][0]']
batch_normalization_10 (BatchN (None, 32, 32, 512)
['conv2d_35[0][0]']
ormalization)
conv2d_36 (Conv2D)
                                 (None, 32, 32, 512)
                                                      2359808
['batch_normalization_10[0][0]']
batch_normalization_11 (BatchN (None, 32, 32, 512)
['conv2d_36[0][0]']
ormalization)
```

```
conv2d_34 (Conv2D)
                                 (None, 32, 32, 512)
                                                      786944
['concatenate_4[0][0]']
add 4 (Add)
                                 (None, 32, 32, 512) 0
['batch_normalization_11[0][0]',
'conv2d_34[0][0]']
up_sampling2d_5 (UpSampling2D)
                                 (None, 64, 64, 512) 0
                                                                   ['add_4[0][0]']
                                 (None, 512)
global_average_pooling2d_1 (Gl
                                                      0
['up_sampling2d_5[0][0]']
obalAveragePooling2D)
dense_2 (Dense)
                                 (None, 256)
                                                      131328
['global_average_pooling2d_1[0][0
                                                                   ]']
dense_3 (Dense)
                                 (None, 512)
                                                      131584
['dense_2[0][0]']
reshape_1 (Reshape)
                                 (None, 1, 1, 512)
['dense_3[0][0]']
multiply_1 (Multiply)
                                 (None, 64, 64, 512) 0
['up_sampling2d_5[0][0]',
'reshape_1[0][0]']
concatenate_5 (Concatenate)
                                 (None, 64, 64, 768) 0
['multiply_1[0][0]',
                                                                    'add_2[0][0]']
conv2d_38 (Conv2D)
                                 (None, 64, 64, 256)
                                                      1769728
['concatenate_5[0][0]']
batch_normalization_12 (BatchN (None, 64, 64, 256)
['conv2d 38[0][0]']
ormalization)
conv2d_39 (Conv2D)
                                 (None, 64, 64, 256)
                                                      590080
['batch_normalization_12[0][0]']
batch_normalization_13 (BatchN (None, 64, 64, 256)
                                                       1024
['conv2d_39[0][0]']
ormalization)
conv2d_37 (Conv2D)
                                 (None, 64, 64, 256)
                                                      196864
['concatenate_5[0][0]']
```

```
add_5 (Add)
                                (None, 64, 64, 256) 0
['batch_normalization_13[0][0]',
'conv2d_37[0][0]']
                                (None, 128, 128, 25 0
                                                                  ['add_5[0][0]']
up_sampling2d_6 (UpSampling2D)
global_average_pooling2d_2 (Gl (None, 256)
                                                      0
['up_sampling2d_6[0][0]']
obalAveragePooling2D)
dense_4 (Dense)
                                (None, 128)
                                                      32896
['global_average_pooling2d_2[0][0
                                                                  ]']
dense_5 (Dense)
                                (None, 256)
                                                      33024
['dense_4[0][0]']
reshape_2 (Reshape)
                                (None, 1, 1, 256)
                                                      0
['dense_5[0][0]']
multiply_2 (Multiply)
                                (None, 128, 128, 25 0
['up_sampling2d_6[0][0]',
                                6)
'reshape_2[0][0]']
concatenate_6 (Concatenate)
                                (None, 128, 128, 38 0
['multiply_2[0][0]',
                                4)
                                                                   'add_1[0][0]']
conv2d_41 (Conv2D)
                                (None, 128, 128, 12 442496
['concatenate_6[0][0]']
                                8)
batch_normalization_14 (BatchN (None, 128, 128, 12 512
['conv2d_41[0][0]']
ormalization)
                                8)
conv2d_42 (Conv2D)
                                 (None, 128, 128, 12 147584
['batch_normalization_14[0][0]']
                                8)
batch_normalization_15 (BatchN (None, 128, 128, 12 512
['conv2d_42[0][0]']
ormalization)
                                8)
conv2d_40 (Conv2D)
                                (None, 128, 128, 12 49280
```

```
['concatenate_6[0][0]']
                                8)
add_6 (Add)
                                 (None, 128, 128, 12 0
['batch_normalization_15[0][0]',
'conv2d_40[0][0]']
up_sampling2d_7 (UpSampling2D) (None, 256, 256, 12 0
                                                                  ['add_6[0][0]']
global_average_pooling2d_3 (Gl (None, 128)
                                                      0
['up_sampling2d_7[0][0]']
obalAveragePooling2D)
dense_6 (Dense)
                                 (None, 64)
                                                      8256
['global_average_pooling2d_3[0][0
                                                                  ]']
dense_7 (Dense)
                                (None, 128)
                                                      8320
['dense_6[0][0]']
reshape_3 (Reshape)
                                (None, 1, 1, 128)
                                                      0
['dense_7[0][0]']
multiply_3 (Multiply)
                                (None, 256, 256, 12 0
['up_sampling2d_7[0][0]',
                                8)
'reshape_3[0][0]']
concatenate_7 (Concatenate)
                                (None, 256, 256, 19 0
['multiply_3[0][0]',
                                2)
                                                                   'add[0][0]']
conv2d_44 (Conv2D)
                                (None, 256, 256, 64 110656
['concatenate_7[0][0]']
                                )
batch_normalization_16 (BatchN (None, 256, 256, 64
['conv2d_44[0][0]']
                                )
ormalization)
conv2d_45 (Conv2D)
                                 (None, 256, 256, 64 36928
['batch_normalization_16[0][0]']
batch_normalization_17 (BatchN (None, 256, 256, 64
                                                       256
['conv2d_45[0][0]']
```

```
ormalization)
                         )
   conv2d_43 (Conv2D)
                          (None, 256, 256, 64 12352
   ['concatenate_7[0][0]']
                          )
   add 7 (Add)
                          (None, 256, 256, 64 0
   ['batch_normalization_17[0][0]',
   'conv2d_43[0][0]']
                                                 ['add_7[0][0]']
   conv2d_46 (Conv2D)
                          (None, 256, 256, 1) 65
   _____
   _____
   Total params: 34,055,937
   Trainable params: 34,044,161
   Non-trainable params: 11,776
    1. Entrenar el Modelo
[5]: # Entrenar el modelo
   #importar ModelCheckpoint
   from tensorflow.keras.callbacks import ModelCheckpoint
   history = model.fit(
      train_images, train_masks,
      validation_data=(val_images, val_masks),
      batch_size=BATCH_SIZE,
      epochs=EPOCHS,
      #quardar el modelo
      callbacks=[ModelCheckpoint('model.h5', save_best_only=True)]
   Epoch 1/50
   accuracy: 0.9223 - val_loss: 0.1401 - val_accuracy: 0.9812
   Epoch 2/50
   accuracy: 0.9787 - val_loss: 0.1065 - val_accuracy: 0.9812
   Epoch 3/50
   accuracy: 0.9787 - val_loss: 0.1037 - val_accuracy: 0.9812
   Epoch 4/50
```

accuracy: 0.9787 - val\_loss: 0.0977 - val\_accuracy: 0.9812

```
Epoch 5/50
accuracy: 0.9787 - val_loss: 0.0990 - val_accuracy: 0.9812
accuracy: 0.9787 - val_loss: 0.1068 - val_accuracy: 0.9812
accuracy: 0.9787 - val_loss: 0.1032 - val_accuracy: 0.9812
Epoch 8/50
accuracy: 0.9787 - val_loss: 0.0943 - val_accuracy: 0.9812
Epoch 9/50
accuracy: 0.9787 - val_loss: 0.0966 - val_accuracy: 0.9812
Epoch 10/50
accuracy: 0.9787 - val_loss: 0.0932 - val_accuracy: 0.9812
Epoch 11/50
accuracy: 0.9787 - val_loss: 0.0976 - val_accuracy: 0.9812
Epoch 12/50
accuracy: 0.9787 - val_loss: 0.0927 - val_accuracy: 0.9812
Epoch 13/50
accuracy: 0.9787 - val_loss: 0.0986 - val_accuracy: 0.9812
Epoch 14/50
accuracy: 0.9787 - val_loss: 0.0957 - val_accuracy: 0.9812
Epoch 15/50
accuracy: 0.9787 - val_loss: 0.0975 - val_accuracy: 0.9812
Epoch 16/50
accuracy: 0.9787 - val_loss: 0.0968 - val_accuracy: 0.9812
Epoch 17/50
accuracy: 0.9787 - val_loss: 0.0989 - val_accuracy: 0.9812
Epoch 18/50
accuracy: 0.9787 - val_loss: 0.0977 - val_accuracy: 0.9812
accuracy: 0.9787 - val_loss: 0.0942 - val_accuracy: 0.9812
Epoch 20/50
accuracy: 0.9787 - val_loss: 0.0931 - val_accuracy: 0.9812
```

```
Epoch 21/50
accuracy: 0.9787 - val_loss: 0.0935 - val_accuracy: 0.9812
Epoch 22/50
accuracy: 0.9787 - val_loss: 0.0924 - val_accuracy: 0.9812
accuracy: 0.9787 - val_loss: 0.0957 - val_accuracy: 0.9812
Epoch 24/50
accuracy: 0.9787 - val_loss: 0.0935 - val_accuracy: 0.9812
Epoch 25/50
accuracy: 0.9787 - val_loss: 0.0928 - val_accuracy: 0.9812
Epoch 26/50
accuracy: 0.9787 - val_loss: 0.0952 - val_accuracy: 0.9812
Epoch 27/50
accuracy: 0.9787 - val_loss: 0.0937 - val_accuracy: 0.9812
Epoch 28/50
accuracy: 0.9787 - val_loss: 0.0927 - val_accuracy: 0.9812
Epoch 29/50
accuracy: 0.9787 - val_loss: 0.0927 - val_accuracy: 0.9812
Epoch 30/50
accuracy: 0.9787 - val_loss: 0.0921 - val_accuracy: 0.9812
Epoch 31/50
accuracy: 0.9787 - val_loss: 0.0922 - val_accuracy: 0.9812
Epoch 32/50
accuracy: 0.9787 - val_loss: 0.0920 - val_accuracy: 0.9812
Epoch 33/50
accuracy: 0.9787 - val_loss: 0.0935 - val_accuracy: 0.9812
Epoch 34/50
accuracy: 0.9787 - val_loss: 0.0924 - val_accuracy: 0.9812
accuracy: 0.9787 - val_loss: 0.0946 - val_accuracy: 0.9812
Epoch 36/50
accuracy: 0.9787 - val_loss: 0.0928 - val_accuracy: 0.9812
```

```
Epoch 37/50
  accuracy: 0.9787 - val_loss: 0.0932 - val_accuracy: 0.9812
  Epoch 38/50
  accuracy: 0.9787 - val_loss: 0.0922 - val_accuracy: 0.9812
  Epoch 39/50
  accuracy: 0.9787 - val_loss: 0.0922 - val_accuracy: 0.9812
  Epoch 40/50
  accuracy: 0.9787 - val_loss: 0.0922 - val_accuracy: 0.9812
  Epoch 41/50
  accuracy: 0.9787 - val_loss: 0.0937 - val_accuracy: 0.9812
  Epoch 42/50
  accuracy: 0.9787 - val_loss: 0.0923 - val_accuracy: 0.9812
  Epoch 43/50
  accuracy: 0.9787 - val_loss: 0.0929 - val_accuracy: 0.9812
  Epoch 44/50
  accuracy: 0.9787 - val_loss: 0.0928 - val_accuracy: 0.9812
  Epoch 45/50
  accuracy: 0.9787 - val_loss: 0.0918 - val_accuracy: 0.9812
  Epoch 46/50
  accuracy: 0.9787 - val_loss: 0.0918 - val_accuracy: 0.9812
  Epoch 47/50
  accuracy: 0.9787 - val_loss: 0.0928 - val_accuracy: 0.9812
  Epoch 48/50
  accuracy: 0.9787 - val_loss: 0.0918 - val_accuracy: 0.9812
  Epoch 49/50
  18/18 [============= ] - 410s 23s/step - loss: 0.0999 -
  accuracy: 0.9787 - val_loss: 0.0921 - val_accuracy: 0.9812
  Epoch 50/50
  accuracy: 0.9787 - val_loss: 0.0912 - val_accuracy: 0.9812
[6]: # quardar modelo
  model.save("modelo_unet.h5")
  # quardar el modelo entrenado
```

```
model.save("modelo_unet.h5")

# guardar el historial de entrenamiento
import pickle
with open("history_unet.pkl", "wb") as f:
    pickle.dump(history.history, f)
```

```
[7]: #Validar el modelo
     # #Primero matriz de confusión
     # from sklearn.metrics import confusion_matrix
     # #cargar modelo
     # import matplotlib.pyplot as plt
     # from keras.models import load_model
     # import time
     # import numpy as np
     # model = load model("modelo unet.h5")
     # model.summary()
     # # cargar el historial de entrenamiento
     # import pickle
     # with open("history_unet.pkl", "rb") as f:
         history = pickle.load(f)
     # # Predecir máscaras en el conjunto de validación
     # predicciones = model.predict(val_images)
     # # Convertir las máscaras a valores binarios
     # predicciones_binarias = (predicciones > 0.5).astype(np.uint8)
     # # Calcular la matriz de confusión
     # confusion_matrices = []
     # for i in range(len(val_masks)):
         y_true = val_masks[i].flatten()
           y_pred = predicciones_binarias[i].flatten()
           confusion\_matrices.append(confusion\_matrix(y\_true,\ y\_pred))
     # # Calcular la matriz de confusión promedio
     # confusion_matrix_avg = np.mean(confusion_matrices, axis=0)
     # # Mostrar la matriz de confusión promedio
     # print("Matriz de confusión promedio:")
     # print(confusion_matrix_avq)
     # # Segundo métricas de evaluación
```

```
# from sklearn.metrics import accuracy score, precision score, recall score,
 ⇔f1_score
# # Calcular métricas de evaluación
# accuracy = accuracy_score(y_true, y_pred)
# precision = precision score(y true, y pred)
# recall = recall_score(y_true, y_pred)
# f1 = f1\_score(y\_true, y\_pred)
# # Mostrar métricas de evaluación
# print(f"Precisión: {precision:.4f}")
# print(f"Recall: {recall:.4f}")
# print(f"F1 Score: {f1:.4f}")
# # Tercero visualización de resultados
# import matplotlib.pyplot as plt
# # Seleccionar una muestra aleatoria de índices
# indices = np.random.choice(range(len(val images)), size=5, replace=False)
# # Mostrar las imágenes y las máscaras correspondientes
# plt.figure(figsize=(15, 10))
# for i, idx in enumerate(indices, 1):
     # Imagen original
     plt.subplot(5, 3, 3 * i - 2)
#
#
     plt.imshow(val_images[idx])
#
     plt.axis("off")
     plt.title("Imagen")
     # Máscara real
#
     plt.subplot(5, 3, 3 * i - 1)
#
     plt.imshow(val_masks[idx].squeeze(), cmap="gray")
     plt.axis("off")
#
     plt.title("Máscara Real")
     # Máscara predicha
#
     plt.subplot(5, 3, 3 * i)
     plt.imshow(predicciones_binarias[idx].squeeze(), cmap="gray")
     plt.axis("off")
     plt.title("Máscara Predicha")
# plt.tight_layout()
# plt.show()
# Cuarto visualización de métricas
# import matplotlib.pyplot as plt
```

```
# Mostrar la pérdida y la precisión en el entrenamiento y la validación
# plt.figure(figsize=(12, 4))
# plt.subplot(1, 2, 1)
# plt.plot(history.history['loss'], label='Pérdida de entrenamiento')
# plt.plot(history.history['val_loss'], label='Pérdida de validación')
# plt.xlabel('Épocas')
# plt.subplot(1, 2, 2)
# plt.plot(history.history['accuracy'], label='Precisión de entrenamiento')
# plt.plot(history.history['val_accuracy'], label='Precisión de validación')
# plt.xlabel('Épocas')
# plt.legend()
# plt.tight_layout()
# plt.show()
# # Quinto visualización de máscaras
# import matplotlib.pyplot as plt
# # Seleccionar una muestra aleatoria de índices
# indices = np.random.choice(range(len(val_images)), size=5, replace=False)
# # Mostrar las imágenes y las máscaras correspondientes
# plt.figure(figsize=(15, 10))
# # for i, idx in enumerate(indices, 1):
# #
       # Imagen original
       plt.subplot(5, 3, 3 * i - 2)
# #
# #
       plt.imshow(val_images[idx])
# #
       plt.axis("off")
# #
       plt.title("Imagen")
       # Máscara real
# #
       plt.subplot(5, 3, 3 * i - 1)
# #
       plt.imshow(val_masks[idx].squeeze(), cmap="gray")
# #
# #
       plt.axis("off")
# #
       plt.title("Máscara Real")
# #
       # Máscara predicha
# #
       plt.subplot(5, 3, 3 * i)
       plt.imshow(predicciones_binarias[idx].squeeze(), cmap="gray")
# #
# #
       plt.axis("off")
# #
       plt.title("Máscara Predicha")
# plt.tight_layout()
# plt.show()
```

## 6. Evaluar el Modelo

```
[4]: #cargar modelo
     import matplotlib.pyplot as plt
     from keras.models import load_model
     import time
     import numpy as np
     model = load model("modelo unet.h5")
     model.summary()
     # cargar el historial de entrenamiento
     import pickle
     with open("history_unet.pkl", "rb") as f:
         history = pickle.load(f)
     # Evaluar en el conjunto de validación
     inicio = time.time()
     predictions = model.predict(val_images)
     fin = time.time()
     # Calcular el tiempo de inferencia
     tiempo_total_por_frame = fin - inicio
     print(f"Tiempo de inferencia: {fin - inicio:.4f} segundos")
     fps = len(val_images) / (fin - inicio)
     print(f"FPS: {fps:.2f} frames por segundo")
     # Mostrar predicciones
     def plot_predictions(images, masks, preds, num=5):
         Muestra imágenes, máscaras reales y predicciones.
         for i in range(num):
             plt.figure(figsize=(12, 4))
             plt.subplot(1, 3, 1)
             plt.title("Imagen")
```

```
plt.imshow(images[i])
       plt.axis('off')
       plt.subplot(1, 3, 2)
       plt.title("Máscara Real")
       plt.imshow(masks[i].squeeze(), cmap='gray')
       plt.axis('off')
       plt.subplot(1, 3, 3)
       plt.title("Predicción")
       plt.imshow(preds[i].squeeze(), cmap='gray')
       plt.axis('off')
       plt.show()
plot_predictions(val_images, val_masks, predictions)
#calculamos las métricas
from sklearn.metrics import accuracy_score, precision_score
# Convertir las máscaras a valores binarios
binary_preds = (predictions > 0.5).astype(np.uint8)
# Calcular métricas
accuracy = accuracy_score(val_masks.flatten(), binary_preds.flatten())
# Mostrar métricas
print(f"Precisión: {accuracy:.4f}")
# Visualizar las métricas
import matplotlib.pyplot as plt
# Mostrar la pérdida y la precisión en el entrenamiento y la validación
plt.figure(figsize=(12, 4))
plt.subplot(1, 2, 1)
plt.plot(history['loss'], label='Pérdida de entrenamiento')
plt.plot(history['val_loss'], label='Pérdida de validación')
plt.xlabel('Épocas')
plt.ylabel('Pérdida')
plt.legend()
plt.subplot(1, 2, 2)
plt.plot(history['accuracy'], label='Precisión de entrenamiento')
plt.plot(history['val_accuracy'], label='Precisión de validación')
plt.xlabel('Épocas')
plt.ylabel('Precisión')
```

```
plt.legend()
plt.tight_layout()
plt.show()
#matriz de confusión
from sklearn.metrics import confusion_matrix
# Calcular la matriz de confusión
predicciones_binarias = (predictions > 0.5).astype(np.uint8)
confusion_matrices = []
for i in range(len(val_masks)):
   y_true = val_masks[i].flatten()
   y_pred = predicciones_binarias[i].flatten()
   confusion_matrices.append(confusion_matrix(y_true, y_pred))
# Calcular la matriz de confusión promedio
confusion_matrix_avg = np.mean(confusion_matrices, axis=0)
# Mostrar la matriz de confusión promedio
print("Matriz de confusión promedio:")
print(confusion_matrix_avg)
```

Model: "model"

\_\_\_\_\_\_

Layer (type)	Output Shape	Param #	Connected to
<pre>input_1 (InputLayer)</pre>	[(None, 256, 256, 3)]	0	
<pre>conv2d (Conv2D) ['input_1[0][0]']</pre>	(None, 256, 256, 64	1792	
	)		
conv2d_1 (Conv2D) ['conv2d[0][0]']	(None, 256, 256, 64	36928	
	)		
<pre>max_pooling2d (MaxPooling2D) ['conv2d_1[0][0]']</pre>	(None, 128, 128, 64	0	
	)		
conv2d_2 (Conv2D) ['max_pooling2d[0][0]']	(None, 128, 128, 12	73856	

```
8)
conv2d_3 (Conv2D)
                                 (None, 128, 128, 12 147584
['conv2d_2[0][0]']
                                8)
max_pooling2d_1 (MaxPooling2D)
                                 (None, 64, 64, 128) 0
['conv2d_3[0][0]']
conv2d_4 (Conv2D)
                                 (None, 64, 64, 256)
                                                      295168
['max_pooling2d_1[0][0]']
conv2d_5 (Conv2D)
                                 (None, 64, 64, 256)
                                                      590080
['conv2d_4[0][0]']
max_pooling2d_2 (MaxPooling2D)
                                 (None, 32, 32, 256)
['conv2d_5[0][0]']
conv2d_6 (Conv2D)
                                 (None, 32, 32, 512)
                                                      1180160
['max_pooling2d_2[0][0]']
conv2d_7 (Conv2D)
                                 (None, 32, 32, 512)
                                                      2359808
['conv2d_6[0][0]']
max_pooling2d_3 (MaxPooling2D)
                                 (None, 16, 16, 512) 0
['conv2d_7[0][0]']
conv2d_8 (Conv2D)
                                 (None, 16, 16, 1024 4719616
['max_pooling2d_3[0][0]']
                                )
                                 (None, 16, 16, 1024 9438208
conv2d_9 (Conv2D)
['conv2d_8[0][0]']
                                )
up_sampling2d (UpSampling2D)
                                 (None, 32, 32, 1024 0
['conv2d_9[0][0]']
concatenate (Concatenate)
                                 (None, 32, 32, 1536 0
['up_sampling2d[0][0]',
                                )
'conv2d_7[0][0]']
conv2d_10 (Conv2D)
                                 (None, 32, 32, 512)
                                                      7078400
['concatenate[0][0]']
```

conv2d\_11 (Conv2D)

(None, 32, 32, 512)

2359808

```
['conv2d_10[0][0]']
up_sampling2d_1 (UpSampling2D)
                                 (None, 64, 64, 512) 0
['conv2d_11[0][0]']
concatenate_1 (Concatenate)
                                (None, 64, 64, 768)
['up_sampling2d_1[0][0]',
'conv2d_5[0][0]']
conv2d_12 (Conv2D)
                                (None, 64, 64, 256)
                                                      1769728
['concatenate_1[0][0]']
conv2d_13 (Conv2D)
                                (None, 64, 64, 256)
                                                      590080
['conv2d_12[0][0]']
up_sampling2d_2 (UpSampling2D)
                                 (None, 128, 128, 25 0
['conv2d_13[0][0]']
                                6)
concatenate 2 (Concatenate)
                                (None, 128, 128, 38 0
['up_sampling2d_2[0][0]',
                                4)
'conv2d_3[0][0]']
conv2d_14 (Conv2D)
                                (None, 128, 128, 12 442496
['concatenate_2[0][0]']
                                8)
                                (None, 128, 128, 12 147584
conv2d_15 (Conv2D)
['conv2d_14[0][0]']
                                8)
                                 (None, 256, 256, 12 0
up_sampling2d_3 (UpSampling2D)
['conv2d_15[0][0]']
                                8)
                                (None, 256, 256, 19 0
concatenate_3 (Concatenate)
['up_sampling2d_3[0][0]',
                                2)
'conv2d_1[0][0]']
conv2d_16 (Conv2D)
                                (None, 256, 256, 64 110656
['concatenate_3[0][0]']
                                )
conv2d_17 (Conv2D)
                                (None, 256, 256, 64 36928
['conv2d_16[0][0]']
                                )
```

conv2d\_18 (Conv2D)
['conv2d\_17[0][0]']

(None, 256, 256, 1) 65

\_\_\_\_\_

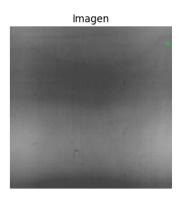
Total params: 31,378,945 Trainable params: 31,378,945

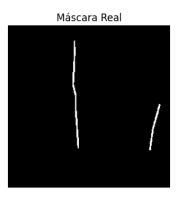
Non-trainable params: 0

-----

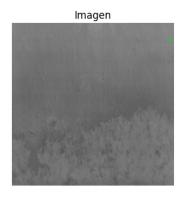
Tiempo de inferencia: 12.6713 segundos

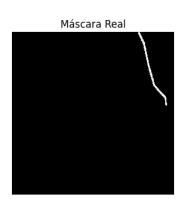
FPS: 1.89 frames por segundo

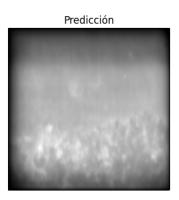


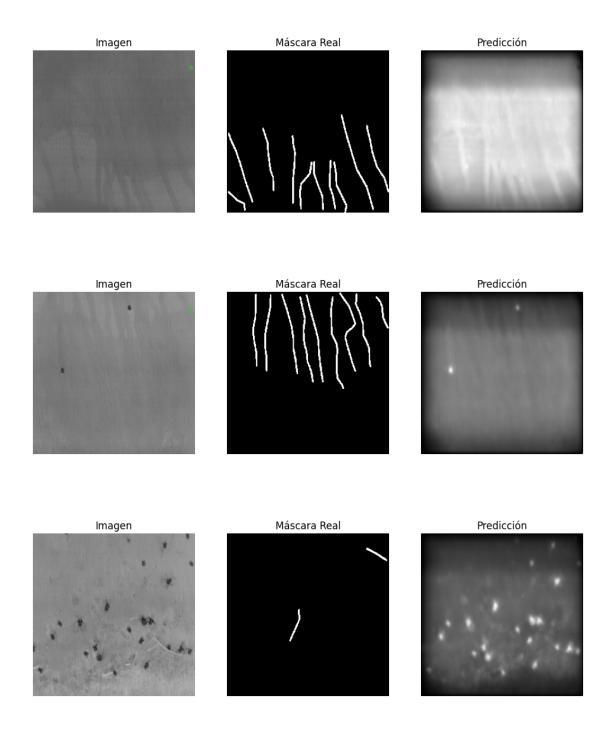




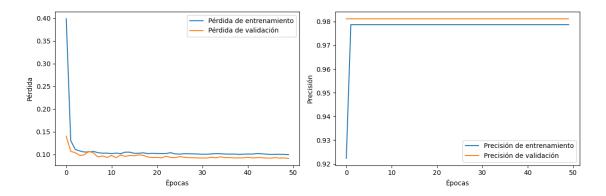








Precisión: 0.9812



```
[12]: from tensorflow.keras.preprocessing.image import load_img, img_to_array
      import numpy as np
      import matplotlib.pyplot as plt
      # Cargar la imagen
      image_path = r"C:
       →\Users\crome\Desktop\TFM\Dades\osaconservation\Dataset_Organizado\images\108FTASK_MAX_2379.
      ⇒JPG"
      image = load_img(image_path, target_size=(256, 256)) # Asumiendo que el modelou
       ⇔usa imágenes de 256x256
      # Convertir a array y normalizar si es necesario
      image_array = img_to_array(image) / 255.0 # Normalización a [0,1] si el modelou
       ⇒fue entrenado así
      # Añadir una dimensión extra para el batch
      image_batch = np.expand_dims(image_array, axis=0)
      # Realizar la predicción
      prediction = model.predict(image_batch)
      # Visualizar la imagen y su predicción
      plt.figure(figsize=(12, 6))
      plt.subplot(1, 2, 1)
      plt.title("Imagen de Entrada")
      plt.imshow(image_array)
      plt.axis('off')
      plt.subplot(1, 2, 2)
      plt.title("Predicción del Modelo")
```

```
plt.imshow(prediction.squeeze(), cmap='gray') # Mostrar la predicción
plt.axis('off')
plt.show()
```

## 1/1 [======] - Os 424ms/step



