Atelier 5

Transformer implementation for translation

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In This notebook we will carry out translate sentences from French to English using Transformer model

PyTorch Initialization and Device Configuration

```
import torch
import torch.nn as nn
from torch import optim
import torch.nn.functional as F
from torch.optim.lr_scheduler import LambdaLR
import math
import numpy as np
import unicodedata
import string
import re
import random
import pandas as pd
from tqdm import tqdm
device = torch.device("cuda" if torch.cuda.is_available() else "cpu")
print("device :", device)
```

```
device : cuda
```

Text Preprocessing

Language Processing and Dataset Preparation Functions

```
SOS_token = 0
EOS_token = 1
PAD_token = 2
MAX_LENGTH = 50

class Lang:
    def __init__(self, name):
        self.name = name
        self.word2index = {}
        self.word2count = {}
        self.index2word = {0: "SOS", 1: "EOS", 2:"PAD"}
```

```
        self.n_words = 3  # Count SOS and EOS

    def addSentence(self, sentence):
        for word in sentence.split(' '):
            self.addWord(word)

    def addWord(self, word):
        if word not in self.word2index:
            self.word2index[word] = self.n_words
            self.word2count[word] = 1
            self.index2word[self.n_words] = word
            self.n_words += 1
        else:
            self.word2count[word] += 1

def unicodeToAscii(s):
    return ''.join(
        c for c in unicodedata.normalize('NFD', s)
        if unicodedata.category(c) != 'Mn'
    )

# Lowercase, trim, and remove non-letter characters
def normalizeString(s):
    s = unicodeToAscii(s.lower().strip())
    s = re.sub(r"([.!?])", r" \1", s)
    s = re.sub(r"[^a-zA-Z.!?]+", r" ", s)
    return s



def readLangs(lang1, lang2, reverse=False):
    df = pd.read_csv('./en-fr-translation-dataset/en-fr.csv')

    # Sample 1% of your dataframe
    df_sample = df.sample(frac=0.01)

    # Split every line into pairs and normalize
    pairs = [[normalizeString(str(s)) for s in l] for l in
df_sample.values]

    # Reverse pairs, make Lang instances
    if reverse:
        pairs = [list(reversed(p)) for p in pairs]
        input_lang = Lang(lang2)
        output_lang = Lang(lang1)
    else:
        input_lang = Lang(lang1)
        output_lang = Lang(lang2)

    return input_lang, output_lang, pairs
```

```
def filterPair(p):
    return len(p[0].split(' ')) < MAX_LENGTH and \
        len(p[1].split(' ')) < MAX_LENGTH

def filterPairs(pairs):
    return [pair for pair in pairs if filterPair(pair)]
```

Mounting Google Drive in Colab

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

Unzipping Dataset from Google Drive

```
!unzip -q /content/drive/MyDrive/archive.zip
```

Preparing Data for Sequence-to-Sequence Model Training

```
def prepareData(lang1, lang2, reverse=False):
    input_lang, output_lang, pairs = readLangs(lang1, lang2, reverse)
    print("Read %s sentence pairs" % len(pairs))
    pairs = filterPairs(pairs)
    print("Trimmed to %s sentence pairs" % len(pairs))
    print("Counting words...")
    for pair in pairs:
        input_lang.addSentence(pair[0])
        output_lang.addSentence(pair[1])
    print("Counted words:")
    print(input_lang.name, input_lang.n_words)
    print(output_lang.name, output_lang.n_words)
    return input_lang, output_lang, pairs

input_lang, output_lang, pairs = prepareData('eng', 'fra', True)
print(random.choice(pairs))
```

```
Read 225204 sentence pairs
Trimmed to 192613 sentence pairs
Counting words...
Counted words:
fra 99383
eng 83561
[' analyse l effet des barrages et autres methodes de retenue sur la
qualite de l eau les regimes des glaces fluviales les aspects
chimiques et de temperature la charge et la deposition de sediments
ainsi que l integrite des systemes aquatiques .', ' examines impacts
```

```
of dams and other impoundments on water quality river ice regimes
chemistry and thermal structure sediment load and deposition and the
integrity of aquatic systems .']
```

From sentence to indexes and batches

Converting Sentences to Indexes and Creating Batches for Training

```
def indexes_from_sentence(lang, sentence):
    idxs = [lang.word2index[word] for word in sentence.split(' ')]
    idxs.append(EOS_token)
    idxs.insert(SOS_token,0)
    return idxs

def batch_from_pairs(pairs):
    batch_inp = [indexes_from_sentence(input_lang, p[0]) for p in
pairs]
    longest_seq = max([len(seq) for seq in batch_inp])
    batch_inp = [seq+[PAD_token]*(longest_seq-len(seq)) for seq in
batch_inp]
    input_tensor = torch.tensor(batch_inp, dtype=torch.long,
device=device)

    batch_trg = [indexes_from_sentence(output_lang, p[1]) for p in
pairs]
    longest_seq = max([len(seq) for seq in batch_trg])
    batch_trg = [seq+[PAD_token]*(longest_seq-len(seq)) for seq in
batch_trg]
    target_tensor = torch.tensor(batch_trg, dtype=torch.long,
device=device)

    return input_tensor,target_tensor
```

Implementing the Transformer

Multi-Head Attention Module for Transformer

```
def attention(q,k,v,dropout,mask=None):
    b,h,l,dk = q.size()
    x = torch.matmul(q,k.transpose(-2,-1)) / dk**0.5

    if mask is not None:
        x= x.masked_fill(mask==0,-1e9)
    x = x.softmax(dim=-1)
    x = dropout(x)
    x = torch.matmul(x,v)
```

```
    return x

class MultiHeaderAttention(nn.Module):
    def __init__(self,d_model,dropout,n_heads=8, dk=64,dv=64):
        super(MultiHeaderAttention,self).__init__()
        self.dims = dk,dv,n_heads
        self.q = nn.Linear(d_model, dk*n_heads)
        self.k = nn.Linear(d_model, dk*n_heads)
        self.v = nn.Linear(d_model, dv*n_heads)
        self.dropout = nn.Dropout(p=dropout)

        self.out = nn.Linear(dv*n_heads, d_model)

    def forward(self,k,v,q,mask=None):
        b,len_k,len_q,len_v = k.size(0), k.size(1), q.size(1),
v.size(1)
        dk,dv,h =self.dims
        q = self.q(q).view(b,len_q,h,dk).transpose(1,2)
        k = self.k(k).view(b,len_k,h,dk).transpose(1,2)
        v = self.v(v).view(b,len_v,h,dk).transpose(1,2)
        if mask is not None:
            mask = mask.unsqueeze(1) #put header dim for broadcasting

        x = attention(q,k,v, self.dropout, mask)
        x = x.transpose(1,2).contiguous().view(b,len_q,h*dk) # swap
headers and seq_len
        return self.out(x)
```

Positional encoding

Positional Encoding Module for Transformer

```
class PositionEncoding(nn.Module):
    def __init__(self,max_len,d_model):
        super(PositionEncoding,self).__init__()
        self.max_len = max_len+5
        self.register_buffer('pos_table',
self.tensor_pos_encoding(self.max_len, d_model))

    def pos_encoding(self,pos, k):
        """taking an vocab index and generating a a geometric
progression with k dimensions """
        f = lambda i,k: pos / 10000**(2 * (i // 2) / k)
        return [math.sin(f(i,k)) if i%2==0 else math.cos(f(i,k)) for i
in range(0,k)]

    def tensor_pos_encoding(self,max_len,dim):
        return torch.tensor([self.pos_encoding(i,dim) for i in
range(max_len)],device=device).view( max_len,dim)
```

```
    def forward(self,x):
        return x+
self.pos_table[:x.size(1),:].detach().clone().unsqueeze(0)
```

Subylayer connection

Sublayer Connection Module for Transformer

```
# code from "the annotated transfomer"
class SublayerConnection(nn.Module):
    def __init__(self, size, dropout):
        super(SublayerConnection, self).__init__()
        self.norm = nn.LayerNorm(size)
        self.dropout = nn.Dropout(dropout)

    def forward(self, x, sublayer):
        return x + self.dropout(sublayer(self.norm(x)))
```

Encoder

Encoder and Encoder Layer Modules for Transformer

```
class Encoder(nn.Module):
    def __init__(self, n_input_vocab,
d_model,n_hidden,n_layers,dropout):
        super().__init__()
        self.d_model = d_model

        self.embedding =
nn.Embedding(n_input_vocab,d_model,padding_idx=PAD_token)
        self.dropout = nn.Dropout(p=dropout)
        self.normal = nn.LayerNorm(d_model, eps=1e-6)
        self.encoder_layers = nn.ModuleList(
            [EncoderLayer(d_model, n_hidden,dropout) for i in
range(n_layers)]
            )

        self.pos_enc = PositionEncoding(MAX_LENGTH,d_model)


    def forward(self,x,mask):
        x = self.embedding(x) * self.d_model**0.5
        x = self.pos_enc(x)

        #stack of N = 6 identical layers
        for layer in self.encoder_layers:
            x = layer(x,mask)
        return self.normal(x)
```

```
class EncoderLayer(nn.Module):
    def __init__(self, d_model, n_hidden,dropout):
        super(EncoderLayer, self).__init__()
        self.self_attn = attn = MultiHeaderAttention(d_model,dropout)
        self.feed_forward = nn.Sequential(
                        nn.Linear(d_model,n_hidden),
                        nn.ReLU(),
                        nn.Dropout(p=dropout),
                        nn.Linear(n_hidden,d_model)
        )
        self.sublayer = nn.ModuleList([SublayerConnection(d_model,
dropout) for i in range(2)])

    def forward(self, x, mask):
        x = self.sublayer[0](x, lambda x: self.self_attn(x, x, x,
mask))
        return self.sublayer[1](x, self.feed_forward)
```

Decoder

Decoder and Decoder Layer Modules for Transformer

```
class Decoder(nn.Module):
    def __init__(self,n_target_vocab,d_model,
n_hidden,n_layers,dropout):
        super().__init__()
        self.d_model = d_model

        self.embedding =
nn.Embedding(n_target_vocab,d_model,padding_idx=PAD_token)
        self.dropout = nn.Dropout(p=dropout)
        self.normal = nn.LayerNorm(d_model, eps=1e-6)
        self.decoder_layers = nn.ModuleList(
            [DecoderLayer(d_model, n_hidden,dropout) for i in
range(n_layers)]
            )

        self.pos_enc = PositionEncoding(MAX_LENGTH,d_model)

    def forward(self,x,encoder_outputs,self_attn_mask, enc_dec_mask):
        x = self.embedding(x)*self.d_model**0.5
        x = self.pos_enc(x)

        #stack of N = 6 identical layers
        for layer in self.decoder_layers:
            x = layer(x,encoder_outputs,self_attn_mask, enc_dec_mask)

        return self.normal(x)
```

```
class DecoderLayer(nn.Module):
    def __init__(self, d_model, n_hidden,dropout):
        super(DecoderLayer, self).__init__()

        self.self_attn = MultiHeaderAttention(d_model,dropout)
        self.src_attn = MultiHeaderAttention(d_model,dropout)
        self.feed_forward = nn.Sequential(
                        nn.Linear(d_model,n_hidden),
                        nn.ReLU(),
                        nn.Dropout(p=dropout),
                        nn.Linear(n_hidden,d_model)
        )
        self.sublayer = nn.ModuleList([SublayerConnection(d_model,
dropout) for i in range(3)])

    def forward(self, x, memory, tgt_mask,src_mask):
        m = memory
        x = self.sublayer[0](x, lambda x: self.self_attn(x, x, x,
tgt_mask))
        x = self.sublayer[1](x, lambda x: self.src_attn(m, m,
x,src_mask))
        return self.sublayer[2](x, self.feed_forward)
```

The Transfomer

Transformer Model for Sequence-to-Sequence Tasks

```
class Transformer(nn.Module):
    def __init__(self,d_model, n_input_vocab,n_target_vocab,
n_hidden,n_layers,dropout):
        super().__init__()

        self.encoder = Encoder(n_input_vocab=n_input_vocab,
d_model=d_model,n_hidden=n_hidden,n_layers=n_layers,dropout=dropout)
        self.decoder =
Decoder(n_target_vocab=n_target_vocab,d_model=d_model,n_hidden=n_hidde
n,n_layers=n_layers,dropout=dropout)
        self.out = nn.Linear(d_model,n_target_vocab)

    def get_target_mask(self, target_seq):
        b_sz, len_s = target_seq.size()
        return
torch.tril(torch.ones(len_s,len_s,device=device)).bool().expand(1,len_
s,len_s)

    def get_pad_mask(self,seq):
        return (seq != PAD_token).unsqueeze(-2)
```

```
    def forward(self,input_seq, target_seq):
        trg_mask = self.get_pad_mask(target_seq)
        trg_mask = trg_mask &
self.get_target_mask(target_seq).type_as(trg_mask.data)
        inp_mask = self.get_pad_mask(input_seq)

        encoder_out = self.encoder(input_seq,inp_mask)
        decoder_out =
self.decoder(target_seq,encoder_out,trg_mask,inp_mask)

        out = self.out(decoder_out)
        return out
```

Training & Random Tests

Splitting Data and Initializing a Transformer Model for Sequence-to-Sequence Tasks

```
#splitting the data into train and test datasets

np.random.shuffle(pairs)
train = pairs[:-1000]
test = pairs[-1000:]

#the model with the parameter-values of the paper
transformer1 = Transformer(d_model=512,
                           n_input_vocab=input_lang.n_words,
                           n_target_vocab= output_lang.n_words,
                           n_hidden = 2048,
                           n_layers=6,
                           dropout=0.1).to(device)

transformer1 = nn.DataParallel(transformer1)

for p in transformer1.parameters():
    if p.dim() > 1:
        nn.init.xavier_uniform_(p)
```

Optimizer

Optimizer and Learning Rate Scheduler Initialization for the Transformer Model

```
#the optimizer
lr= 1
opt1 = optim.Adam(transformer1.parameters(),lr=lr, betas=(0.9, 0.98),
eps=1e-09)

def lr_rate(step_num, d_model, factor, warmup_steps):
```

```
    step_num =max(1,step_num)
    return factor * (
        d_model ** (-0.5) * min(step_num ** (-0.5), step_num *
warmup_steps ** (-1.5))
    )

lr_scheduler = LambdaLR(
    optimizer=opt1,
    lr_lambda=lambda step_num: lr_rate(
        step_num, 512, factor=1, warmup_steps=4000
    ),
)
```

Training and evaluation functions

Sequence Prediction and Random Model Testing Functions for Transformer Model

```
def pred(input_seq, model):
    outputs = [SOS_token]

    loss = 0
    for i in range(MAX_LENGTH):
        target_seq = torch.tensor([outputs],device=device)
        output = model(input_seq,target_seq)
        probs = F.softmax(output,dim=2)
        word_pred = torch.argmax(probs[:,-1,:],dim=1)

        outputs.append(word_pred.item())

        if word_pred.item()== EOS_token:
            break

    return outputs[1:]

def random_model_testing(n_examples,model):
    batch_sz=1
    test_samples = [random.choice(test) for i in range(n_samples)]
    print("Random Tests")
    print("*"*30)
    for i in range(0,len(test_samples[:n_examples]),batch_sz):
        input_tensor, output_tensor =
batch_from_pairs(test_samples[i:i+batch_sz])
        out = pred(input_tensor, model)
        print("Pred: ", " ".join([output_lang.index2word[i] for i in
out]), "True: ",test_samples[i][1])
    print("*"*30)
```

Training Batch Function for Transformer Model

```
def train_batch(input_seq, target_seq, model, optimizer,scheduler):
    target, truth = target_seq[:,:-1], target_seq[:,1:]
    pred = model(input_seq,target)

    loss = F.cross_entropy(pred.view(-1,output_lang.n_words),
truth.reshape(-1),reduction='sum',label_smoothing=0.1)
    loss.backward()
    optimizer.step()
    optimizer.zero_grad()
    scheduler.step()

    return loss.item()
```

Let's train our transfomer!

Training Transformer Model for Language Translation

```
n_samples=21000
epochs =200
batch_sz=128

for e in range(epochs):
    loss = 0
    train_samples = [random.choice(train) for i in range(n_samples)]
    for i in range(0,len(train_samples),batch_sz):
        input_tensor, output_tensor =
batch_from_pairs(train_samples[i:i+batch_sz])
        loss += train_batch(input_tensor, output_tensor, transformer1,
opt1,lr_scheduler)
    print(f"Epoch {e}/{epochs} | loss: {round(loss/n_samples,2)} |
learning rate: {round(lr_scheduler.get_last_lr()[0],6)}")
    #random testing
    if e%25==0:
        random_model_testing(10,transformer1)
```

```
Epoch 0/200 | loss: 461.78 | learning rate: 2.9e-05
Random Tests
*****************************
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  during the visit president barroso met prime minister tony
blair to discuss the forthcoming informal summit in lahti and held a
separate meeting with chancellor of the exchequer gordon brown .
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  professor yves landry an undisputed expert in this field will
assume this position .
```

```
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  in the five year planning period from to strong emphasis will
be placed on enhancing the customer and employee experience and
improving efficiencies in business systems and processes .
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  to achieve this goal the conference brings together
intergovernmental organizations with responsibilities in these areas .
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  the crafts sector is not alone among sectors of the economy
with these general characteristics .
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:   this option was introduced by council regulation eec no of
july on the protection of geographical indications and designations of
origin for agricultural products and foodstuffs oj l p .
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  a holder of a registered disability savings plan will be
subject to the provisions of the act that impose sanctions relating to
such plans .
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  northerners are taking larger roles on northern management
boards claims and self government agreements continue to be settled
and partnerships between northerners and industry are flourishing .
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  he stated that there was much more to developing a framework
than merely writing a program .
Pred:  PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD PAD
True:  as a more long term solution in addition to a strategy the
embassy will take steps to explore the feasibility of seeking an
additional py in the ibd section dedicated only to the it sector .
******************************
Epoch 1/200 | loss: 321.03 | learning rate: 5.8e-05
Epoch 2/200 | loss: 212.3 | learning rate: 8.6e-05
Epoch 3/200 | loss: 194.32 | learning rate: 0.000115
```

```
Epoch 4/200 | loss: 189.75 | learning rate: 0.000144
Epoch 5/200 | loss: 185.05 | learning rate: 0.000173
Epoch 6/200 | loss: 181.87 | learning rate: 0.000202
Epoch 7/200 | loss: 176.97 | learning rate: 0.000231
Epoch 8/200 | loss: 174.56 | learning rate: 0.000259
Epoch 9/200 | loss: 169.68 | learning rate: 0.000288
Epoch 10/200 | loss: 166.74 | learning rate: 0.000317
Epoch 11/200 | loss: 162.39 | learning rate: 0.000346
Epoch 12/200 | loss: 159.54 | learning rate: 0.000375
Epoch 13/200 | loss: 157.52 | learning rate: 0.000404
Epoch 14/200 | loss: 153.18 | learning rate: 0.000432
Epoch 15/200 | loss: 150.72 | learning rate: 0.000461
Epoch 16/200 | loss: 146.95 | learning rate: 0.00049
Epoch 17/200 | loss: 145.26 | learning rate: 0.000519
Epoch 18/200 | loss: 142.15 | learning rate: 0.000548
Epoch 19/200 | loss: 141.82 | learning rate: 0.000576
Epoch 20/200 | loss: 139.94 | learning rate: 0.000605
Epoch 21/200 | loss: 139.38 | learning rate: 0.000634
Epoch 22/200 | loss: 137.11 | learning rate: 0.000663
Epoch 23/200 | loss: 136.19 | learning rate: 0.000692
Epoch 24/200 | loss: 134.8 | learning rate: 0.000688
Epoch 25/200 | loss: 134.3 | learning rate: 0.000675
Random Tests
******************************
Pred:   . . . w w w w w w fax fax e .g . com j EOS True:  reem aslan
canada fund coordinator p .o . box amman jordan tel . fax . raslan psu
amman .org
Pred:   . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . True:  trinidad and tobago had
recently received officials from another caribbean state to share with
them the experiences in modernizing its intellectual property system
and said that it could offer significant assistance to other member
states who wished to make similar adjustments .
Pred:  to support a international study on the provisions policies
practices and processes on the suspension and revocation of the
freedom . EOS True:  contribution purpose in support of an
international study of parole suspension revocation and recall
legislations policies practices and processes .
Pred:   yesterday i have taken a member with i ve been a two wing .
EOS True:  yesterday i take it i went over there i got two moose .
Pred:  the grant is currently of the million canadian dollars in a
million . EOS True:  four different banking documents had required
levels between grades and .
Pred:  the committee also provides the opportunity to hear the views
on many canadians as officials are interested in professional groups
and private organizations . EOS True:  committees also provide
senators with an opportunity to hear from many canadians government
officials representatives of interest groups academics and private
citizens appear as witnesses .
```

```
Pred:  this is a vision of the vision . EOS True:  these
recommendations are currently being reviewed .
Pred:   continue to develop and implement health canada s capacity and
information technology tools to measure the performance of the program
and accountability accountability . EOS True:   develop a blueprint of
the technical components of a national health infostructure and a
tactical plan describing the initiatives needed to move canada toward
that infostructure .
Pred:  iii . EOS True:  statistics canada .
Pred:  f . . . . . .
. . . . . True:  cb approval of the minutes
of the th meeting of the budget committee of and november .
******************************
Epoch 26/200 | loss: 133.22 | learning rate: 0.000662
Epoch 27/200 | loss: 130.83 | learning rate: 0.00065
Epoch 28/200 | loss: 129.94 | learning rate: 0.000639
Epoch 29/200 | loss: 128.17 | learning rate: 0.000628
Epoch 30/200 | loss: 128.17 | learning rate: 0.000618
Epoch 31/200 | loss: 127.6 | learning rate: 0.000608
Epoch 32/200 | loss: 126.26 | learning rate: 0.000599
Epoch 33/200 | loss: 125.31 | learning rate: 0.00059
Epoch 34/200 | loss: 124.37 | learning rate: 0.000582
Epoch 35/200 | loss: 123.51 | learning rate: 0.000573
Epoch 36/200 | loss: 123.01 | learning rate: 0.000566
Epoch 37/200 | loss: 122.56 | learning rate: 0.000558
Epoch 38/200 | loss: 121.47 | learning rate: 0.000551
Epoch 39/200 | loss: 120.53 | learning rate: 0.000544
Epoch 40/200 | loss: 120.01 | learning rate: 0.000537
Epoch 41/200 | loss: 119.64 | learning rate: 0.000531
Epoch 42/200 | loss: 119.52 | learning rate: 0.000525
Epoch 43/200 | loss: 118.75 | learning rate: 0.000519
Epoch 44/200 | loss: 117.19 | learning rate: 0.000513
Epoch 45/200 | loss: 117.55 | learning rate: 0.000507
Epoch 46/200 | loss: 116.03 | learning rate: 0.000502
Epoch 47/200 | loss: 116.58 | learning rate: 0.000497
Epoch 48/200 | loss: 116.01 | learning rate: 0.000492
Epoch 49/200 | loss: 115.38 | learning rate: 0.000487
Epoch 50/200 | loss: 115.05 | learning rate: 0.000482
Random Tests
******************************
Pred:  code civil code of quebec s .q . c . EOS True:  in addition he
may not when establishing or using the file otherwise invade the
privacy or damage the reputation of the person concerned .
Pred:  according to rating exhibit a non existent answer is defined as
follows the competencies of the candidate are not enough to perform in
several aspects of this factor and the candidate probably the duties
of the position . EOS True:  according to the rating scale exhibit d a
poor answer was defined as follows candidate s qualifications are
inadequate in several areas of this factor and the candidate is likely
```

to be ineffective in performing many of the duties of the position .
Pred: the radical change relates to the wide range of these things to a significant change in the practice and the reading that the critical principles of the system s sustainability are very important . EOS True: radical change affects all of these elements so as to significantly alter practices organizational forms and the interpretation by agents of critical issues for the sustainable development of the system .
Pred: name of project medicine tree centre for aboriginal seniors program summary project the centre continued its program for aboriginal seniors self care self care coordinator and a private care worker in the home . EOS True: project name medicine tree centre aboriginal seniors program project summary the centre continued its aboriginal seniors program . it hired an aboriginal coordinator and personal home care worker .
Pred: these activities will be identified through a framework of collaboration and consultation with management staff employees and union representatives to define priorities and making solutions . EOS True: these activities will be characterized by a broader framework of collaboration and consultation between management employees and union representatives in the definition of priorities and the formulation of solutions .
Pred: if this is the same the same the same type of the single parent . EOS True: if an eavesdropper disturbs the photons then they re gone .
Pred: improving the work of the police using targeted measures based on security and expectations of the population . EOS True: enhancing police work through targeted action based on security problems and public expectations .
Pred: to achieve the goals outlined in action the department is responsible for setting the government to identify in which its actions are economically responsive to environmental risks and to sustainable development . EOS True: to achieve the goals outlined in agenda each department is accountable to parliament to report how their actions mitigate any environmental risks as well as support sustainable development .
Pred: the st . lawrence seaway action is the last work to facilitate the navigation of the st . lawrence . EOS True: the st . lawrence seaway is the most recent infrastructure created to facilitate ship traffic on the st . lawrence river .
Pred: provides a lump sum to persons with disabilities with permanent disabilities and unable to work and contribute to a pension plan because of a condition related to the service or a disability who is terminated to be employed in the career EOS True: provides a lump sum retirement benefit to those who are permanently incapacitated and unable to work and contribute to a retirement pension as a result of a service related or career ending disability .
****
Epoch 51/200 | loss: 114.3 | learning rate: 0.000477

```
Epoch 52/200 | loss: 113.89 | learning rate: 0.000473
Epoch 53/200 | loss: 113.55 | learning rate: 0.000468
Epoch 54/200 | loss: 113.05 | learning rate: 0.000464
Epoch 55/200 | loss: 112.55 | learning rate: 0.00046
Epoch 56/200 | loss: 112.6 | learning rate: 0.000456
Epoch 57/200 | loss: 111.26 | learning rate: 0.000452
Epoch 58/200 | loss: 111.55 | learning rate: 0.000448
Epoch 59/200 | loss: 110.65 | learning rate: 0.000444
Epoch 60/200 | loss: 110.39 | learning rate: 0.000441
Epoch 61/200 | loss: 110.2 | learning rate: 0.000437
Epoch 62/200 | loss: 109.12 | learning rate: 0.000433
Epoch 63/200 | loss: 109.41 | learning rate: 0.00043
Epoch 64/200 | loss: 108.98 | learning rate: 0.000427
Epoch 65/200 | loss: 109.14 | learning rate: 0.000423
Epoch 66/200 | loss: 108.47 | learning rate: 0.00042
Epoch 67/200 | loss: 108.13 | learning rate: 0.000417
Epoch 68/200 | loss: 107.58 | learning rate: 0.000414
Epoch 69/200 | loss: 107.03 | learning rate: 0.000411
Epoch 70/200 | loss: 107.5 | learning rate: 0.000408
Epoch 71/200 | loss: 106.97 | learning rate: 0.000405
Epoch 72/200 | loss: 107.0 | learning rate: 0.000403
Epoch 73/200 | loss: 105.79 | learning rate: 0.0004
Epoch 74/200 | loss: 106.3 | learning rate: 0.000397
Epoch 75/200 | loss: 105.42 | learning rate: 0.000395
Random Tests
******************************
Pred:  one of our highly respected international transit passengers in our country such as the vancouver who take a approximate ha area or small the only complete location of the needs . EOS True:  an airport may be a large busy international port of entry such as vancouver international which covers approximately hectares of area or a small heliport requiring as little as square metres .
Pred:   PAD PAD director general prevention of discrimination EOS True:  dominique dennery moderator
Pred:   yves corporation proposes a very unique in the sherbrooke january . EOS True:   yves beaupre propose un son tres particulier harpsichord maker la tribune sherbrooke january .
Pred:  according to air canada overall prices of around per cent were implemented in august and in november largely due to higher fuel costs . EOS True:  according to air canada general fare increases of approximately percent were implemented in august and november primarily due to higher fuel costs .
Pred:  the copy s numbers could be linked in a database to the clean up to the various users . EOS True:  copy numbers could be linked in a secure database to the individual users .
Pred:  however when the board presented its outcome compilation at the departmental human resources office it was noted that his error was made . EOS True:  however when the board submitted its tabulated results to the department s human resources office the board s error
```

```
was realized .
Pred:  the development of a framework requires more than just simple writing . EOS True:  he stated that there was much more to developing a framework than merely writing a program .
Pred:  the most recent travel on business travel survey revealed that the number of business trips in the united kingdom should increase as the average length of such trips could be reduced . EOS True:  the latest business travel survey by barclaycard revealed that u .k . business travel volumes are expected to grow in although average days away are expected to decline .
Pred:  the value of these two types of initiatives is not possible . EOS True:  there is no questioning the value of these two types of initiatives .
Pred:   . . guiding and planning assumptions data requirements epidemiological and entitled are constantly evolving . EOS True:   . . planning principles and assumptions during each phase of a pandemic epidemiologic and virologic data needs will change .
******************************
Epoch 76/200 | loss: 105.17 | learning rate: 0.000392
Epoch 77/200 | loss: 105.08 | learning rate: 0.00039
Epoch 78/200 | loss: 104.69 | learning rate: 0.000387
Epoch 79/200 | loss: 104.88 | learning rate: 0.000385
Epoch 80/200 | loss: 103.75 | learning rate: 0.000382
Epoch 81/200 | loss: 103.22 | learning rate: 0.00038
Epoch 82/200 | loss: 103.34 | learning rate: 0.000378
Epoch 83/200 | loss: 103.13 | learning rate: 0.000375
Epoch 84/200 | loss: 102.91 | learning rate: 0.000373
Epoch 85/200 | loss: 102.47 | learning rate: 0.000371
Epoch 86/200 | loss: 102.52 | learning rate: 0.000369
Epoch 87/200 | loss: 102.3 | learning rate: 0.000367
Epoch 88/200 | loss: 102.24 | learning rate: 0.000365
Epoch 89/200 | loss: 101.79 | learning rate: 0.000363
Epoch 90/200 | loss: 101.37 | learning rate: 0.000361
Epoch 91/200 | loss: 100.66 | learning rate: 0.000359
Epoch 92/200 | loss: 100.5 | learning rate: 0.000357
Epoch 93/200 | loss: 100.8 | learning rate: 0.000355
Epoch 94/200 | loss: 99.85 | learning rate: 0.000353
Epoch 95/200 | loss: 99.92 | learning rate: 0.000351
Epoch 96/200 | loss: 100.41 | learning rate: 0.000349
Epoch 97/200 | loss: 99.94 | learning rate: 0.000348
Epoch 98/200 | loss: 99.19 | learning rate: 0.000346
Epoch 99/200 | loss: 99.54 | learning rate: 0.000344
Epoch 100/200 | loss: 98.81 | learning rate: 0.000342
Random Tests
******************************
Pred:  failure to work for a long period of time . EOS True:  this organization s policies are supportive of my needs .
Pred:  marine germ contribution to the diet of northern a ornamental owls in the queen charlotte islands  EOS True:  nocturnal owl
```

```
monitoring project rocky point bird observatory .
Pred:   a university of western ontario may . EOS True:  doctorate dissertation university of western ontario may .
Pred:  new brunswick and saskatchewan were respectively second and third highest . EOS True:  after ontario s exports are adjusted for imbedded imports its export intensity drops significantly .
Pred:   people with minor criminal behaviour were likely to have more results from the mclellan divided treatment simpson a scientific knowledge of obtaining a higher risk of information society .  EOS True:   those with minimal criminal involvement are likely to have better treatment outcomes mclellan simpson sells ball ross anglin hser as cited in national institute on drug abuse .
Pred:  a man and a woman went on to air in halifax from the kidney and came back to the car from fredericton to weekly . EOS True:  another couple flew from dallas to halifax traveled by car to fredericton spent the week and returned home to texas much the wiser about their ancestors and the land they left behind .
Pred:  adults between and years that have been producing invasive disease and were not immunocompromised were identified through surveillance conducted by the various top controls . EOS True:  adults from to years of age who had ipd and were not immunocompromised were identified by laboratory based surveillance and matched prospectively with controls .
Pred:  the system of clear objectives is to be used and assess performance against those objectives . EOS True:  clear goals and objectives should be established for the system and performance should be evaluated against these goals and objectives .
Pred:  management of fire and fire risk in populated areas parks canada has taken a dynamic approach to over fires and reduce the risk of fires that are lost while ensuring ecological integrity . EOS True:  managing fires and fire risk in populated areas parks canada has adopted an aggressive approach to fighting fires and reducing risk of wildfire while managing for ecological integrity .
Pred:  the commission may also establish premises offices in either counties or areas as well as antenna or other units in other regions of liberia or even outside the country section iii section . EOS True:  it can also establish county or regional sub offices branches or units in other parts of liberia or even outside liberia article iii section .
******************************
Epoch 101/200 | loss: 99.1 | learning rate: 0.000341
Epoch 102/200 | loss: 98.79 | learning rate: 0.000339
Epoch 103/200 | loss: 98.55 | learning rate: 0.000337
Epoch 104/200 | loss: 97.96 | learning rate: 0.000336
Epoch 105/200 | loss: 98.31 | learning rate: 0.000334
Epoch 106/200 | loss: 97.88 | learning rate: 0.000333
Epoch 107/200 | loss: 98.01 | learning rate: 0.000331
Epoch 108/200 | loss: 97.24 | learning rate: 0.00033
Epoch 109/200 | loss: 97.23 | learning rate: 0.000328
```

```
Epoch 110/200 | loss: 97.49 | learning rate: 0.000327
Epoch 111/200 | loss: 96.98 | learning rate: 0.000325
Epoch 112/200 | loss: 95.8 | learning rate: 0.000324
Epoch 113/200 | loss: 96.92 | learning rate: 0.000322
Epoch 114/200 | loss: 96.61 | learning rate: 0.000321
Epoch 115/200 | loss: 96.11 | learning rate: 0.000319
Epoch 116/200 | loss: 95.32 | learning rate: 0.000318
Epoch 117/200 | loss: 95.88 | learning rate: 0.000317
Epoch 118/200 | loss: 96.17 | learning rate: 0.000315
Epoch 119/200 | loss: 95.49 | learning rate: 0.000314
Epoch 120/200 | loss: 94.84 | learning rate: 0.000313
Epoch 121/200 | loss: 95.22 | learning rate: 0.000311
Epoch 122/200 | loss: 94.81 | learning rate: 0.00031
Epoch 123/200 | loss: 94.97 | learning rate: 0.000309
Epoch 124/200 | loss: 95.22 | learning rate: 0.000308
Epoch 125/200 | loss: 94.38 | learning rate: 0.000307
Random Tests
**************************
Pred:  complaints received and investigations wd were not received any complaints related to the act . EOS True:  complaints and investigations in wd received no complaints pursuant to the act .
Pred:   council regulation eec euratom no .  EOS True:   regulation eec euratom ecsc no . .
Pred:  in this context the committee proposes to organize together with the relevant stakeholders and the institutions concerned to strengthen dialogue . EOS True:  the committee in this context offers to organise a conference together with the relevant actors and institutions to strengthen the dialogue .
Pred:  chapter comments on the findings of a survey of the success of aging in by the PAD research network network centre and a follow up survey in with the same women and men to years with a high degree of functioning . EOS True:  chapter reports the findings of a macarthur foundation research network on successful aging survey in and a follow up survey in involving the same high functioning men and women to years of age .
Pred:  the persons who were not received and had already worked in the sydney district had been successful in the sydney public service commission to dismiss the eligibility list . EOS True:  those who were unsuccessful and who had worked at cpc sydney before lodged a complaint which was upheld by the public service commission who ordered that the eligibility list was to be thrown out .
Pred:  home programs and services activities activities every year canada s environment canada is attracting a number of activities around canada to raise awareness and understanding of environmental issues and encourage positive environmental influences . EOS True:  home programs and services events events environment canada hosts a number of events across canada each year to increase knowledge and understanding of environmental subjects and encourage positive action on the environment .
```

```
Pred:  what are the priorities for the application ? EOS True:  what are the priorities for the request for proposals ?
Pred:  radio canada will also participate in these discussions as they are part of the process of renewal of the crown corporation . EOS True:  the cbc will also be present at these sessions as they are part its overall licensing process .
Pred:  if the applicant has not made any necessary within the applicable time limit under section or . of the pct the agency will call for it within one month of the time beginning of receipt of the invitation to file a reply . EOS True:  if not already complied with within the time limit applicable under pct article or the office will invite the applicant to comply with the requirement within a time limit of two months from the date of receipt of the invitation .
Pred:  he first indicated that regulators were very revenue and did then have a summary of their needs and questions . EOS True:  he first indicated that regulators are very skeptical towards models and then made a summary of their needs and the questions they usually ask .
******************************
Epoch 126/200 | loss: 94.49 | learning rate: 0.000305
Epoch 127/200 | loss: 94.77 | learning rate: 0.000304
Epoch 128/200 | loss: 94.41 | learning rate: 0.000303
Epoch 129/200 | loss: 94.41 | learning rate: 0.000302
Epoch 130/200 | loss: 94.56 | learning rate: 0.000301
Epoch 131/200 | loss: 93.61 | learning rate: 0.000299
Epoch 132/200 | loss: 93.89 | learning rate: 0.000298
Epoch 133/200 | loss: 93.74 | learning rate: 0.000297
Epoch 134/200 | loss: 93.5 | learning rate: 0.000296
Epoch 135/200 | loss: 93.23 | learning rate: 0.000295
Epoch 136/200 | loss: 93.58 | learning rate: 0.000294
Epoch 137/200 | loss: 93.58 | learning rate: 0.000293
Epoch 138/200 | loss: 92.44 | learning rate: 0.000292
Epoch 139/200 | loss: 91.95 | learning rate: 0.000291
Epoch 140/200 | loss: 92.56 | learning rate: 0.00029
Epoch 141/200 | loss: 92.03 | learning rate: 0.000289
Epoch 142/200 | loss: 92.25 | learning rate: 0.000288
Epoch 143/200 | loss: 92.07 | learning rate: 0.000287
Epoch 144/200 | loss: 92.01 | learning rate: 0.000286
Epoch 145/200 | loss: 92.01 | learning rate: 0.000285
Epoch 146/200 | loss: 91.79 | learning rate: 0.000284
Epoch 147/200 | loss: 91.42 | learning rate: 0.000283
Epoch 148/200 | loss: 91.34 | learning rate: 0.000282
Epoch 149/200 | loss: 91.09 | learning rate: 0.000281
Epoch 150/200 | loss: 91.11 | learning rate: 0.00028
Random Tests
******************************
Pred:  during the spill period all dissolved metals concentrations were greater than the corresponding natural concentrations from various degrees . EOS True:  during the discharge period all dissolved metals levels are above baseline levels to varying degrees .
```

```
Pred:  over the time the failure to recognize these needs and to meet has a potential to jeopardize our corporate level and to limit its wide social choices which we support through our prosperity . back to the table of contents EOS True:  failure to recognize and respond to these needs could jeopardize our standard of living over time and could constrain the broader societal choices we sustain through our prosperity .
Pred:  these recommendations are in the context of the process . EOS True:  these recommendations are currently being reviewed .
Pred:  the collecting capacity typical are defined separately for the risk factors related to the areas of scale overload and density . EOS True:  the uplift capacity factors are worked out separately for cohesion surcharge and density components .
Pred:  the exports of canola . per cent . total exports of protein meal in and . of canola meal exports were for the us . to taiwan and fewer than . . in singapore . EOS True:  canola meal exports accounted for of total meal exports in with of canola meal exports being destined for the us for ireland to taiwan and less than for singapore .
Pred:   branch will enhance product monographs for drugs including a new section on consumer information . EOS True:   the branch will improve product monograph requirements for drugs including a new consumer information section .
Pred:  craig broadcast systems canada wide for a licence to operate a english category specialty television service which will be known as the western channel . EOS True:  craig broadcast systems across canada for a licence to operate a category national english language specialty television service to be known as the western channel .
deadline for intervention
Pred:  commercial form and marketing the use and control of those in the community within the community . EOS True:  justification the development of products for the the minor crops must be encouraged by including the option of running the approval procedure free of charge and granting applicants a longer period of data protection .
Pred:  the recommendations in the review board of the canadian human rights act are of particular the excellent place to develop legislation . EOS True:  and we still await word from the government on what changes it plans to make .
Pred:  this return concerns the following s  EOS True:  the present statement concerns the following registration s and or application s
******************************
Epoch 151/200 | loss: 90.79 | learning rate: 0.000279
Epoch 152/200 | loss: 91.41 | learning rate: 0.000278
Epoch 153/200 | loss: 90.83 | learning rate: 0.000277
Epoch 154/200 | loss: 90.86 | learning rate: 0.000276
Epoch 155/200 | loss: 90.77 | learning rate: 0.000275
Epoch 156/200 | loss: 90.21 | learning rate: 0.000275
Epoch 157/200 | loss: 90.82 | learning rate: 0.000274
Epoch 158/200 | loss: 90.25 | learning rate: 0.000273
Epoch 159/200 | loss: 90.23 | learning rate: 0.000272
```

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Epoch 160/200 | loss: 90.14 | learning rate: 0.000271
Epoch 161/200 | loss: 90.44 | learning rate: 0.00027
Epoch 162/200 | loss: 89.94 | learning rate: 0.000269
Epoch 163/200 | loss: 89.8 | learning rate: 0.000269
Epoch 164/200 | loss: 90.66 | learning rate: 0.000268
Epoch 165/200 | loss: 89.99 | learning rate: 0.000267
Epoch 166/200 | loss: 90.26 | learning rate: 0.000266
Epoch 167/200 | loss: 90.01 | learning rate: 0.000265
Epoch 168/200 | loss: 89.07 | learning rate: 0.000265
Epoch 169/200 | loss: 89.35 | learning rate: 0.000264
Epoch 170/200 | loss: 89.46 | learning rate: 0.000263
Epoch 171/200 | loss: 88.93 | learning rate: 0.000262
Epoch 172/200 | loss: 88.86 | learning rate: 0.000262
Epoch 173/200 | loss: 88.8 | learning rate: 0.000261
Epoch 174/200 | loss: 89.03 | learning rate: 0.00026
Epoch 175/200 | loss: 89.08 | learning rate: 0.000259
Random Tests
**************************
Pred:  codes for the countries and languages code should be dk es es it nl at pt fi se uk se nl EOS True:  country and language codes code be dk de gr es fr ie it lu nl at pt fi se uk
Pred:  procedural directives were published on march and the hearing took place in nanaimo british columbia in all provinces and may . EOS True:  procedural directions were issued on march and the oral hearing was held in nanaimo british columbia on may and .
Pred:  the most recent business survey carried out by now indicated that number of business trips in the united kingdom should increase by while the mean duration of these travel may be reduced . EOS True:  the latest business travel survey by barclaycard revealed that u .k . business travel volumes are expected to grow in although average days away are expected to decline .
Pred:   develop intervention protocols and a ability to manage public health threats and include ngos in this process . EOS True:   create response protocols and capacity to deal with public health threats and include ngos in this process .
Pred:  succeeded at the sea science institute in the british columbia was received in awarding the concept in a leading role for a primary statements . EOS True:  for his leading role in ocean science dr . carmack a climate oceanographer with the institute of ocean sciences in sidney british columbia was awarded the massey medal .
Pred:  the unique entrepreneurship program in its target residents of safe drinking for women of la . . EOS True:  the unique entrepreneurship program targets the residents of the la ronge women s shelter .
Pred:   ontario s average female of such mother gave it some of the canadian school of medical services . EOS True:  she was the daughter of emily howard stowe who in was the first woman to practice medicine in canada after graduating from an american medical school .
Pred:  in this context the committee called for the jointly organise
```

```
in line with the stakeholders and the institutions involved a
conference to reinforce the dialogue . EOS True:  the committee in
this context offers to organise a conference together with the
relevant actors and institutions to strengthen the dialogue .
Pred:  with the billion approved and or other sufficient billion for
new equipment in the next years this component will be followed to
increase the focus as criticism of the potential investors as a
supporters of defence investment . EOS True:  with billion approved
and another billion planned for new equipment over the next years this
thrust will attract the most attention from both critics and
supporters of defence investment .
Pred:   b means a large scale ballast detection and water in a clean
edge contact facility . EOS True:  b bush a large debris collar at the
touchdown point of a tornado funnel .
******************************
Epoch 176/200 | loss: 89.19 | learning rate: 0.000259
Epoch 177/200 | loss: 88.71 | learning rate: 0.000258
Epoch 178/200 | loss: 88.12 | learning rate: 0.000257
Epoch 179/200 | loss: 88.7 | learning rate: 0.000256
Epoch 180/200 | loss: 88.14 | learning rate: 0.000256
Epoch 181/200 | loss: 88.34 | learning rate: 0.000255
Epoch 182/200 | loss: 88.16 | learning rate: 0.000254
Epoch 183/200 | loss: 88.41 | learning rate: 0.000254
Epoch 184/200 | loss: 87.97 | learning rate: 0.000253
Epoch 185/200 | loss: 87.95 | learning rate: 0.000252
Epoch 186/200 | loss: 87.61 | learning rate: 0.000252
Epoch 187/200 | loss: 87.89 | learning rate: 0.000251
Epoch 188/200 | loss: 87.35 | learning rate: 0.00025
Epoch 189/200 | loss: 88.26 | learning rate: 0.00025
Epoch 190/200 | loss: 87.73 | learning rate: 0.000249
Epoch 191/200 | loss: 87.53 | learning rate: 0.000248
Epoch 192/200 | loss: 87.7 | learning rate: 0.000248
Epoch 193/200 | loss: 87.52 | learning rate: 0.000247
Epoch 194/200 | loss: 87.7 | learning rate: 0.000246
Epoch 195/200 | loss: 87.09 | learning rate: 0.000246
Epoch 196/200 | loss: 86.89 | learning rate: 0.000245
Epoch 197/200 | loss: 86.98 | learning rate: 0.000245
Epoch 198/200 | loss: 87.25 | learning rate: 0.000244
Epoch 199/200 | loss: 87.27 | learning rate: 0.000243
```

Random Tests on Trained Transformer Model for Language Translation

```
#more random tests
random_model_testing(20,transformer1)

Random Tests
******************************
Pred:   on the long term to permit the island by organizations we will
help to understand how they are increasing sun and if there is a great
```

deal to the where lewis continues to be an issue . EOS True: ultimately alma will help us to understand how planets formed around our sun and how common planets are in the universe says dr . knee .
Pred: the other factors which have been considered are not as yet in other words they have EOS True: in the absence of quite exceptional circumstances letting out a golf course cannot therefore constitute the main service supplied .
Pred: although there is complete limits for proper accountability in this respect and to disseminate it to other areas of authority that are required to be a model of authority and credibility . EOS True: in order to effectively carry out its statutory responsibilities and successfully promote its vision for the future the department must be able to lead with authority and credibility .
Pred: the committees also provide senators to hear the opportunity for a wide variety of canadians to share university and conventional interests and interest groups . EOS True: committees also provide senators with an opportunity to hear from many canadians government officials representatives of interest groups academics and private citizens appear as witnesses .
Pred: EOS True: be targeted towards real policy needs be supported by adequate resources and generate confidence in the benefits of changes in orientations and approaches structures and delivery mechanisms .
Pred: the national and local of la sa academy attracts national students EOS True: cior language academy draws students from countries
Pred: . in addition i can t pay you a lot of control over the company s ip so i do it . EOS True: since mr . murphy is not a member of the house of commons i cannot assess his conduct against obligations under the members code which has no application in relation to him .
Pred: most of these companies are active in one service industry namely computer and its related activities . EOS True: most of these enterprises are active in a single service industry namely computer related activities .
Pred: the canada pharmacists association s bi report includes a list of databases . EOS True: the canadian pharmacists association cpha semi annual report has list of databases
Pred: this declaration relates to the following registrations or applications EOS True: the present statement concerns the following registration s and or application s
Pred: the career development resources and hr expertise are required as well as participants called for enhanced improvement or recognition . EOS True: professional development resources and hr expertise are all existing tools for which participants requested improvement or further recognition .
Pred: however names of origin are protected under specific rules as set out in the legislation or regulations which undertaking these . EOS True: designations of origin on the other hand are protected

under special rules laid down in the statutes or regulations by which they are established .
Pred: the opening ceremonies and tour of the medals inside a opening ceremony is expected to be conducted at a opening opening stage from the fort castle like a fort the castle like site is intended . EOS True: the plan is to hold opening closing and medal ceremonies in a temporary stadium built over the river salzach and facing the hohensalzburg fortress which will be very attractive .
Pred: EOS True: be targeted towards real policy needs be supported by adequate resources and generate confidence in the benefits of changes in orientations and approaches structures and delivery mechanisms .
Pred: if there is a foreign body label on the belt of rust at the site of the applicable . EOS True: if foreign body is metallic look for a rust ring around material differential diagnosis
Pred: which are the priorities for proposals in the application ? EOS True: what are the priorities for the request for proposals ?
Pred: the chair noted that the delegation of tunisia had suggested earlier during the meeting that the possibility of developing the guidelines for the application of ibd in the context of the review . EOS True: the chair observed that the delegation of tunisia had suggested earlier in the meeting that consideration be given to the possibility of developing guidelines on the application of inns in the context of examination .
Pred: september to respect and commitments of turkey s responsibilities recommendation reply from the committee of ministers adopted at the th meeting of the ministers deputies september . EOS True: september honouring of obligations and commitments by turkey recommendation reply from the committee of ministers adopted at the th meeting of the ministers deputies september .
Pred: the transition will use the cost of accommodation for the purpose of further productivity . EOS True: some benefits and costs may be unquantified but still need to be considered see section . .
Pred: sample units to the reserve population the number of provincial status and a regional name in which the population was reported in the special section was given under the proposed section . EOS True: census subdivision types found in the interim list of changes to municipal boundaries status and names census subdivision type descriptions
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