Assignment 5

Character Level Language Model

Download dino names dataset

In [0]:

```
#https://drive.google.com/file/d/1LqQWRAxC8qEXPVJHeonRX1H6Qfb1cX8F/view?usp=sharing
!wget --no-check-certificate 'https://docs.google.com/uc?export=download&id=1LqQWRAxC8qEXPVJHeonRX1H6Qfb1cX8
F' -O dinos.txt
```

```
--2019-04-14 15:18:17--  https://docs.google.com/uc?export=download&id=1LqQWRAxC8qEXPVJHeonRX1H
6Qfb1cX8F
Resolving docs.google.com (docs.google.com)... 64.233.188.102, 64.233.188.101, 64.233.188.139,
...
Connecting to docs.google.com (docs.google.com)|64.233.188.102|:443... connected.
HTTP request sent, awaiting response... 302 Moved Temporarily
Location: https://doc-08-2o-docs.googleusercontent.com/docs/securesc/ha0ro937gcuc7l7deffksulhg5
h7mbp1/2v41npjgabnvja23mstolifk6725ccu2/1555250400000/10632806613498870968/*/1LqQWRAxC8qEXPVJHe
onRX1H6Qfb1cX8F?e=download [following]
Warning: wildcards not supported in HTTP.
--2019-04-14 15:18:18--  https://doc-08-2o-docs.googleusercontent.com/docs/securesc/ha0ro937gcu
c7l7deffksulhg5h7mbp1/2v41npjgabnvja23mstolifk6725ccu2/1555250400000/10632806613498870968/*/1Lq
QWRAxC8qEXPVJHeonRX1H6Qfb1cX8F?e=download
Resolving doc-08-2o-docs.googleusercontent.com (doc-08-2o-docs.googleusercontent.com)... 64.233
.187.132, 2404:6800:4008:c05::84
Connecting to doc-08-2o-docs.googleusercontent.com (doc-08-2o-docs.googleusercontent.com)|64.23
3.187.132|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 19909 (19K) [text/plain]
Saving to: 'dinos.txt'

dinos.txt           100%[===================>]  19.44K  --.-KB/s    in 0s

2019-04-14 15:18:18 (74.5 MB/s) - 'dinos.txt' saved [19909/19909]
```

Utils used in assignment

In [0]:

```python
import numpy as np

def softmax(x):
    e_x = np.exp(x - np.max(x))
    return e_x / e_x.sum(axis=0)

def smooth(loss, cur_loss):
    return loss * 0.999 + cur_loss * 0.001

def print_sample(sample_ix, ix_to_char):
    txt = ''.join(ix_to_char[ix] for ix in sample_ix)
    txt = txt[0].upper() + txt[1:]  # capitalize first character
    print ('%s' % (txt, ), end='')

def get_initial_loss(vocab_size, seq_length):
    return -np.log(1.0/vocab_size)*seq_length

def softmax(x):
    e_x = np.exp(x - np.max(x))
    return e_x / e_x.sum(axis=0)

def initialize_parameters(n_a, n_x, n_y):
    """
    Initialize parameters with small random values

    Returns:
    parameters -- python dictionary containing:
                        Wax -- Weight matrix multiplying the input, numpy array of shape (n_a, n_x)
                        Waa -- Weight matrix multiplying the hidden state, numpy array of shape (n_a, n_a)
                        Wya -- Weight matrix relating the hidden-state to the output, numpy array of shape (
```

```
n_y, n_a)
                        b -- Bias, numpy array of shape (n_a, 1)
                        by -- Bias relating the hidden-state to the output, numpy array of shape (n_y, 1)
    """
    np.random.seed(1)
    Wax = np.random.randn(n_a, n_x)*0.01 # input to hidden
    Waa = np.random.randn(n_a, n_a)*0.01 # hidden to hidden
    Wya = np.random.randn(n_y, n_a)*0.01 # hidden to output
    b = np.zeros((n_a, 1)) # hidden bias
    by = np.zeros((n_y, 1)) # output bias

    parameters = {"Wax": Wax, "Waa": Waa, "Wya": Wya, "b": b,"by": by}

    return parameters

def rnn_step_forward(parameters, a_prev, x):

    Waa, Wax, Wya, by, b = parameters['Waa'], parameters['Wax'], parameters['Wya'], parameters['by'], parame
ters['b']
    a_next = np.tanh(np.dot(Wax, x) + np.dot(Waa, a_prev) + b) # hidden state
    p_t = softmax(np.dot(Wya, a_next) + by) # unnormalized log probabilities for next chars # probabilities
for next chars

    return a_next, p_t

def rnn_step_backward(dy, gradients, parameters, x, a, a_prev):

    gradients['dWya'] += np.dot(dy, a.T)
    gradients['dby'] += dy
    da = np.dot(parameters['Wya'].T, dy) + gradients['da_next'] # backprop into h
    daraw = (1 - a * a) * da # backprop through tanh nonlinearity
    gradients['db'] += daraw
    gradients['dWax'] += np.dot(daraw, x.T)
    gradients['dWaa'] += np.dot(daraw, a_prev.T)
    gradients['da_next'] = np.dot(parameters['Waa'].T, daraw)
    return gradients

def update_parameters(parameters, gradients, lr):

    parameters['Wax'] += -lr * gradients['dWax']
    parameters['Waa'] += -lr * gradients['dWaa']
    parameters['Wya'] += -lr * gradients['dWya']
    parameters['b']   += -lr * gradients['db']
    parameters['by']  += -lr * gradients['dby']
    return parameters

def rnn_forward(X, Y, a0, parameters, vocab_size = 27):

    # Initialize x, a and y_hat as empty dictionaries
    x, a, y_hat = {}, {}, {}

    a[-1] = np.copy(a0)

    # initialize your loss to 0
    loss = 0

    for t in range(len(X)):

        # Set x[t] to be the one-hot vector representation of the t'th character in X.
        # if X[t] == None, we just have x[t]=0. This is used to set the input for the first timestep to the
zero vector.
        x[t] = np.zeros((vocab_size,1))
        if (X[t] != None):
            x[t][X[t]] = 1

        # Run one step forward of the RNN
        a[t], y_hat[t] = rnn_step_forward(parameters, a[t-1], x[t])

        # Update the loss by substracting the cross-entropy term of this time-step from it.
        loss -= np.log(y_hat[t][Y[t],0])

    cache = (y_hat, a, x)

    return loss, cache

def rnn_backward(X, Y, parameters, cache):
    # Initialize gradients as an empty dictionary
    gradients = {}

    # Retrieve from cache and parameters
    (y hat, a, x) = cache
```

```
        Waa, Wax, Wya, by, b = parameters['Waa'], parameters['Wax'], parameters['Wya'], parameters['by'], parame
ters['b']

    # each one should be initialized to zeros of the same dimension as its corresponding parameter
    gradients['dWax'], gradients['dWaa'], gradients['dWya'] = np.zeros_like(Wax), np.zeros_like(Waa), np.zer
os_like(Wya)
    gradients['db'], gradients['dby'] = np.zeros_like(b), np.zeros_like(by)
    gradients['da_next'] = np.zeros_like(a[0])

    ### START CODE HERE ###
    # Backpropagate through time
    for t in reversed(range(len(X))):
        dy = np.copy(y_hat[t])
        dy[Y[t]] -= 1
        gradients = rnn_step_backward(dy, gradients, parameters, x[t], a[t], a[t-1])
    ### END CODE HERE ###

    return gradients, a
```

Assignment Implementation

In [0]:

```
import numpy as np
import random

data = open('dinos.txt', 'r').read()
data = data.lower()
chars = list(set(data))
data_size, vocab_size = len(data), len(chars)
print('There are %d total characters and %d unique characters in your data.' % (data_size, vocab_size))

char_to_ix = { ch:i for i,ch in enumerate(sorted(chars)) }
ix_to_char = { i:ch for i,ch in enumerate(sorted(chars)) }
print(ix_to_char)
```

```
There are 19909 total characters and 27 unique characters in your data.
{0: '\n', 1: 'a', 2: 'b', 3: 'c', 4: 'd', 5: 'e', 6: 'f', 7: 'g', 8: 'h', 9: 'i', 10: 'j', 11:
'k', 12: 'l', 13: 'm', 14: 'n', 15: 'o', 16: 'p', 17: 'q', 18: 'r', 19: 's', 20: 't', 21: 'u',
22: 'v', 23: 'w', 24: 'x', 25: 'y', 26: 'z'}
```

Clipping Implementation

In [0]:

```
### GRADED FUNCTION: clip

def clip(gradients, maxValue):
    '''
    Clips the gradients' values between minimum and maximum.

    Arguments:
    gradients -- a dictionary containing the gradients "dWaa", "dWax", "dWya", "db", "dby"
    maxValue -- everything above this number is set to this number, and everything less than -maxValue is set
to -maxValue

    Returns:
    gradients -- a dictionary with the clipped gradients.
    '''

    dWaa, dWax, dWya, db, dby = gradients['dWaa'], gradients['dWax'], gradients['dWya'], gradients['db'], grad
ients['dby']

    ### START CODE HERE ###
    np.clip(dWaa, -maxValue, maxValue, dWaa)
    np.clip(dWax, -maxValue, maxValue, dWax)
    np.clip(dWya, -maxValue, maxValue, dWya)
    np.clip(db, -maxValue, maxValue, db)
    np.clip(dby, -maxValue, maxValue, dby)
    ### END CODE HERE ###

    gradients = {"dWaa": dWaa, "dWax": dWax, "dWya": dWya, "db": db, "dby": dby}

    return gradients
```

In [0]:

```
np.random.seed(3)
dWax = np.random.randn(5,3)*10
dWaa = np.random.randn(5,5)*10
dWya = np.random.randn(2,5)*10
db = np.random.randn(5,1)*10
dby = np.random.randn(2,1)*10
gradients = {"dWax": dWax, "dWaa": dWaa, "dWya": dWya, "db": db, "dby": dby}
gradients = clip(gradients, 10)
print("gradients[\"dWaa\"][1][2] =", gradients["dWaa"][1][2])
print("gradients[\"dWax\"][3][1] =", gradients["dWax"][3][1])
print("gradients[\"dWya\"][1][2] =", gradients["dWya"][1][2])
print("gradients[\"db\"][4] =", gradients["db"][4])
print("gradients[\"dby\"][1] =", gradients["dby"][1])
```

```
gradients["dWaa"][1][2] = 10.0
gradients["dWax"][3][1] = -10.0
gradients["dWya"][1][2] = 0.2971381536101662
gradients["db"][4] = [10.]
gradients["dby"][1] = [8.45833407]
```

Sample Implementation

```
In [0]:
```

```python
# GRADED FUNCTION: sample

def sample(parameters, char_to_ix, seed):
    """
    Sample a sequence of characters according to a sequence of probability distributions output of the RNN

    Arguments:
    parameters -- python dictionary containing the parameters Waa, Wax, Wya, by, and b.
    char_to_ix -- python dictionary mapping each character to an index.
    seed -- used for grading purposes. Do not worry about it.

    Returns:
    indices -- a list of length n containing the indices of the sampled characters.
    """

    # Retrieve parameters and relevant shapes from "parameters" dictionary
    Waa, Wax, Wya, by, b = parameters['Waa'], parameters['Wax'], parameters['Wya'], parameters['by'], parameters['b']
    vocab_size = by.shape[0]
    n_a = Waa.shape[1]

    ### START CODE HERE ###
    # Step 1: Create the one-hot vector x for the first character (initializing the sequence generation).
    x = np.zeros((vocab_size, 1))
    # Step 1': Initialize a_prev as zeros
    a = np.zeros((n_a, 1))
    # Create an empty list of indices, this is the list which will contain the list of indices of the characte
rs to generate (≈1 line)
    indices = []
    # Idx is a flag to detect a newline character, we initialize it to -1
    idxFlag = -1
    # Loop over time-steps t. At each time-step, sample a character from a probability distribution and append
    # its index to "indices". We'll stop if we reach 50 characters (which should be very unlikely with a well
    # trained model), which helps debugging and prevents entering an infinite loop.
    indList = [i for i in range(vocab_size)]
    newlineEnd = char_to_ix['\n']
    counter = 0
    for t in range(50):
        # Step 2: Forward propagate x using the equations (1), (2) and (3)
        a, y = rnn_step_forward(parameters, a, x)
        # for grading purposes
        np.random.seed(counter + seed)

        # Step 3: Sample the index of a character within the vocabulary from the probability distribution y
        idx = np.random.choice(indList, p = y.ravel());
        # Append the index to "indices"
        indices.append(idx)
        # Step 4: Overwrite the input character as the one corresponding to the sampled index.
        x = np.zeros((vocab_size, 1))
        x[idx] = 1
        # Update "a_prev" to be "a"
        # Already done.
        # for grading purposes
        seed += 1
        counter +=1
        if (idx == newlineEnd):
            break

    ### END CODE HERE ###

    if (counter == 50):
        indices.append(char_to_ix['\n'])

    return indices
```

```
np.random.seed(2)
_, n_a = 20, 100
Wax, Waa, Wya = np.random.randn(n_a, vocab_size), np.random.randn(n_a, n_a), np.random.randn(vocab_size, n_a
)
b, by = np.random.randn(n_a, 1), np.random.randn(vocab_size, 1)
parameters = {"Wax": Wax, "Waa": Waa, "Wya": Wya, "b": b, "by": by}


indices = sample(parameters, char_to_ix, 0)
print("Sampling:")
print("list of sampled indices:", indices)
print("list of sampled characters:", [ix_to_char[i] for i in indices])
```

```
Sampling:
list of sampled indices: [12, 17, 24, 14, 13, 9, 10, 22, 24, 6, 13, 11, 12, 6, 21, 15, 21, 14,
3, 2, 1, 21, 18, 24, 7, 25, 6, 25, 18, 10, 16, 2, 3, 8, 15, 12, 11, 7, 1, 12, 10, 2, 7, 7, 11,
17, 24, 12, 13, 24, 0]
list of sampled characters: ['l', 'q', 'x', 'n', 'm', 'i', 'j', 'v', 'x', 'f', 'm', 'k', 'l', '
f', 'u', 'o', 'u', 'n', 'c', 'b', 'a', 'u', 'r', 'x', 'g', 'y', 'f', 'y', 'r', 'j', 'p', 'b', '
c', 'h', 'o', 'l', 'k', 'g', 'a', 'l', 'j', 'b', 'g', 'g', 'k', 'q', 'x', 'l', 'm', 'x', '\n']
```

Optimize Function

```python
# GRADED FUNCTION: optimize

def optimize(X, Y, a_prev, parameters, learning_rate = 0.01):
    """
    Execute one step of the optimization to train the model.

    Arguments:
    X -- list of integers, where each integer is a number that maps to a character in the vocabulary.
    Y -- list of integers, exactly the same as X but shifted one index to the left.
    a_prev -- previous hidden state.
    parameters -- python dictionary containing:
                        Wax -- Weight matrix multiplying the input, numpy array of shape (n_a, n_x)
                        Waa -- Weight matrix multiplying the hidden state, numpy array of shape (n_a, n_a)
                        Wya -- Weight matrix relating the hidden-state to the output, numpy array of shape (n_
y, n_a)
                        b --  Bias, numpy array of shape (n_a, 1)
                        by -- Bias relating the hidden-state to the output, numpy array of shape (n_y, 1)
    learning_rate -- learning rate for the model.

    Returns:
    loss -- value of the loss function (cross-entropy)
    gradients -- python dictionary containing:
                        dWax -- Gradients of input-to-hidden weights, of shape (n_a, n_x)
                        dWaa -- Gradients of hidden-to-hidden weights, of shape (n_a, n_a)
                        dWya -- Gradients of hidden-to-output weights, of shape (n_y, n_a)
                        db -- Gradients of bias vector, of shape (n_a, 1)
                        dby -- Gradients of output bias vector, of shape (n_y, 1)
    a[len(X)-1] -- the last hidden state, of shape (n_a, 1)
    """

    ### START CODE HERE ###

    # Forward propagate through time
    loss, cache = rnn_forward(X, Y, a_prev, parameters)
    # Backpropagate through time
    gradients, a = rnn_backward(X, Y, parameters, cache)
    # Clip your gradients between -5 (min) and 5 (max)
    gradients = clip(gradients, 5)
    # Update parameters
    parameters = update_parameters(parameters, gradients, learning_rate)
    ### END CODE HERE ###

    return loss, gradients, a[len(X)-1]
```

In [0]:

```
np.random.seed(1)
vocab_size, n_a = 27, 100
a_prev = np.random.randn(n_a, 1)
Wax, Waa, Wya = np.random.randn(n_a, vocab_size), np.random.randn(n_a, n_a), np.random.randn(vocab_size, n_a
)
b, by = np.random.randn(n_a, 1), np.random.randn(vocab_size, 1)
parameters = {"Wax": Wax, "Waa": Waa, "Wya": Wya, "b": b, "by": by}
X = [12,3,5,11,22,3]
Y = [4,14,11,22,25, 26]

loss, gradients, a_last = optimize(X, Y, a_prev, parameters, learning_rate = 0.01)
print("Loss =", loss)
print("gradients[\"dWaa\"][1][2] =", gradients["dWaa"][1][2])
print("np.argmax(gradients[\"dWax\"]) =", np.argmax(gradients["dWax"]))
print("gradients[\"dWya\"][1][2] =", gradients["dWya"][1][2])
print("gradients[\"db\"][4] =", gradients["db"][4])
print("gradients[\"dby\"][1] =", gradients["dby"][1])
print("a_last[4] =", a_last[4])
```

```
Loss = 126.50397572165369
gradients["dWaa"][1][2] = 0.19470931534720928
np.argmax(gradients["dWax"]) = 93
gradients["dWya"][1][2] = -0.007773876032003706
gradients["db"][4] = [-0.06809825]
gradients["dby"][1] = [0.01538192]
a_last[4] = [-1.]
```

Model Function

In [0]:

```python
# GRADED FUNCTION: model

def model(data, ix_to_char, char_to_ix, num_iterations = 35000, n_a = 50, dino_names = 7, vocab_size = 27):
    """
    Trains the model and generates dinosaur names.

    Arguments:
    data -- text corpus
    ix_to_char -- dictionary that maps the index to a character
    char_to_ix -- dictionary that maps a character to an index
    num_iterations -- number of iterations to train the model for
    n_a -- number of units of the RNN cell
    dino_names -- number of dinosaur names you want to sample at each iteration.
    vocab_size -- number of unique characters found in the text, size of the vocabulary

    Returns:
    parameters -- learned parameters
    """

    # Retrieve n_x and n_y from vocab_size
    n_x, n_y = vocab_size, vocab_size

    # Initialize parameters
    parameters = initialize_parameters(n_a, n_x, n_y)

    # Initialize loss (this is required because we want to smooth our loss, don't worry about it)
    loss = get_initial_loss(vocab_size, dino_names)

    # Build list of all dinosaur names (training examples).
    with open("dinos.txt") as f:
        examples = f.readlines()
    examples = [x.lower().strip() for x in examples]

    # Shuffle list of all dinosaur names
    np.random.seed(0)
    np.random.shuffle(examples)

    # Initialize the hidden state of your LSTM
    a_prev = np.zeros((n_a, 1))

    # Optimization loop
    for j in range(num_iterations):

        ### START CODE HERE ###

        # Use the hint above to define one training example (X,Y) (≈ 2 lines)
        index = j % len(examples);
        X = [None] + [char_to_ix[ch] for ch in examples[index]];
        Y = X[1:] + [char_to_ix['\n']];
        # Perform one optimization step: Forward-prop -> Backward-prop -> Clip -> Update parameters
        # Choose a learning rate of 0.01
        curr_loss, _, _ = optimize(X, Y, a_prev, parameters, learning_rate = 0.01)
        ### END CODE HERE ###

        # Use a latency trick to keep the loss smooth. It happens here to accelerate the training.
        loss = smooth(loss, curr_loss)

        # Every 100 Iteration, generate "n" characters thanks to sample() to check if the model is learning properly
        if j % 100 == 0:

            print('Iteration: %d, Loss: %f' % (j, loss) + '\n')

            # The number of dinosaur names to print
            seed = 0
            for name in range(dino_names):

                # Sample indices and print them
                sampled_indices = sample(parameters, char_to_ix, seed)
                print_sample(sampled_indices, ix_to_char)

                seed += 1  # To get the same result for grading purposed, increment the seed by one.

            print('\n')
        if j == len(examples) - 1:
            np.random.shuffle(examples)
    return parameters
```

Run model

In [0]:

```
parameters = model(data, ix_to_char, char_to_ix, dino_names = 10)
```

Iteration: 0, Loss: 32.964959

Nkzxwtdmfqoeyhsqwasjkjvu
Kneb
Kzxwtdmfqoeyhsqwasjkjvu
Neb
Zxwtdmfqoeyhsqwasjkjvu
Eb
Xwtdmfqoeyhsqwasjkjvu
B
Wtdmfqoeyhsqwasjkjvu

Iteration: 100, Loss: 33.662699

Olyvusbnerodyhsru
Koea
Lyvusbnerodyhsru
Oea
Yvusbnerodyhsru
Ea
Vusbnerodyhsru
A
Usbnerodyhsru

Iteration: 200, Loss: 33.986852

Olxuusaocrpbwfsru
Koc
Lxuusaocrpbwfsru
Oca
Xuusaocrpbwfsru
Ca
Uusaocrpbwfsru
A
Usaocrpbwfsru

Iteration: 300, Loss: 34.143873

Omwuusaocrrauhsru
Lod
Lxuusaocrrauhsru
Od
Xuusaocrqauhsru
Da
Uusaocrqauhsru
A
Usaocrqauhsru

Iteration: 400, Loss: 34.304867

Omyuts
Koea
Lyuts
Oea
Yuts
Da
Utsaoeroduisou
A
Us

Iteration: 500, Loss: 33.976267

Onyusnhmesaotatouaus

Knda
Lyusnhnesaotatouaus
Oga
Yusmhohrururtsras
Ea
Usmhohrururtsras
A
Us

Iteration: 600, Loss: 33.704460

Nixttraohos
Inca
Jxttraohos
Nca
Yttraohos
Da
Ushfohoraurusaeruraus
A
Traogos

Iteration: 700, Loss: 33.350230

Nixttrarasaus
Inca
Jyttraolos
Ncaadrur
Yttraojos
Daadrur
Ushgoirurus
A
Tpckdoraurusaes

Iteration: 800, Loss: 33.023173

Nixtsmeras
Inba
Ixtsnerasaus
Ncaadps
Ytsnerasaus
Daadpsal
Ushercoraurus
Aadpsaiaus
Todieqoiurus
Aerur

Iteration: 900, Loss: 32.588494

Mixtsihiirurus
Incaaesoog
Iytroinesassus
Mcaaerur
Ytsiepesaus
Daaertea
Ushhieronusaus
Aaerteaaptis
Toemcoraurusaerurosaerurus
Aerupabnurus

Iteration: 1000, Loss: 32.104470

Mixtroenapohupros
Indaaeromaansaurusdur
Iytroencopcupros
Mcaaeromaanrhsathus
Ytsididoraurusaeroraus
Daaerolaanrhsasaursauonos
Usididoraurusaeroraus
Aaerpfaanrhraheuribyairul
Todieoraurusaeroraus
Aerrecanrhraheurhayanos

```
Iteration: 1100, Loss: 31.640734

Nixtsihlesaus
Jmecahosapbosaurusosautanos
Lytroliironusaur
Ndaagpsanatsaurusosautanos
Ytskhmesaus
Ecagrur
Ushiresaus
Aaesonacosaurusosautanos
Tohiironusaur
Aerur


Iteration: 1200, Loss: 31.327218

Mixtrohigoraurusadrus
Indaaerur
Jytqraokos
Mcaaertecaosaurusisautgirun
Ytrogieronusaus
Daaersafatrisatius
Usidieronurusaerus
Aaerrecaosaurusisautgirun
Toendoraurusadrus
Aertecaosaurusisautgirun


Iteration: 1300, Loss: 30.936949

Mixusiapasaus
Inecahosaoeosaurusaurut
Jyttoinarontcrus
Necagpsalaropsanius
Yusneresausauruiloratr
Daagosanaus
Usmergoraurus
Aafpsaiausaurusaurut
Tofleromuosauhus
Agpsaiausaurusaurut


Iteration: 1400, Loss: 30.577527

Nixtosaurus
Inecagosatarrlthanton
Jytosaurus
Necagosaogos
Ytosaurus
Daagosaogos
Usidoloraurus
Aafosanapsaurus
Toenepolurosanros
Agosalaosaurus


Iteration: 1500, Loss: 30.355872

Miwslulomoraurus
Incaahosaulus
Ixtosaurus
Mcaahosaulus
Ytosaurus
Caahosasaus
Tpraneos
Aahosaodos
Togicopaurus
Agosalapsaurusaurut


Iteration: 1600, Loss: 29.952528

Nixusenops
Knedanrus
Lytronnasaus
Necalos
Yusolopsastosaurus
Ecalosaurus
Usoirhos
```

```
Aalosaurus
Tolonos
Ajrus


Iteration: 1700, Loss: 29.585833

Lgytoraolos
Hiacaerta
Iyusianesaus
Labaeroma
Yusianeriaurus
Baagosalaus
Tpodiatolurus
A
Todiatoluprus
Agprcabithur


Iteration: 1800, Loss: 29.290787

Mgytosaurus
Imacaeronaanusaurus
Iyuseeoliohurosgerosaurasipwja
Macaeromaanusaurus
Yushanbinaurusaerus
Caaeronaanusaurus
Toranepiaupsauhus
Aaeromaantesaurus
Todgapiaunusaerus
Afpracaosaurusgurotanos


Iteration: 1900, Loss: 29.038983

Mgytosaurus
Incaados
Jytosaurus
Ncaaerop
Yusicondonus
Caaerop
Tosaurus
A
Togharontesauius
Agosan


Iteration: 2000, Loss: 28.779737

Mgytronlesausisaupus
Ilecalosaurus
Iytronlesausisaupus
Macaisonaanus
Yusoeresausgurul
Caakosaurus
Torangos
Aahosaokus
Toineronurus
Agrpefaptis


Iteration: 2100, Loss: 28.547268

Mhytorapcronurusanpor
Imacalosaunus
Iytosaurus
Macalosaunus
Yusleomipaurus
Caagosaunus
Torandos
Aagosaunus
Toghapomurosaurus
Aisomaciusaurus


Iteration: 2200, Loss: 28.257074

Liwrosaurus
Hicaadosaurus
Ixtosaurus
```

```
Lacaeropa
Yusiandiraurus
Caadosataus
Torapatontcosalrsaurud
Aafosaogus
Todicoraurus
Agosalasiurus


Iteration: 2300, Loss: 28.009846

Mhytrogolosaurus
Imedagsona
Kytrogolosaurus
Mecakssaedosaurus
Yustengoraurus
Daaisthacosaurus
Torengoraurus
Aagrrgacosaurus
Togmepolurusanrus
Agrtgcantosaurus


Iteration: 2400, Loss: 27.714237

Mevssoiondthus
Imcabashurnsaurus
Jysruhonosaurus
Ndaaeropa
Xusmeonosaurus
Cabcosas
Trodonosaurus
Aagosapdus
Toendoraurus
Agronaanus


Iteration: 2500, Loss: 27.514407

Mexushancir
Ilacakosaurus
Jytoranasaus
Macahosan
Xusiandos
Caadosan
Torandos
Aafpracarsaurus
Todegosaurus
Airuia


Iteration: 2600, Loss: 27.379559

Mexusoerasaus
Ilacalosan
Jxusnbkeronths
Macahosalantos
Xusmaneronthrns
Caadosamantns
Toraneronths
Aadosalantos
Todhapolus
Agprecantis


Iteration: 2700, Loss: 27.120859

Mevrosaurus
Imecalosaurus
Kustomiamonus
Macalosaurus
Xuspangos
Daagosaurus
Toraolos
Aagosaurus
Tognesaurus
Ahosan


Iteration: 2800, Loss: 27.012187
```

Mgwtrolonos
Jicaagosas
Kvusqchesastis
Necakropcanus
Xusrangos
Daafropcaosaurus
Trraphosaurus
Aagropcaptos
Toglciraurus
Ajrracerus

Iteration: 2900, Loss: 26.919215

Mevssolomopeurosherisaurashus
Jicabdosaurus
Kvsspdomoravhoshcrosaurashus
Macalosas
Xusnchdoravhosharosaurashus
Dabcosalassus
Trochepolthorocoprisalosaurum
Aadosan
Toindoravhosharosaurashus
Airomachusaurus

Iteration: 3000, Loss: 26.621444

Miwusierasaurus
Ilacamseurasosrurus
Kustolonosaurus
Macalpsaurus
Xuspaonosaurus
Daagosaurus
Toraonosaurus
Aagsiiacisaurus
Tohieronusaurus
Akrun

Iteration: 3100, Loss: 26.426173

Miyusmendopaupus
Jogaagosaunus
Kytoranasausosaukus
Nebagshia
Xusqenepiaurusasaurus
Daagpsauhus
Toraneoraunosasaurus
A
Tofkeopauosaunus
Akruhachukun

Iteration: 3200, Loss: 26.104210

Mewtosaurus
Imacalos
Jytosaurus
Macalosaurus
Xustanes
Caagosaurus
Torangos
Aagosaurus
Toligos
Alosan

Iteration: 3300, Loss: 26.082038

Nhytromiciraurus
Inacalosaurus
Kytromichontasaurus
Nacalosaurus
Xussaonlieusauran
Daaesiiacisaurusaurpx
Trolonkontanos
Aadosaurus
Toisaurothusanopgosalosauruf

Ahpsalashusaurus

Iteration: 3400, Loss: 26.008161

Miyusoineriaurus
Indaaerona
Jyusoeodopaurus
Macagosan
Yusoenepicurorocopborua
Daadosan
Torangoraviros
Aadosamatops
Tofidoqavipitatepeus
Aispecaotosaurus

Iteration: 3500, Loss: 25.914874

Lhytoraneromur
Hicaaeronabosaurus
Ixusoeneromuratodrin
Lacahosaichuseurus
Yuspanepidus
Caadosan
Toranephaurus
Aaerolachus
Togichicternudus
Agprecanthur

Iteration: 3600, Loss: 25.840914

Meusprapaqonusaurhimhatraloryicanalui
Inda
Jytroloniomurosaurus
Macalosaurus
Xussasaurus
Daaisheedis
Trrangosaurus
Aagpreeanoronapton
Tolharontesaurus
Akronaanretdenus

Iteration: 3700, Loss: 25.720796

Lixtqomegos
Hicbaesaurus
Hysspandos
Labaeros
Yusodopsantes
Cabcosaurus
Toranesaurus
Aadosaurus
Todneriaushus
Agpria

Iteration: 3800, Loss: 25.491270

Mewusichos
Ilecalosaurus
Jytrononiolus
Macahosaurus
Xuspclisausus
Caadosaurus
Trodonlonus
Aadosaurus
Todlgosaurus
Aissadeps

Iteration: 3900, Loss: 25.331644

Mewtronnatontartohus
Hidaaisaurus
Ivusonnatontasaurus
Macalosaurus
Xusrendosaurus

```
Cabcosateus
Trodonis
Aadosaurus
Togleroptosaurus
Ahrrhadosaurus


Iteration: 4000, Loss: 25.273879

Mextosaurus
Hicaadosaurus
Ivtrodomaleus
Macaeropa
Xusocheriathosashurus
Caadosaurus
Trochepkeus
Aadosaurus
Todiciomurus
Ahosaiaus


Iteration: 4100, Loss: 25.192939

Mewtosaurus
Ilecalosaurus
Justoerasaurus
Macaisiia
Xuspangosaurus
Daagosaurus
Trodidorawhus
Aagosaurus
Toficholuosaurus
Ajpola


Iteration: 4200, Loss: 25.145380

Mevtosaurus
Jkeeaeropa
Kurroeratontanjumirosaunus
Macalosaolus
Xurodonos
Daairon
Trodolosaurus
Aagosan
Togohoravisaurus
Akroma


Iteration: 4300, Loss: 24.976815

Mevusiandosaurus
Kicbagsaurisaurus
Kustojianontesaurus
Macajsiceiptosaurus
Xuspandosaurus
Daaesia
Trodolosaurus
Aadosaurus
Toenesaurus
Aisula


Iteration: 4400, Loss: 24.989428

Mevuspclisaus
Ilacalosaurus
Jusuraratoptor
Macakroodansaurus
Xustanesaurus
Cabcosas
Toranergator
Aadosaphus
Toglaromus
Airracersaurus


Iteration: 4500, Loss: 24.923899

Mexuskines
```

```
Jiacalqsaurus
Kytosaurus
Macaisaurus
Xuspanesaurus
Daagosaurus
Torangosaurus
Aagpsaurus
Toingpontesaurus
Aispeiantis


Iteration: 4600, Loss: 24.743882

Mewusienesaurus
Jiccakus
Kutqrapeponus
Macairon
Xutoeojosaurus
Daaeron
Trodolus
Bagrona
Todierontesaurus
Akpria


Iteration: 4700, Loss: 24.523742

Nixushengosaurus
Kokaalosaurus
Kytronopor
Nacalosaurus
Xusteonosaurus
Daalosaurus
Trogonosaurus
Aagroraarsaurus
Tohikosaurus
Akrphacosaurus


Iteration: 4800, Loss: 24.500631

Optrronlesaustiptan
Klacalsnia
Lytromietieus
Olaaesaurus
Xustanesaurus
Daadosaurus
Trochesaus
Aachracersauruscur
Toklesaurus
Aksthachusjur


Iteration: 4900, Loss: 24.587589

Miwusophepn
Hiceacosam
Ixusordenlateritaran
Macajosan
Yussanesaurus
Caacoracersauroptor
Trocherokus
Aaciracersauroptor
Tochepigus
Ahosahaus


Iteration: 5000, Loss: 24.437984

Livtrrasaurus
Hihaagosaurus
Hystolonosaurus
Lacalrosaurus
Yustangosaurus
Cabersakeroshurnx
Trraperletes
Aagropa
Tollesaurus
Airrgachusaurus
```

```
Iteration: 5100, Loss: 24.396583

Mevtronigis
Imacanosaurus
Jytromiesaurus
Macalosaurus
Xustangosaurus
Caahosaurus
Trpangosaurus
Aagosaurus
Togngriaurtitar
Agronabosaurus


Iteration: 5200, Loss: 24.482009

Lexusolonlonvhors
Heeaadosaurus
Hytorangosaurus
Laaadosaurus
Xuspanesaurus
Caacosateps
Trocheoneusauros
Aadosaurus
Tocgeoolyetos
Agosamasiton


Iteration: 5300, Loss: 24.267878

Mexusolnatopteritaus
Ilecalosaurus
Jytosaurus
Macahosaurus
Yuspangosaurus
Cabbosaurus
Trochimngusaurblikesairusthia
Aacosaurus
Tocheosaurus
Aispegatops


Iteration: 5400, Loss: 24.228822

Mevstolops
Ilecamosataps
Justrerasaurus
Macalosatbus
Xusteolosaurus
Cabbosan
Trodolosaurus
Aadosaodos
Tojlipomus
Akrolacosaurus


Iteration: 5500, Loss: 24.164275

Mexusolomonauosaurus
Hiacagosaurus
Iussueokonaupnosaurus
Macaeroma
Xuspanesaurus
Caacosaurus
Trocheonexator
Aacosatdosaurus
Tramchohumosalrus
Agqueedloptophxidey


Iteration: 5600, Loss: 24.123141

Mewtosaurus
Jncaaesaurus
Kustidona
Macakptom
Xussangthaurus
Cabaptol
Trocheps
```

```
Aagpsaurus
Toflaptitan
Alrpcedhteus


Iteration: 5700, Loss: 24.078004

Miwustangosaurus
Ilecalotel
Iustrepeosaurus
Macaloteiaptos
Xustcilosaurus
Cabdrona
Trodleroitas
Aafusaurus
Todngosaurus
Altomacousin


Iteration: 5800, Loss: 23.941049

Meustolondonus
Jiccagosaurus
Kustrchinomus
Macairopcerus
Xtrrangosaurus
Daadosaurus
Trrangosaurus
Aadosaurus
Togmanolups
Afrolabosaurus


Iteration: 5900, Loss: 24.032846

Mevushanesaurus
Ilaaafosaurus
Justodonosaurus
Macalotha
Xustangosaurus
Daacosaurus
Trochichitepstan
Aadosaurus
Todidon
Airondantitenauroix


Iteration: 6000, Loss: 24.045834

Mevutomidon
Jiecalosaurus
Kytrrasaurus
Macalosaurus
Xustanesaurus
Daaesticantosaurus
Trrardoraxisaurus
Aadosaurus
Traphoraviposaurus
Ajstodentiten


Iteration: 6100, Loss: 23.914278

Mixusomeliohus
Imacalosaurus
Jxuspangosaurus
Macairon
Xustandosaurus
Daadosaurus
Trrangosaurus
Aaclradaptor
Todierelus
Airola


Iteration: 6200, Loss: 23.818459

Nixustasaurus
Koibalros
Lyutokonos
```

```
Ndaaishehaslus
Xustaonos
Daakusaurus
Trubolosaurus
Baisteialsaurus
Togolosaurus
Akstegasous


Iteration: 6300, Loss: 23.733362

Mavusoliamontatos
Ilabalosaurus
Jwtrokonniaus
Mabahosaurus
Xustangosaurus
Caaeropdanphus
Trochernctosaurus
Aadosan
Toflernathus
Alqsaianoptimaura


Iteration: 6400, Loss: 23.769026

Mewtosaurus
Imacalosaurus
Ivusolopor
Macagosaurus
Yustanesaurus
Daacjracerosopintimax
Trochasaurus
Aackracerosopintimax
Spanchiaus
Agosalaptos


Iteration: 6500, Loss: 23.761830

Mexusnenesaurus
Hicaadosaurus
Iwutodon
Macaisaurus
Yusranhosaurus
Cabarracergosaurus
Trrangosaurus
Aacosaurus
Todlgosaurus
Agquia


Iteration: 6600, Loss: 23.791679

Miwustangosaurus
Imedalosaurus
Ivustangosaurus
Macairracerosir
Xustangosaurus
Cabcrrag
Trpbomoravhus
Aagrphachus
Toingosaurus
Airthacitaten


Iteration: 6700, Loss: 23.786054

Lexussaonosaurus
Heiaadosaurus
Hyutoeonosaurus
Lacalosaurus
Yustancoravorataus
Cabarradansaurus
Trpandosaurus
Aacosaodos
Trandosaurus
Aistecansaurus


Iteration: 6800, Loss: 23.678399
```

```
Lextroidaptis
Helaacosaurus
Hyrqrapepsaurus
Lacalosaurus
Yuspancholurus
Cabarracaroropentie
Trocicmolurus
Aadropa
Trandosaurus
Ajrohaclusuon


Iteration: 6900, Loss: 23.643913

Mevusnerasaus
Ilecalsor
Justogopsaus
Macalosapkus
Xustanjosaurus
Cabbosaurus
Trodolosaurus
Abcosaurus
Togmasaurus
Altopedos


Iteration: 7000, Loss: 23.549393

Leytosaurus
Hhecaesceiagops
Hustrgonosaurus
Macagosaurus
Xuspengosaurus
Cabbosaurus
Trodicopaurus
Aadosaurus
Toenesaurus
Ahosanatops


Iteration: 7100, Loss: 23.523102

Mewusolong
Ilcaagron
Justpdong
Macainona
Xuspangosaurus
Caadosaurus
Trocheorax
Aadrona
Todidon
Aiprncerosaurus


Iteration: 7200, Loss: 23.523542

Mawuscen
Hegaadosaurus
Iustogia
Macagosaurus
Xustangosaurus
Caacosaurus
Trochaptos
Aadosaurus
Todlara
Ahosaurus


Iteration: 7300, Loss: 23.531370

Mevtosaurus
Jiceadosaurus
Kustodon
Macafosaurus
Xustangosaurus
Dabbosaurus
Tosangosaurus
Aachoma
Todoeosaurus
```

Agosaterinon

Iteration: 7400, Loss: 23.525691

Mevussasaurus
Jiceaeton
Kustodonis
Macaishodanmitallus
Xustanesaurus
Dabcosaurus
Torbilosaurus
Aacosaurus
Toengriaurus
Agrteg

Iteration: 7500, Loss: 23.508894

Metrosaurus
Ilacajnon
Justodonatius
Macaipsaurus
Xuspandon
Dabaroma
Trochaniauosaurus
Aaciracapsaurus
Todieoravhorocops
Agpracanosaurus

Iteration: 7600, Loss: 23.422997

Miwuspeomonathus
Joga
Kuttolonn
Macalosaurus
Xutogonnidur
Daaerreia
Trocherontes
A
Tognesaurus
Aisugcansaurus

Iteration: 7700, Loss: 23.328771

Miwushangosaurus
Kogbalus
Kvtroenatindhus
Macagosaurus
Xutoeonamus
Daaesia
Trrangosaurus
Aadosaurus
Togolosaurus
Aisona

Iteration: 7800, Loss: 23.179182

Mevushenes
Imacamosaurus
Jytosaurus
Macairope
Xustanisaurus
Caalosaurus
Trodnerhathus
Abbroncascithelus
Tohilosaurus
Alpsaldos

Iteration: 7900, Loss: 23.232035

Mexusolomoraweus
Jiacaisen
Kxutohhasaurus
Mabaeropa
Yustandosaurus

```
Daachuehaosaurus
Trobheronus
Aachuegaseus
Toelephaurthucr
Ahpria


Iteration: 8000, Loss: 23.279857

Mivusmendosaurus
Ingbaisaurus
Ivusolonis
Macaisaurus
Yuspanosaurus
Daaeosaurus
Troconosaurus
Abaroodamus
Toeojosaurus
Aispederpiter


Iteration: 8100, Loss: 23.287205

Liwssololophus
Hicaakosaurus
Hustodomondylus
Lebaerondanosaurus
Yusoengosaurus
Cabcosaurus
Trocienonus
Aadosaurus
Todliongxioptas
Aipolechunolentom


Iteration: 8200, Loss: 23.339957

Mexussasaurus
Ileaaeros
Jyussangosaurus
Macalosaurus
Yustanesaurus
Daadropabrus
Trpandosaurus
Aadrona
Togmeriaushosaurus
Agruelasiosaurus


Iteration: 8300, Loss: 23.310040

Livtosaurus
Hiacalpton
Hystrionis
Labaesthia
Yuspangsaurus
Cabaosaurus
Trociclonvhsus
Abansasaurus
Tochenoryptos
Agquceisaurus


Iteration: 8400, Loss: 23.214319

Mexusolongiatititan
Hiacalosaurus
Iustoeratops
Mabaeros
Yusrapios
Caacosaurus
Trociaroptos
Aacosaurus
Todleroptos
Aisoldantosaurus


Iteration: 8500, Loss: 23.134100

Mexuspchesaurus
```

Hiacaeropa
Hustrerasaurus
Macaeropa
Xusrandosaurus
Caacosaurus
Toraomeraurus
Aadosatatsaurus
Toenesanthosaprus
Afromabisaurus

Iteration: 8600, Loss: 23.165096

Mexusoenatopus
Hiacaisaurus
Iussuangosaurus
Macaeropa
Xuspameraius
Caacosaurus
Trochepomx
Abcosaurus
Trambopcurosaurus
Ajpria

Iteration: 8700, Loss: 23.116379

Mevusmchus
Imedalosaurus
Jususaurus
Madalosaurus
Xussangtenta
Cabdosaurus
Troengosaurus
Abcosaurus
Toengosaurus
Airtelanosaurus

Iteration: 8800, Loss: 23.158079

Mevusodon
Ilecachteca
Justrerhin
Macaisin
Xuspanis
Dabdosaurus
Trochisaurus
A
Toengosaurus
Agrone

Iteration: 8900, Loss: 23.064866

Nixstriongiaplosaurus
Kicaajosaurus
Lustonia
Neaahosaurus
Xussangosaurus
Daajosaurus
Torangosaurus
A
Tohilosaurus
Agrondansaurus

Iteration: 9000, Loss: 23.124001

Meurorapsaurus
Inabanria
Jurtogonia
Macalropedpthus
Xuronoporax
Cabcrrafcoratops
Trocheromusauris
Aberopa
Traneromurus
Ajropabroosaurus

```
Iteration: 9100, Loss: 23.125284

Mewutonleps
Ilacalosaurus
Justrcilis
Macalosaurus
Xustangosaurus
Caahosaurus
Trodliriathoseisaurus
Aadrondanosaurus
Tomigosaurus
Akrricarosaurus


Iteration: 9200, Loss: 23.018762

Mexutonichus
Kigabeshelasaurus
Kutrolonosaurus
Macakrsas
Xutoinathosaurus
Daagrsasaus
Trtdomosaurus
Bajssaictriten
Trangosaurus
Akrrgdanthus


Iteration: 9300, Loss: 22.903748

Mbytosaurus
Kidaamosaurus
Kustrerasaurus
Macalosaurus
Xustasaurus
Caalosasaurus
Trrapcoravlosaurus
Aadrria
Tohilosaurus
Ajpsalasaurus


Iteration: 9400, Loss: 22.875598

Niwtromicopeurus
Kicaacosaurus
Lutroinetimus
Nabaerura
Yustanesaurus
Daaclracericopllus
Trochepraus
Aacisaurus
Tolicoravisaurus
Alstocerkes


Iteration: 9500, Loss: 22.950694

Mivuscenatoron
Hiccacmrae
Ivuskellor
Macalosaurus
Yuspanesaurus
Caacosas
Trocheosaurus
Abarqecaosaurus
Tramdosaurus
Ainpcenator


Iteration: 9600, Loss: 22.895837

Lixtosaurus
Hiacalosaurus
Hytosaurus
Labaisia
Yuspanosaurus
Caaepthados
Trraphosaurus
```

```
Aadosaurus
Tolleropths
Aironcbosaurus


Iteration: 9700, Loss: 22.932387

Mavtosaurus
Hiacanosaurus
Iustomogaphus
Macairope
Yutoeon
Caadosaurus
Totanisaurus
Aadosaurus
Togolopeurus
Ahosaurus


Iteration: 9800, Loss: 23.038675

Leyuspanosaurus
Hegaadosaurus
Hyrosaurus
Labaeroncaptor
Yuspangosaurus
Cabarracaptor
Trochenneurortara
Aadosaurus
Tramanmaurosceramosaurusnodaj
Airscachurus


Iteration: 9900, Loss: 22.847323

Liususaurus
Ilecalosaurus
Iustolona
Leaaeroracius
Yuspanimicuris
Cabaropacius
Trocherontcors
Abcosaurus
Trameosaurus
Alproceroscidius


Iteration: 10000, Loss: 22.921059

Mewusraplosaurus
Ilebalosaurus
Justraphorax
Macalosaurus
Xusteneshauposaprus
Cabaropegmus
Trociimggusaurus
Aberopegitosaurus
Trchenopuosaurus
Alromacosaurus


Iteration: 10100, Loss: 22.812443

Mexusnanhosaurus
Ilebaiosaurus
Justrcomhiaus
Macaeropeertiten
Xuspanihaiurlosaurus
Cabarona
Trocidon
Aadropegotosaurus
Treodonaurus
Airoma


Iteration: 10200, Loss: 22.855232

Mevtrodon
Imcaagosaurus
Justodratops
```

```
Macalptor
Yusrangoraxosaurus
Cabcosaurus
Trododromus
Abersaurus
Tpengopesaurus
Ajrola


Iteration: 10300, Loss: 22.832694

Mexutoniclraurus
Imeecersalesitron
Jutrrasbus
Macalrrcelitor
Xuurergosaurus
Cachrphedroptor
Trrbngriguroshes
Aberthedosaurus
Trchenoruptor
Aistodentesaurus


Iteration: 10400, Loss: 22.743396

Mavrosaurus
Jicaaeropa
Kustoeonaphus
Macagosaurus
Xtrodonasaurus
Cabaropa
Torangosaurus
Aacosaurus
Togolosaurus
Agrona


Iteration: 10500, Loss: 22.823712

Miwustenesaurus
Ilabaisauroscisaurus
Justofonntcurnsmesaurus
Macaisauroseus
Xuspankosaurus
Caacosasaurus
Toranhongusauros
Aacisan
Todicophurosaurus
Agronechuosaurus


Iteration: 10600, Loss: 22.870031

Mexutogonimivonhulus
Jiedagosaurus
Kwussaodon
Macaisaurus
Yustangihaveratirdinus
Daahusaurus
Trtasaurix
Abbssaeesaurus
Trangosaurus
Alstia


Iteration: 10700, Loss: 22.752520

Mivutona
Iodaberos
Kutrodon
Macaisaurus
Xutodon
Dabertha
Trtengsaurus
Aadosaurus
Togngthauptos
Ajptodantkus


Iteration: 10800, Loss: 22.692456
```

Mexusteormimus
Koleakosaurus
Kustoiosaurus
Nfabesteia
Yussangosaurus
Daalosaurus
Truenisaurus
Baisteialops
Tohkerostes
Aisseldosaurus

Iteration: 10900, Loss: 22.592675

Levtosaurus
Heiaagosaurus
Iururapanomus
Laaagrona
Yussangosaurus
Caadrona
Trodoiriaurus
Aadrona
Tolidopesaurus
Alprlachrathenus

Iteration: 11000, Loss: 22.641883

Mewushangosaurus
Ingaacosaurus
Iustognatoptoraucurilus
Macaiosaurus
Yuspangosaurus
Daadosaurus
Trocieosaurus
Aaclracerhateontopavaosaurus
Trangosaurus
Aipoleasaurus

Iteration: 11100, Loss: 22.674046

Mexutodonmolus
Ingaagosaurus
Jytrodontomylus
Macaisen
Yusrangosaurus
Daadrona
Trtangosaurus
Abarrehantithacur
Trangoravhus
Aispiachus

Iteration: 11200, Loss: 22.712691

Mexwsrarasaurus
Hiacamosaurus
Iustrasaurus
Macaisor
Yusrarasaurus
Cabastelansaurus
Trrapasemtapsullelrtoaroster
Aagrralaps
Tomekosaurus
Airopa

Iteration: 11300, Loss: 22.744788

Leytosaurus
Hiacalosaurus
Hystodonas
Labaisaurus
Yusrannosaurus
Cabarosaurus
Trochernausaurus
Aadroracisaurus
Togngosaurus

```
Aistaderhathoseurus


Iteration: 11400, Loss: 22.661481

Livssucongilus
Imacalosaurus
Jytrocharons
Lcaacosaurus
Yuspangosaurus
Cabarracericus
Troconlilus
Abcosaurus
Trandosaurus
Airodecosaurus


Iteration: 11500, Loss: 22.665179

Mewusokongostes
Ilecalosaurus
Justreratons
Macaischedosaurus
Yusreplosaurus
Cabaroracosaurus
Trodolosaurus
Abershacosaurus
Trenerontisaurus
Aisthcentosaurus


Iteration: 11600, Loss: 22.637892

Matrsthomosaurus
Ilecadosaurus
Justrergtopus
Macalosaurus
Xusthidopeus
Cabaropedosaurus
Troengqsaurus
Aafropherys
Tohilophylus
Ajropeerys


Iteration: 11700, Loss: 22.612009

Mevuskeong
Kojaahosaurus
Kustodon
Macaeropecrus
Xusrangosaurus
Cabcosaurus
Trocheronymus
Abfosaurus
Treogosaurus
Alspacerntoprntophyepis


Iteration: 11800, Loss: 22.615529

Mavusannis
Ilacalosaurus
Justicinatos
Macagosaurus
Xuspangsaurus
Cabasaurus
Trochasausus
Abarona
Todlaps
Agpola


Iteration: 11900, Loss: 22.653139

Mawuspenas
Jiacagosaurus
Kustogncophx
Macaeosaurus
Xustanfsaurus
```

```
Dabcisaurus
Totcemis
Abbosaurus
Toemernes
Afromdarus


Iteration: 12000, Loss: 22.649562

Mevussaurus
Kohaafton
Kusurgomophus
Macaisiia
Xustangosaurus
Daaguraceosaurus
Trocliosaurus
Aacoteia
Todoiriaurosces
Agroma


Iteration: 12100, Loss: 22.629327

Mbustoenatoptnosiamimasia
Jicaadosaurus
Kustraphor
Macairophaptosaurus
Xtrodomtorsaurus
Dacerosaurus
Trochernauhus
Aacisaurus
Tochenodurosaurus
Agpsan


Iteration: 12200, Loss: 22.572055

Mevushenesaurus
Jokaamosaurus
Kustolong
Maealosaurus
Xutolnesaurus
Daalosaurus
Trodicosaurus
A
Tolldrngx
Aisiehasiosaurus


Iteration: 12300, Loss: 22.508201

Mewushangosaurus
Imacalosaurus
Kusskangosaurus
Macaesaurus
Xutodondonoriptarichus
Daaesna
Totangosaurus
Aachuelansaurus
Spandoraus
Ahisaqaus


Iteration: 12400, Loss: 22.401512

Mevusolonionus
Jolaalosaurus
Kustrasaurus
Macalosaurus
Xutolokondynus
Daakosaurus
Troenchulus
Abasta
Tokilosaurus
Alotia


Iteration: 12500, Loss: 22.439805

Nixusteodon
```

Jiacalosaurus
Kustriongactos
Nebakton
Yustcomimturus
Daadrong
Trrarerontarus
Abbptelanosaurus
Togolophus
Airuna

Iteration: 12600, Loss: 22.509885

Miwutodon
Hiedacosaurus
Ivutodon
Macalosaurus
Yutrerasaurus
Daadosaurus
Trtbmeronterptariphus
Abastedermbsme
Trandorawisaurus
Ajptadentesaurus

Iteration: 12700, Loss: 22.476538

Lhystodon
Gngbanosaurus
Hytosaurus
Lacakronceosaurus
Yuspangosaurus
Cachrondantiten
Trododon
Abdosaurus
Togngosaurus
Ainseiceusia

Iteration: 12800, Loss: 22.547085

Mavssiangosaurus
Hegaamosaurus
Iustonopholynsaurus
Macagosaurus
Yusoingosaurus
Daaestelaosaurus
Trocenosaurus
Aagosaurus
Toengosaurus
Agrramapsaurus

Iteration: 12900, Loss: 22.548664

Livoselopon
Hiacalosaurus
Hyrosaurus
Leaberoracius
Yuroceosaurus
Cabarrceglunus
Trociciraurus
Abaropedrus
Todngosaurus
Agroia

Iteration: 13000, Loss: 22.476569

Mewussaodon
Ilecalsia
Jutronggosaurus
Macakosaurus
Yutogosaurus
Cabbosaurus
Troengosaurus
Abcothedosaurus
Traonjontaptops
Aisteehesaurus

```
Iteration: 13100, Loss: 22.438436

Mavusolophusus
Hiacagosaurus
Justodon
Macagosaurus
Xusterasaurus
Cabcosaurus
Trocheptosaurus
Aacotceentitan
Toeneshavhus
Ajpoledosaurus


Iteration: 13200, Loss: 22.482147

Mexusodon
Ilebaftor
Justodon
Macaerosaurus
Xuspanhosaurus
Daadropdasaurus
Trochepolus
Abcosaurus
Trelernathosaurus
Agrus


Iteration: 13300, Loss: 22.446227

Mavussasaurus
Heicalosaurus
Justolidin
Madaisaurus
Xuspangosaurus
Caberope
Tosasaurus
Abbosaurus
Todlerontarmumus
Ahrondantasaurus


Iteration: 13400, Loss: 22.460734

Mewutodonconus
Ilecadptia
Kustrgongnhumoseenionos
Macainos
Xuspcigosaurus
Daberondantitan
Trodliphlugnos
Aberondantitan
Toelgosaurus
Agrogdantitan


Iteration: 13500, Loss: 22.399131

Niwuspenatoptos
Kigaalosaurus
Lustomelin
Nebalosaurus
Xussanesaurus
Daberrabaps
Torcherghunsaurus
Aaerrahaus
Toimermateratasaurus
Agrondanthus


Iteration: 13600, Loss: 22.455943

Mcsusiangangus
Ilacalropa
Kurusaurus
Macairia
Xurrapios
Cabaspela
Trocicholursiu
```

```
Abcloma
Tochaosaurus
Airondantaus


Iteration: 13700, Loss: 22.471145

Mevuspandongulosaurus
Imbabepthachuisaurus
Justpengophuosaurus
Maebeosaurus
Xuspangonguhorocondosaurus
Dabdosaurus
Trododon
Abbtondantitan
Tohilophulosaurus
Ahpsagbosaurus


Iteration: 13800, Loss: 22.362240

Mavussasaurus
Kolaakosaurus
Lutrqdnatoransus
Macalosaurus
Xutrerasausus
Daberten
Trtapasaurus
Baltonachuseurosaurus
Traperoosaurus
Alssadaroptor


Iteration: 13900, Loss: 22.278304

Miwusterasaurus
Kuklalosaurus
Kususaurus
Medaerus
Yusuenhhumus
Dabertemansaurus
Trteomos
Abcnylechunsaurus
Togomos
Ajpsalasaurus


Iteration: 14000, Loss: 22.238595

Mavuronterelups
Ileaaerondalus
Justreonin
Macaerope
Yuroengtheurnoter
Caagosaiaus
Totanginatititas
Abarondanthong
Toengosaurus
Alponachus


Iteration: 14100, Loss: 22.304681

Mewtosaurus
Hicaaesaura
Ivutodon
Macairus
Yutrasaurus
Cabaste
Trrararontermug
Abarona
Tramaronteriu
Aioteodor


Iteration: 14200, Loss: 22.272826

Mexytogonfomus
Hiceaiton
Iutosaurus
```

```
Macakosaurus
Yutoiraptos
Cabaste
Trtareptos
Aaerthadosaurus
Toineroptor
Alpteedosaurus


Iteration: 14300, Loss: 22.299438

Mevusoipa
Hiacantor
Iustraplos
Macaisauroshus
Yusraphosaurus
Cabastacaps
Tptapaprlus
Aagosaurus
Toengosaurus
Ahpradeptasaurus


Iteration: 14400, Loss: 22.407149

Leyturaphoravhus
Hiadadrona
Hyrusasaurus
Lacagosaurus
Yustanchiasaurus
Cabarsaldosaurus
Trochepmiter
Abarradanthur
Trandopathras
Agptecanthus


Iteration: 14500, Loss: 22.230188

Lixuusaurus
Hiacalosaurus
Iustria
Labacosaurus
Yurochanrhylus
Cabaropegotithilus
Trocheriaurus
Abbosaurus
Trameroptor
Ajosaurus


Iteration: 14600, Loss: 22.308119

Mewustenatoptosaurus
Imedaesheechus
Justrcelosaurus
Macaisaurus
Xusteneseites
Cabbosasaurus
Trochepsaurus
Abbosalapus
Toeleronus
Aistiaaptosaurus


Iteration: 14700, Loss: 22.207789

Mevusolonis
Jogaakrradeosaurus
Kustogonnthus
Macalosaurus
Xuspanmus
Cabaston
Trodolosaurus
Abcosaurus
Toeneropus
Ajproceritopilus


Iteration: 14800, Loss: 22.258444
```

```
Mavtrollesaurus
Jiacaltor
Kustodon
Macalosaurus
Xussandon
Cabdosaurus
Trochepsaurus
Abersasaurus
Traphorax
Altoracosaurus


Iteration: 14900, Loss: 22.246024

Mexutodon
Hoddacosaurus
Iuutodon
Macalosaurus
Xustanisaurus
Caberope
Trododon
Abcosaurus
Todperkathus
Agrrcedosaurus


Iteration: 15000, Loss: 22.218608

Nixptoma
Kidaadosaurus
Lutrodon
Necadosaurus
Xutodon
Daberosaurus
Tosaodorax
Aadosaurus
Toengosaurus
Agrondantesaurus


Iteration: 15100, Loss: 22.273135

Mewutnionggitan
Ilea
Kustodon
Macaisaurus
Xustangosaurus
Caacothachus
Tosanetiathus
Abbosaurus
Todidosaurus
Aisucefks


Iteration: 15200, Loss: 22.330724

Mewusiangosaurus
Jidaadosaurus
Kustrcidin
Macaiosaurus
Yussaogosaurus
Dabdysaurus
Truchepodpepmodon
Abcosaurus
Tpengosaurus
Ahstodantitan


Iteration: 15300, Loss: 22.218471

Mevusonops
Jidaadosaurus
Kutsodon
Macairor
Xutrasaurus
Daadosaurus
Trraoeosaurus
Abbropa
Tohelosaurus
```

Ahosan

Iteration: 15400, Loss: 22.127079

Mewusndong
Jidaanosaurus
Kustonia
Maebesha
Yuspaonkilus
Dabeosaurus
Trrangosaurus
Abbosaurus
Spangosaurus
Ajosan

Iteration: 15500, Loss: 22.053011

Lavrronnatiosaurus
Hiaeakosaurus
Hyptodonnmasaurus
Laaagosaurus
Yurolohin
Cabarona
Trodolophurus
Abaron
Tohelopeurtitanglesaurus
Alosataton

Iteration: 15600, Loss: 22.115038

Mewtosaurus
Ingaaerope
Ivrsialing
Macaisheecetatia
Yussangosaurus
Daaestedanlosaurus
Trodoeosaurus
Abcisaurus
Trangrogtesaurus
Ahpsaceriisaurus

Iteration: 15700, Loss: 22.142661

Mewusodon
Ingaahosaurus
Jyxsodon
Macaisaurus
Yuspangosaurus
Cabaste
Trrapephaurus
Abastecamon
Togodopas
Ahpria

Iteration: 15800, Loss: 22.155298

Mewusognathous
Hiaealosaurus
Ivpsiangosaurus
Macaisaurus
Yusocenos
Cabastelanopholous
Trocheosaurus
Abcisaurus
Tolmanops
Aiosan

Iteration: 15900, Loss: 22.250067

Leytroiosaurus
Hiacalosaurus
Hyrupangrelurus
Labaerosaurus
Yurognbinathus

```
Cabaropacrus
Trochepnius
Abastacasaurus
Toeneosaurus
Ahlolachuholnitor


Iteration: 16000, Loss: 22.186916

Leystreosaurus
Heia
Hyrosaurus
Laaadosaurus
Yuroceosaurus
Cabarosaurus
Trocieosaurus
Aacosaurus
Toeneosaurus
Agrona


Iteration: 16100, Loss: 22.144844

Mewusteomimosaurus
Hiacaltophalurus
Ivrrong
Macalosaurus
Yussangosaurus
Cabcotheentosaurus
Trkangosaurus
Abbosaurus
Toemerostes
Agrscegntosaurus


Iteration: 16200, Loss: 22.113029

Matrosaurus
Hidaaisaurus
Iustrinesaurus
Macalosaurus
Xussangosaurus
Cabaropeisaurus
Torangosaurus
Aaeropegny
Toengopesaurus
Agropadrus


Iteration: 16300, Loss: 22.129981

Mawuspepas
Ilea
Justodon
Macalosaurus
Xussangosaurus
Caalosaurus
Trocherianesaurus
Abcosaurus
Trandopes
Aistecaosaurus


Iteration: 16400, Loss: 22.168319

Mawusoceritatosaurus
Idacaltor
Justicima
Macalosaurus
Xuspaliosaurus
Cabcosaurus
Toramiophus
Aadosaurus
Todicoratops
Agpoia


Iteration: 16500, Loss: 22.192707

Mavrosaurus
```

```
Kifaalosaurus
Lutrognathoucnus
Macairia
Xusrangosaurus
Daagosaurus
Trodlchonia
Abdrondanus
Toelchonodondang
Agrondantas


Iteration: 16600, Loss: 22.149474

Mavusteomosaurus
Igaa
Kurureorlimus
Macairophanthon
Xuroengosaurus
Caamosaurus
Trochasaurus
Aacotacasaurus
Tochaponus
Agropdarusaurus


Iteration: 16700, Loss: 22.152463

Mcsutreplor
Kiecadrom
Lustrgin
Macalosaurus
Xusrapsaurus
Dabcosaurus
Trochesaurus
Bajtrodentisaurus
Tochciraurus
Agrondantosaurus


Iteration: 16800, Loss: 22.110017

Mevutomong
Kolaagosaurus
Lusster
Maealosaurus
Xusrarioqaurus
Daamosaurus
Trodolosaurus
Abbosaurus
Tognchuhus
Airona


Iteration: 16900, Loss: 22.057125

Mewursaurus
Inaa
Kustodon
Madakropeclus
Xuspangosaurus
Daaersaurus
Trrangosaurus
Abaron
Tohilosaurus
Agosaurus


Iteration: 17000, Loss: 21.953052

Meutosaurus
Inabamkon
Kustrasaurus
Macalosaurus
Xusrania
Cabarran
Trodonosaurus
Abasosaurus
Stanisaurus
Alosaurus
```

```
Iteration: 17100, Loss: 21.966541

Nixutongatins
Klabahosaurus
Kustidongpaus
Nebahosaurus
Yustanesaurus
Daamosaurus
Trocheronterkufus
Abbosaurus
Toengosaurus
Ajprocerhes


Iteration: 17200, Loss: 22.093995

Meyutodon
Hicebaton
Hyustangosaurus
Macalosaurus
Yusrbilon
Cabastea
Trododon
Abantceletos
Toemeosaurus
Aintedanthus


Iteration: 17300, Loss: 22.042339

Leytrongaton
Glicalosaurus
Hystodon
Lacaisaurus
Yussangosaurus
Cabersasaurus
Trrenesaurus
Abcntaedosaurus
Toingosaurus
Ajpsedentosaurus


Iteration: 17400, Loss: 22.119282

Mautosaurus
Hiacantopekpulus
Iuustenes
Macalosaurus
Yutokonosaurus
Dabasteia
Trocherlius
Abbosaurus
Trangosaurus
Agpricersaurus


Iteration: 17500, Loss: 22.121126

Lexustephonathus
Hiacantopeentosaurus
Hyrtodia
Laaaerosaurus
Yuroceratops
Cabarredanopholosaurus
Trocercilus
Abasteia
Toengosaurus
Ahisaceritops


Iteration: 17600, Loss: 22.047484

Mewuspenatorgiamocinator
Ilecaltopefptor
Justrerhindyiosaurus
Macakosaurus
Yusoerariangosbangantoceraurus
Cacersalcesaurus
Trocheronosaurus
```

Abcosaurus
Tramerosperitar
Agrucelitor

Iteration: 17700, Loss: 21.987181

Mextosaurus
Hoecalsaurus
Justodon
Macadosaurus
Xussandosaurus
Cacersalaptor
Trodocorator
Aacoten
Tododosaurus
Akptodans

Iteration: 17800, Loss: 22.054104

Mewysodon
Ilea
Justodon
Macaiosaurus
Xusodondons
Daagosaurus
Trocheonex
Abbosaurus
Toemeronymus
Ahosasaurus

Iteration: 17900, Loss: 22.025089

Mbvussaraptos
Jicbagropa
Kustidong
Macalosaurus
Xussaneus
Dabbosaurus
Tosasaurus
Abbosaurus
Toelerosichus
Agrophaspes

Iteration: 18000, Loss: 22.052200

Mewustiong
Ilecacoratatros
Juttodong
Macalotleantitan
Xuspanlongxatotan
Cachrondanthur
Tordohurax
Abcoreechylton
Toeliphoternt
Agroidantiten

Iteration: 18100, Loss: 22.017742

Nixusranisaurus
Kiedajprod
Lutrollesaurus
Nebafosaurus
Xustanesaurus
Daagpona
Torangosaurus
Abbosan
Tichaniasaurus
Agrshacirathus

Iteration: 18200, Loss: 22.028679

Miwuspendosaurus
Joeeagosaurus
Kususaurus

```
Macairos
Xusqandosaurus
Dabeosaurus
Trocidosaurus
Abbosaurus
Todleroptes
Airondantholenta


Iteration: 18300, Loss: 22.059960

Mawustangosaurus
Jiadamosaurus
Kususaurus
Madalosaurus
Xustancia
Dabaropa
Trodigosaurus
Abatopa
Toglapolusaurus
Agrugaashus


Iteration: 18400, Loss: 22.001132

Mawusolois
Klaaaeosaurus
Kuttoceosaurus
Macaeosaurus
Xutodoisaurus
Daaepticantisaurus
Trraparons
Abasicadon
Togokosaurus
Akrogachus


Iteration: 18500, Loss: 21.938598

Niyuslinanopteryx
Kuibaltos
Luxurhenosaurus
Necalosaurus
Xutrhonngisaurus
Daalosaurus
Trtangosaurus
Abbrope
Togonosaurus
Akrukachurus


Iteration: 18600, Loss: 21.864777

Mavusianesaurus
Hiabanosaurus
Iuutiangka
Maaagosaurus
Xustangosaurus
Caaertan
Tosangsaurus
Abassadan
Tmaleosaurus
Alnthacirathus


Iteration: 18700, Loss: 21.922019

Lixrosaurus
Hibaaerosaurus
Hystochasaurus
Laaadpkelanosaurus
Yustaomirix
Cabatosaqrus
Trochaosaurus
Abastceiagika
Todichiathus
Agnqedasaurus


Iteration: 18800, Loss: 21.956235
```

```
Mewyrudon
Ingaakosaurus
Jutusaurus
Macaisaurus
Yutodon
Cacarsar
Trrangosaurus
Abasteg
Toingosaurus
Ajosaurus


Iteration: 18900, Loss: 22.026462

Mexytrasaurus
Imia
Jutrpangosaurus
Madaitra
Yutrercis
Cabbtraeerostes
Trrgonosaurus
Abntregasrosaurus
Tolomosaurus
Airtia


Iteration: 19000, Loss: 22.080412

Lixutongchomus
Holbaisphians
Hyrusaurus
Lacaismoicathus
Yussangsaurus
Cacbtondantos
Trocoiosaurus
Abcosaurus
Treolosaurus
Ahpsicerhanginyphlyn


Iteration: 19100, Loss: 21.960585

Leytronjarngusaurus
Hiacaitopa
Iustrardosaurus
Labacosaurus
Yurolonin
Cabarosaurus
Troconosaurus
Abcosaurus
Tranhosaurus
Ajropacrus


Iteration: 19200, Loss: 22.008786

Meutosaurus
Jicecetope
Kustriphosaurus
Macalosaurus
Xutrgolos
Caceropechus
Trochisausus
Abcosaurus
Toemeosaurus
Agroma


Iteration: 19300, Loss: 21.931127

Mextromomionthus
Ingaalosaurus
Justodon
Macalosaurus
Xpspanosaurus
Cachosaurus
Trocnirnix
Abcosaurus
Todogosaurus
```

```
Aironachus


Iteration: 19400, Loss: 21.972428

Matstripesaurus
Ileaaisaurus
Justichasaurus
Macalosaurus
Xuspaniosaurus
Caalosaurus
Trocelosaurus
Abaspeia
Toemanontesaurus
Alromacisaurus


Iteration: 19500, Loss: 21.968926

Maxustiornis
Hiacaisenca
Hystrerasaurus
Macaiseoka
Xustanosaurus
Caahosaurus
Trocheronys
Aaerricerospimitopex
Todohionyx
Aeroma


Iteration: 19600, Loss: 21.959348

Mevosaurus
Imecaiosaurus
Kustoema
Macainon
Xutodon
Caberona
Torgngosaurus
Abasteedopdus
Toendonbxordunus
Agroncaropteryx


Iteration: 19700, Loss: 21.977798

Mevtureonimus
Jiacacosaurus
Kustreopsaurus
Macaistog
Yusraphorburus
Caadosaurus
Trocheroptor
Abauria
Toemfosaurus
Airondeosaurus


Iteration: 19800, Loss: 22.003948

Mettroenatins
Kojaahosaurus
Lussodon
Macajosaurus
Xussangosaurus
Dabasleia
Trodocinator
Bakrsaicesaurus
Trangosaurus
Airondansaurus


Iteration: 19900, Loss: 21.919533

Mawusraplosaurus
Imaca
Kustrapiractosaurus
Madairosaurus
Xutrarbiontes
```

```
Cabarra
Trododosaurus
Abcosaurus
Todmaroptor
Agruhaceratops


Iteration: 20000, Loss: 21.842316

Mexutodon
Imegagosaurus
Kutus
Maceisaurus
Yutogonis
Dabeosaurus
Trtenisaurus
Abbosaurus
Toenisaurus
Agpsaiagosaurus


Iteration: 20100, Loss: 21.789032

Matrosaurus
Imacaetopa
Justrchesaurus
Macalosaurus
Xuspameps
Cacerope
Trochepheus
Abastef
Toglenolues
Alosalasaurus


Iteration: 20200, Loss: 21.840901

Mevusleng
Hiceaerosaurus
Ivsskaperceusaura
Macaerosaurus
Yuspangosaurus
Cabaskeia
Troceosaurus
Abbnracaroptor
Trangosaurus
Aissaedosaurus


Iteration: 20300, Loss: 21.900986

Meyutodongonus
Hiadacosaurus
Ivusododon
Macairopa
Yustangosaurus
Cabatona
Trtasaurus
Abasoma
Toingosaurus
Airola


Iteration: 20400, Loss: 21.945500

Mawusteonmolus
Hiacalosaurus
Ivrosaurus
Macaisgurostis
Yutoenethoues
Cabbropa
Trocigosaurus
Aagosaurus
Tididosaurus
Aippadeosaurus


Iteration: 20500, Loss: 22.056584

Matrspelliolteriu
```

```
Imedanosaurus
Justolong
Macagosaurus
Yustangosaurus
Daaisaurusopthostnodychus
Troandopes
Aagosaurus
Tokhanoruptos
Ahosaurus


Iteration: 20600, Loss: 21.982435

Leytpodon
Hoga
Iutosaurus
Lbaacosaurus
Yurocichodylosia
Cabarracerhanda
Trocogosaurus
Abbosaurus
Todocosaurus
Agroma


Iteration: 20700, Loss: 21.913526

Mevusolong
Imeealosaurus
Jutroplitiaphus
Macairosaurus
Yutriomkias
Daaeroraerus
Trleonosaurus
Abcothedosaurus
Treolosaurus
Agropeitong


Iteration: 20800, Loss: 21.911257

Matrurephongypshun
Hiceacosaurus
Hyrtoeoniq
Macagosaurus
Yurolonophysuos
Cacerthedosaurus
Trmbmiophus
Aadosaurus
Togngoodyosaurus
Ahiokadopis


Iteration: 20900, Loss: 21.913432

Mawusoeon
Imedaeropa
Juwusaurus
Macakosaurus
Yusodonikasaurus
Cabcosaurus
Trochepritosaurus
Abcosaurus
Treoillatisaurus
Airolaceratops


Iteration: 21000, Loss: 21.926331

Mevusoemesaurus
Ilia
Juuusasaurus
Macalosaurus
Xuutangosaurus
Daagosaurus
Trochioraurus
Abaosaurus
Toeliosaurus
Ajppicepsaurus
```

```
Iteration: 21100, Loss: 21.939255

Matrosaurus
Jiceceropelitos
Kustrinisaurus
Macalosaurus
Xuspaniosaurus
Daalosaphtorim
Trodociravinas
Abcorda
Tohlenorus
Aisoncerntops


Iteration: 21200, Loss: 21.880866

Meutrong
Jiadahusaurus
Kustriphoraurus
Macairsaurus
Xuroinatieus
Daagothachus
Trocignsaurus
Abbosaurus
Toenisaurus
Aitrhachus


Iteration: 21300, Loss: 21.886871

Mavuspangosaurus
Ilcabcosaurus
Jusuocheosaurus
Macaipsaurus
Xuspanimigus
Cabcrodechugon
Trocichoetesaurus
Abaroma
Toglchueus
Ajrudabisaurus


Iteration: 21400, Loss: 21.899291

Meuutrasaurus
Lidaalsaurus
Lutstandon
Maebersaurus
Xutrasaurus
Daalosaurus
Trodlasaurus
Baltoracius
Toelireithorodona
Aistia


Iteration: 21500, Loss: 21.812454

Mextrodon
Kolaamosaurus
Kuttodones
Maeakus
Xuspaodon
Daadosaurus
Trocigosaurus
Bakosaurus
Tofolosaurus
Ajprodanthus


Iteration: 21600, Loss: 21.722149

Mavusmangha
Kracalosaurus
Lutrollasaurus
Macalosaurus
Xusrarasaurus
Daalosaurus
Trodonosaurus
```

```
Abassalaptor
Tohilosaurus
Alropa


Iteration: 21700, Loss: 21.735654

Niwussaurus
Jiacagosaurus
Kustrilisaurus
Nabaerosaurus
Yusteodon
Cabaste
Trochepreus
Abaste
Toingosaurus
Airunabiratiihus


Iteration: 21800, Loss: 21.860054

Lixorophisaus
Goiaahosaurus
Hystraraptor
Lacamosaurus
Yutonkaphaurus
Cabarona
Tusangoraurus
Abarraceratops
Traparomus
Ajorhachoisaurus


Iteration: 21900, Loss: 21.802534

Leytronnes
Gngaagosaurus
Hystrardis
Lacalosaurus
Yutollepsaurus
Cacertelagoptor
Trtangosaurus
Aagosaurus
Tolleskosaurus
Akruna


Iteration: 22000, Loss: 21.851863

Matrsteon
Ingaalosaurus
Jutronterus
Macantrom
Yutomigrn
Cachrsan
Trranesaurus
Abdosaurus
Tomidosaurus
Ahrophasios


Iteration: 22100, Loss: 21.959747

Liwuruchiadeus
Hiadacora
Hyptocerator
Leaaeron
Yurocerator
Cabarona
Trocheorasaurus
Abaron
Trambosaurus
Alosaurus


Iteration: 22200, Loss: 21.824649

Metrosaurus
Imefafros
Justreosaurus
```

```
Macalosaurus
Yuspbia
Dabcosaurus
Trodicosaurus
Abcosaurus
Toenerososauros
Ajsteedosaurus


Iteration: 22300, Loss: 21.864712

Metrosaurus
Imcaceros
Jutrolonlonterus
Macajotma
Xutoenatoptosaurus
Cacerregasaurus
Troceratos
Aacotcelatos
Trephosaurus
Alptodanthus


Iteration: 22400, Loss: 21.916036

Mbstrodon
Hiceadron
Justodolophus
Macagoton
Xusranesaurus
Cachyrhachurphorus
Trocherodyn
Abasracaps
Toeneronykus
Agrygefosaurus


Iteration: 22500, Loss: 21.881667

Meutosaurus
Ileaagrus
Justidongian
Macalosaurus
Xussangosaurus
Daagsoralosaurus
Torallosaurus
Abasteia
Toemantaus
Akronceptitan


Iteration: 22600, Loss: 21.839144

Mevusteong
Huadacotalantitan
Ivussasaurus
Macalotie
Xuuuceplodymantas
Cachyreceritops
Trrcheosaurus
Abasseceritops
Toemeosaurus
Aistaeeosaurus


Iteration: 22700, Loss: 21.804834

Mevtrodon
Jiadacosaurus
Kustrginosaurus
Macairophanx
Xusqangosaurus
Daadosasaurus
Trocheosaurus
Abbosaurus
Toimenonymus
Agrondanthondosaurus


Iteration: 22800, Loss: 21.835934
```

```
Mbxuxjandondylus
Ilaaalosaurus
Jussodonis
Macairosaurus
Yuskandondylus
Caadosaurus
Toranmosaurus
Abastaechonsaurus
Toenesaurus
Alpolbasaurus


Iteration: 22900, Loss: 21.861118

Mctustangosaurus
Jiacaltosaurus
Kustrasaurus
Macalosaurus
Yutjepios
Daagstelamopteryx
Trraphosaurus
Abbtria
Toglapontisaurus
Ajptia


Iteration: 23000, Loss: 21.788156

Mewusterasaurus
Kolaberopa
Luutodon
Macalosaurus
Yutpangosaurus
Dabhusaurus
Trtcherohus
Balrpeccosaurus
Trchanodsaurus
Ajptnlanosaurus


Iteration: 23100, Loss: 21.712558

Niyussaurus
Kukcalosaurus
Luwwulonn
Ngaaisaurus
Xuwuhrisaurus
Daalosaurus
Trranosaurus
Baluthedosaurus
Toingosaurus
Aloscegosaurus


Iteration: 23200, Loss: 21.668171

Leytosaurus
Hiacaeropa
Hyptoenatinus
Laaadorapnor
Yuspangopeurus
Caalosaurus
Trocheoraurus
Abasrecaus
Toeleosaurus
Alosaurus


Iteration: 23300, Loss: 21.730521

Leytosaurus
Hicaadron
Hytstesaurus
Lacaerosaurus
Yutoin
Caaertha
Trocheosaurus
Abassiacesaurus
Trameroptor
```

Agpsan

Iteration: 23400, Loss: 21.762903

Mexytolongony
Hogaaeosaurus
Justodondsaurus
Macaerradentame
Yuspanlopeus
Cabasteia
Trraodon
Abarradentaomelus
Togokosaurus
Agrukadosaurus

Iteration: 23500, Loss: 21.822987

Mexussasaurus
Hiadaisia
Ivosraptor
Macalosaurus
Yutoingosaurus
Cabarria
Trocigosaurus
Abcosasaurus
Toingosaurus
Airshaclratops

Iteration: 23600, Loss: 21.846112

Liwutonimus
Hola
Hyrusasaurus
Macalosaurus
Yussckisaurus
Cacerreddosaurus
Trochesicrosaurus
Abcosaurus
Trfokosaurus
Alropbcosaurus

Iteration: 23700, Loss: 21.750869

Leytronia
Hiadacosaurus
Itrysaurus
Lacaksnia
Yuroinatopucrus
Cabarregasaurus
Trranasaurus
Abjssia
Tranhosaurus
Ajrscacis

Iteration: 23800, Loss: 21.783059

Mestosaurus
Imeealosaurus
Justodon
Maeacotom
Xuspamosaurus
Cabasteda
Trialciraurus
Abcosaurus
Togmerosaurus
Aitomacosaurus

Iteration: 23900, Loss: 21.722189

Mbstspendypdrhus
Hiacalosaurus
Iursianiosaurus
Macagosaurus
Xorodonis

```
Caadosaurus
Trododon
Aadosaurus
Toingosaurus
Agryia


Iteration: 24000, Loss: 21.686941

Mbuttrmodon
Imeaagron
Justoeon
Macaiosaurus
Yuspangosaurus
Caahoreedos
Triangosaurus
Abchtodcosaurus
Trchanodus
Alrong


Iteration: 24100, Loss: 21.716503

Laxtosaurus
Hoedacosaurus
Hyrusaurus
Macaeropeltus
Xusqangosaurus
Caahosaurus
Trkangosaurus
Abasrur
Todociravepsiaroposaurus
Agromacosaurus


Iteration: 24200, Loss: 21.731870

Mavusodon
Hidaaeus
Ivurokekosaurus
Macaiosaurus
Xusrangosaurus
Cabcosaurus
Tosangosaurus
Abarosaurus
Tienenonus
Agropechunon


Iteration: 24300, Loss: 21.704840

Metrosaurus
Jiadacosaurus
Kustrgones
Macalosaurus
Xuspandon
Caagqsasaurus
Trockiroptiratasaurus
Abcotelans
Toemesiancous
Alrondantes


Iteration: 24400, Loss: 21.696501

Mesprochelomus
Imadacloecanosaurus
Jusplanicheuksauhus
Macajosaurus
Xusiandorax
Cabbroleantosaurus
Trochapratioptaria
Abbiracephaneinsaurus
Traminiathusairus
Ajksadeosaurus


Iteration: 24500, Loss: 21.626849

Mawussasaurus
```

Jiadacosaurus
Kutpichisaurus
Macalosaurus
Xutodon
Cabasona
Trochasaurus
Abaspekdrops
Skambosaurus
Agruca

Iteration: 24600, Loss: 21.601895

Miwutochasaurus
Komaa
Kuttodon
Maceisnodenthus
Yutodontonynosaurus
Daagosaurus
Turapinonpmus
Balryha
Tolodon
Aisthaansaurus

Iteration: 24700, Loss: 21.509921

Matrosaurus
Imacaltis
Justrasaurus
Macalosaurus
Xutlanieqnus
Cachosaurus
Trochesaurus
Abaosaurus
Toemaps
Alpleehatmus

Iteration: 24800, Loss: 21.584685

Mawushangosaurus
Ingaagosaurus
Jutosaurus
Macagnosaurus
Yutiaraptos
Caaerosaurus
Trochamiasaurus
Abarracarsaura
Toenaroptor
Aisinaceratops

Iteration: 24900, Loss: 21.639866

Mextosaurus
Ingbaisaurus
Jyxspangosaurus
Macairope
Yutodon
Daadosaurus
Trocilosaurus
Abanoraptor
Trangosaurus
Alosaurus

Iteration: 25000, Loss: 21.711062

Leystolongus
Hiabaesope
Hyrosaurus
Labacosaurus
Yuurangosaurus
Cabaropecrus
Trocheroptisaurus
Aadosaurus
Toimesiathosaurus
Ajmona

```
Iteration: 25100, Loss: 21.809687

Leytosaurus
Hiabalosaurus
Hyrtolomin
Lacalosaurus
Yutoceosaurus
Cabarope
Troangosaurus
Abcosaurus
Trchanoptor
Agruadanosaurus


Iteration: 25200, Loss: 21.787737

Leytroor
Hibaadosaurus
Ivusolles
Laaacosaurus
Yurociemilus
Cabarrcaceratops
Trocicisaurus
Aacotafdis
Toencosaurus
Agrogcaptos


Iteration: 25300, Loss: 21.726640

Mextosaurus
Imedaeropegrus
Juwusaurus
Macalotia
Yutoeon
Cacersaurus
Trocimamaurus
Abcotelans
Treolosaurus
Agrseia


Iteration: 25400, Loss: 21.704292

Matrosaurus
Hieeakosaurus
Iurosaurus
Macairosaurus
Xusrionosaurus
Cachysaodosaurus
Trolonosaurus
Aadropehmusus
Togihosaurus
Airuia


Iteration: 25500, Loss: 21.763349

Meytrodon
Hiceadosaurus
Ivusoenas
Macahosaurus
Xospamiosaurus
Cabcosaoceraurus
Trocilosaurus
Abchogacosaurus
Soclipheus
Agryia


Iteration: 25600, Loss: 21.743918

Leytroines
Ilecalosaurus
Jutosaurus
Lacalosaurus
Xuusaurus
Cachosaurus
Toramimiasaurus
```

```
Abbosaurus
Tichenomus
Ahtokadosaurus


Iteration: 25700, Loss: 21.772905

Matrosaurus
Jicecerora
Kustriongchus
Macagotha
Xutololophynus
Cachysag
Trododon
Abcosaeinosaurus
Togodosaurus
Altora


Iteration: 25800, Loss: 21.699629

Mewussasaurus
Jiahahusaedosaurus
Kustrasaurus
Macalosan
Xtronmansaurus
Cabcosamasaurus
Trognchonulosaurus
Abbosaiapsauropus
Toengosaurus
Ahpqia


Iteration: 25900, Loss: 21.723051

Mexislaidon
Hiacagroncernithomsaurus
Ivuticenator
Macakosaurus
Xutihenatos
Caadrope
Toraleosaurus
Abbiracerhephanx
Todieriausisaurus
Alosaurus


Iteration: 26000, Loss: 21.733724

Mawtroinathrymops
Jiaeairope
Kutrognathoujus
Macalosaurus
Xutollesaurus
Daamosaurus
Trsangronveretarangus
Abbrona
Tolinjuisaurus
Ajstoecetitan


Iteration: 26100, Loss: 21.686126

Mewussasaurus
Kigaaeus
Kutrodon
Macalosaurus
Xlureodon
Dabertidan
Trodidroius
Bakrope
Trapiroptor
Agryledotitan


Iteration: 26200, Loss: 21.610313

Nixtqonlaphmus
Krabakton
Lutrolonnalus
```

```
Nabalosaurus
Xuspanchicurnsanrus
Daaisaurus
Torasaurus
Abasphaciraurus
Ssandrimus
Aismbachus


Iteration: 26300, Loss: 21.597584

Nixustholophus
Kolaabosaurus
Lutronnasaurus
Neaalosaurus
Yustboosaurus
Daadosaurus
Trocierospisaurus
Abasteg
Toindosaurus
Alpsalasaurus


Iteration: 26400, Loss: 21.713725

Lixutodon
Hoedadosaurus
Iwuurasaurus
Macaerope
Yuspandon
Daadosaurus
Tyranes
Abbosaurus
Trandophus
Ajosaurus


Iteration: 26500, Loss: 21.645435

Leytrolodon
Glacalosaurus
Hyrosaurus
Labagosaurus
Yutoiraptor
Cabarope
Troblerorus
Aadosaurus
Togolosaurus
Ahosalasaurus


Iteration: 26600, Loss: 21.696610

Matrosaurus
Hhabakosaurus
Iustraptor
Macanosaurus
Xustandopeus
Cacerthe
Tosangtheus
Aadosaurus
Togmchiangia
Agrosaurus


Iteration: 26700, Loss: 21.811293

Leytrodon
Ileaadosaurus
Jurusaurus
Labacosaurus
Yurocergoltis
Cacarodia
Troanerontithulus
Abastoe
Tramanonvepnta
Agrtahaptor


Iteration: 26800, Loss: 21.603085
```

Mastosaurus
Imedaeror
Justreosaurus
Macalosaurus
Xuuseosaurus
Cacerosaurus
Trodlosaurus
Abcosaurus
Tramiosaurus
Altomacithtangyllaveosia

Iteration: 26900, Loss: 21.700206

Matrosaurus
Ileaalosaurus
Justrephtonog
Macalosaurus
Xuurdongahus
Cacerosaurus
Troceratops
Aadosaurus
Tramanrasaurus
Alstredosaurus

Iteration: 27000, Loss: 21.647117

Mexrosaurus
Imbaadosaurus
Juusodon
Macaerus
Xuwocheonaebus
Cabbrondaptor
Trocheondylus
Abarria
Todoclodus
Agrria

Iteration: 27100, Loss: 21.699263

Matryphoereitar
Imedagosaurus
Justodon
Macalrus
Yuspangosaurus
Cabcosaurus
Toralophitangtaphomosaurus
Abchreacosaurus
Togngopesaurus
Alroma

Iteration: 27200, Loss: 21.652209

Leyutolignopus
Hohabbosaurus
Hytrochitilusaurus
Lacafrtidan
Xuuudolophymus
Cabertheantitan
Torangosaurus
Abbosaunus
Toemimicur
Altigaeotita

Iteration: 27300, Loss: 21.649023

Matrosaurus
Imca
Kustrika
Macalosaurus
Xussangosaurus
Cachysaurus
Toramarihuksus
Abarona
Toimeosaurus

```
Alosaurus


Iteration: 27400, Loss: 21.688447

Mixuvuhikosaurus
Imacalosaurus
Kutrodondolus
Macalosaurus
Xoroceosaurus
Daajosaurus
Trocieosaurus
Abbosaurus
Toengosaurus
Alstndansaurus


Iteration: 27500, Loss: 21.751761

Mawutolongopulus
Inebagotidan
Kutosaurus
Macalosaurus
Xutoinatontisaupus
Caadroma
Trocidosaurus
Abbosaurus
Toengosaurus
Altola


Iteration: 27600, Loss: 21.668891

Mawutodontonynlus
Iohacerhe
Kuttodontonykltpasaurus
Macalosaurus
Xutpanisaurus
Daahosaurus
Trtengosaurus
Abcouce
Todomdravasaurus
Altoka


Iteration: 27700, Loss: 21.619153

Niyusterosaurus
Koleagrs
Lutus
Ngaakosaurus
Yussanitontes
Daaksteidos
Trohilosaurus
Baksteichus
Tohinosaurus
Akruondosaurus


Iteration: 27800, Loss: 21.563691

Lawstraptor
Hegaajioneasrosaurus
Iuutolomosaurus
Laaaerkhadosaurus
Yustangosaurus
Caahosaurus
Trochesofus
Aadosaurus
Toghanonugirocieantoceraurur
Alpphaceratops


Iteration: 27900, Loss: 21.615304

Lixtosaurus
Hiceacosaurus
Ivusibikiodon
Macalosaurus
Yutleratops
```

```
Caadosaurus
Trocheosaurus
Abchicenator
Traminkateraurus
Alrokaceratops


Iteration: 28000, Loss: 21.641362

Mewuspandongs
Ingaadosaurus
Jyutodonmolus
Macakspeladon
Yuutarchodus
Cabarona
Trrangoravisaurus
Abaspela
Tolleosaurus
Agruhaansaurus


Iteration: 28100, Loss: 21.676693

Mausronlipelus
Ilia
Iuutolicholus
Macamosaurus
Yutocerator
Cabarreganosaurus
Trocheropulus
Aagosaurus
Toloeronys
Alspeia


Iteration: 28200, Loss: 21.710171

Leyutomaernaurus
Hiceaerosaurus
Hystrerasaurus
Lacaisaurus
Yutoiodon
Cabarosaurus
Trobhesiathospasaurus
Abasoraerus
Trgolosaurus
Altomachus


Iteration: 28300, Loss: 21.637196

Leystolon
Hicaacosaurus
Iutosaurus
Labacosaurus
Yurocerator
Cabbropacosaurus
Trociasaurus
Abbosaurus
Tramerorur
Ajrocaelosaurus


Iteration: 28400, Loss: 21.634850

Mevusteorapsus
Imecakptoi
Jutrologosaurus
Maeadosaurus
Xuutengosaurus
Cabastegasaurus
Triadenorups
Abarrgeisaurus
Treokosaurus
Ajosasaurus


Iteration: 28500, Loss: 21.651126

Matrus
```

```
Hiacagosaurus
Iustriphseus
Macagosaurus
Xispancis
Cabcosaurus
Trododophyosaurus
Aachtelaps
Tokeloraurus
Alrona


Iteration: 28600, Loss: 21.694007

Matrosaurus
Jiagalosaurus
Kustreondolus
Macalosaurus
Xutreong
Daalosaurus
Troceratous
Abersaurus
Toenepratithueus
Alrona


Iteration: 28700, Loss: 21.693662

Mautqolnes
Inebalosaurus
Jussuchong
Macaloth
Xuxuanerantis
Cacerodelothus
Toraniremurus
Abbosaurus
Tocenntlus
Altojaceratops


Iteration: 28800, Loss: 21.744532

Mawtrodon
Imecalosaurus
Kustraphoraurus
Macagrtedasaurus
Xuspaneranus
Daaerora
Torangosaurus
Abcoteras
Tidnerictes
Agropechykus


Iteration: 28900, Loss: 21.731424

Metrosaurus
Jiadacroma
Kutorasaurus
Macalosaurus
Xuspangosaurus
Daadosaurus
Torangosaurus
Abcoveia
Toengosaurus
Ajroleasiosaurus


Iteration: 29000, Loss: 21.727043

Meutrodon
Jokaadosaurus
Kussodon
Macaiosaurus
Xuuueleosaurus
Dabdosaurus
Trocienia
Abcmodia
Tododophurus
Ajkuia
```

```
Iteration: 29100, Loss: 21.677527

Mbyutrhonnissaurus
Kpeaakosaurus
Lutusaurus
Madalosaurus
Xutolong
Daajosaurus
Troenetontitititations
Abastelans
Toengosaurus
Aksteia


Iteration: 29200, Loss: 21.633972

Mixussaurus
Kola
Lutrohong
Madampsaurus
Xutohlenonys
Daadosaurus
Trodojosaurus
Bainona
Tohidosaurus
Airuelbis


Iteration: 29300, Loss: 21.533683

Nixushondon
Kolaagosaurus
Lutrolong
Nebalosaurus
Xuwolonosaurus
Daagosaurus
Toranion
Abchthaaeus
Tojilophus
Alpplea


Iteration: 29400, Loss: 21.629923

Meyuurhicor
Ingaacosaurus
Kuturhia
Macalosaurus
Yutoingikatdosaurus
Daadosaurus
Trtathosaurus
Abchunaceraurus
Traphorathus
Alsuchaes


Iteration: 29500, Loss: 21.695521

Mextromadophyesaurus
Homaamosaurus
Ivuspbeosaurus
Macalosaurus
Yutoinatheusaus
Daamosaurus
Trodonosaurus
Abarria
Trangosaurus
Alrona


Iteration: 29600, Loss: 21.691056

Leystonaeosaurus
Hmacaerosaurus
Hyrusaurus
Lecaesten
Yutoingosaurus
Cabaroragnus
Trocodon
```

```
Abchona
Togolosaurus
Alstgfanthoma


Iteration: 29700, Loss: 21.787537

Mawusoioqis
Imecalosaurus
Jytrontosaurus
Macalosaurus
Yussanisaurus
Daagosaurus
Trmanerostesaunus
Abcisaurus
Trelerosteshunus
Ajrriadosaurus


Iteration: 29800, Loss: 21.779867

Lexosia
Hiabacosaurus
Hyrosaurus
Laaacosaurus
Yurocenda
Cabarope
Trocicin
Aadosaurus
Toendosaurus
Agroecaptitan


Iteration: 29900, Loss: 21.662922

Mewtosaurus
Imecalosaurus
Juwusaurus
Macalosaurus
Yutofenia
Cacersalcosaurus
Trocllosaurus
Abbosaurus
Trdmeosaurus
Altonachus


Iteration: 30000, Loss: 21.625207

Matrosaurus
Hiadacosas
Hyrpterasaurus
Madacota
Xuspbherenthus
Cabdyrha
Trododon
Aagrosasaurus
Tomheroptitos
Ajqunaceratops


Iteration: 30100, Loss: 21.697381

Matrypholus
Imecalosaurus
Jutrodon
Macaerphacosaurus
Xuvoceratos
Caakrope
Trociclia
Abchoeeeps
Trameoraurus
Alpiledosaurus


Iteration: 30200, Loss: 21.649434

Lexosaurus
Hohaagrope
Ivussasaurus
```

```
Macalosaurus
Xuxuangosaurus
Cacerope
Tordiceratops
Abcosaurus
Tmenhophorosocimakus
Ajppedaropteryx


Iteration: 30300, Loss: 21.647925

Mewussaurus
Imica
Ixuxlchisaurus
Macagruna
Xuxodon
Cabirona
Trrcheosaurus
Abbroleanus
Toikinopulus
Alpolcerosaurus


Iteration: 30400, Loss: 21.545327

Mevusranosaurus
Jiagacosaurus
Kustriong
Macairnia
Xuspania
Daagosaurus
Toraniosaurus
Abbosaurus
Tohomosaurus
Agrondbntitan


Iteration: 30500, Loss: 21.587056

Mdyrosaurus
Hica
Ivusiangosaurus
Macairia
Xuskandophylus
Cabdrona
Trociasaurus
Abcotenator
Todlariasaurus
Akroleesaurus


Iteration: 30600, Loss: 21.618127

Meutoraptor
Imbaanosaurus
Jyxpogniin
Maebarope
Xuxnchenodon
Daampsagberisaurus
Trtengosaurus
Abbusaurus
Togncholus
Ajosanasaurus


Iteration: 30700, Loss: 21.577944

Mawtosaurus
Jibaalosaurus
Kutosaurus
Macalosaurus
Xutofkesaurus
Daakotaeentes
Trtangosaurus
Abbosaurus
Tokhasaurus
Akruiaasaurus


Iteration: 30800, Loss: 21.483745
```

```
Miwusolonnamus
Kulaamosaurus
Kustraphorax
Macalosaurus
Xuxolonhalus
Daalosaurus
Trtangosaurus
Abbysaurus
Toeneronykus
Akrylianphus


Iteration: 30900, Loss: 21.460626

Mewustenia
Kolaalisaurus
Kustraraptor
Neaalloracius
Xuxonia
Daalosaurus
Tosanetinus
Abassan
Toeneronteriv
Alntelasaurus


Iteration: 31000, Loss: 21.571293

Mivusedongahuineucrosaura
Hicebasaura
Ivusoceosaurus
Mecaepta
Yutocephelus
Daadosaurus
Trocherontesaurus
Abbosaurus
Toendosaurus
Ajpona


Iteration: 31100, Loss: 21.511809

Leytosaurus
Hicebatopderyx
Hyrtolomosaurus
Labalosaurus
Yutolomosaurus
Cabarope
Tosanchiatitan
Abastadenthogdithody
Toelisaurus
Ahosdabosaurus


Iteration: 31200, Loss: 21.542707

Mavuskia
Jibaakosaurus
Kutromelte
Macamosaurus
Xutomaeropus
Daagosaurus
Trodonosaurus
Abcosaurus
Tolomosaurus
Altona


Iteration: 31300, Loss: 21.641623

Leyutoilaniathtis
Hoebagosaurus
Hyrusaurus
Lebaerope
Yutoceratos
Cacaronachusulinus
Trocheiggyanis
Abarorador
Tralinonykus
```

```
Alosaurus


Iteration: 31400, Loss: 21.481608

Lexoscelasaurus
Huegalosaurus
Iuuslangosaurus
Lecalosaurus
Yutokenatitan
Cachysaurus
Trocienraxititan
Abcosaurus
Togolosaurus
Altogaatoria


Iteration: 31500, Loss: 21.548007

Mettosaurus
Inecaloth
Juwusaurus
Madacosaurus
Xuwuellosaurus
Cacersanchurus
Trialeosaurus
Abbosaurus
Treilosaurus
Alstrcelus


Iteration: 31600, Loss: 21.467407

Mavusaurus
Hola
Justrhonilosaurus
Macalosaurus
Xutrhodon
Cabastolaskus
Trmaneroptor
Aacnsaurus
Toeneroptor
Agrshadrornirus


Iteration: 31700, Loss: 21.519681

Meutoraprosaurus
Jichaeropeitosaurus
Kustoerasaurus
Macalosaurus
Xuvtangosaurus
Dabgosaurus
Trocliphoteros
Abcosaurus
Tohogosaurus
Altodelos


Iteration: 31800, Loss: 21.461817

Layxusaurus
Hohaadroma
Hystleopon
Lacadron
Xuxuangosaurus
Caahstra
Trocenmtotarlurus
Abartha
Tohalosaurus
Ahutelamus


Iteration: 31900, Loss: 21.407500

Niwuscena
Kolcadosaurus
Lutronlisaurus
Necadosaurus
Xutokelipdrlus
```

```
Dabasogea
Torbiclonyosaurus
Abbosaurus
Tolodor
Agrondapultadosaurus


Iteration: 32000, Loss: 21.483206

Mewtosaurus
Ileaagosaurus
Iwutonlisia
Macalosaurus
Xorocepholx
Caajmong
Trocichiatitan
Abbosaurus
Toingosaurus
Akroleasptrus


Iteration: 32100, Loss: 21.563619

Mawusibia
Ineaagosaurus
Justodon
Macalosaurus
Xussangosaurus
Caalosaurus
Trochapodriposaurus
Abbssaeeosaurus
Todokinator
Aistia


Iteration: 32200, Loss: 21.473331

Mewtosaurus
Kila
Lutosaurus
Macalosaurus
Xustanosaurus
Daadosaurus
Trtengosaurus
Bairuracis
Spanosaurus
Akruraatoraptor


Iteration: 32300, Loss: 21.482410

Meytrthogninurusaurus
Inebalosaurus
Jyrus
Macamosaurus
Yuspaniosaurus
Daanosaurus
Torengosaurus
Balturaceratopsaurus
Tolonimasaurus
Agruicerosiehosaurus


Iteration: 32400, Loss: 21.414681

Mawustonesaurus
Ilecalosaurus
Justranisaurus
Macalosaurus
Xuutaraptor
Daalosaurus
Toraphoratitis
Abbstria
Toingnomyeus
Alptodentisaurus


Iteration: 32500, Loss: 21.481483

Meyusoeon
```

```
Hmaebaus
Ixuxsaurus
Macallten
Yuspangosaurus
Daadosaurus
Tusangosaurus
Abbrraeentater
Trangosaurus
Alsteia


Iteration: 32600, Loss: 21.531164

Meyutodon
Ingaacosaurus
Jyxtndongolus
Macakoten
Yutodongolus
Daadosaurus
Trrangosaurus
Abcosaurus
Todoeropteryx
Agrreegosaurus


Iteration: 32700, Loss: 21.559389

Mawusteratops
Ingaagosaurus
Juwsolong
Macalosaurus
Yutolong
Cacersaodon
Trocleshavephraptor
Abchsapeos
Tololosaurus
Altylecosaurus


Iteration: 32800, Loss: 21.645192

Leytosaurus
Hibaaesaurus
Iuutolololosaurus
Macalosaurus
Yutolong
Cacarsaurus
Trobidosaurus
Abbrracasseus
Toiolosaurus
Alruia


Iteration: 32900, Loss: 21.564529

Leytosaurus
Hiabakosaurus
Iutosaurus
Labacosaurus
Yusrepsiognis
Cabassaldis
Trocieosaurus
Abbosaurus
Toencosaurus
Alsucacitatijax


Iteration: 33000, Loss: 21.555539

Meyutolomimothusuconfissaptos
Hohaagrosaurus
Iwutololophus
Madaerrabanthus
Yutohelosaurus
Daagosaurus
Trocigosaurus
Abcosaurus
Treomerax
Altolderus
```

```
Iteration: 33100, Loss: 21.537552

Matstylong
Hicaagusaurus
Ivutognathouhus
Macakosaurus
Yutoenes
Cacarriachusthimus
Trncheosaurus
Abbosaurus
Toligosaurus
Ahrselapsaurus


Iteration: 33200, Loss: 21.541305

Mavushangosaurus
Jiahaeropechus
Kustreosaurus
Macagnope
Xuusangosaurus
Caalosaurus
Trocheprithus
Abcosasaurus
Toeneriandosaurus
Altona


Iteration: 33300, Loss: 21.512887

Mawusteonis
Huacalosaurus
Juxstarginathus
Macagotidantitan
Xuxlangosaurus
Cacerscelator
Trociasaurus
Aafronccrx
Tocheosaurus
Alppiaanosaurus


Iteration: 33400, Loss: 21.542625

Mawrosaurus
Imecalotha
Justrenirgathonumorkisul
Macalotifanniusaurus
Xuroenes
Daaerope
Toraniosaurus
Abbosaurus
Tidomeliuenitarasaura
Ajpola


Iteration: 33500, Loss: 21.504359

Maustrhia
Jiafacosaurus
Kutoraplordontosaurus
Macagoticanptor
Xunochenomus
Caalosaurus
Trododon
Aacosathounus
Toemeoraunosaurus
Altonceratophotilavenatiasimanceratophosaurus


Iteration: 33600, Loss: 21.505684

Mavtrohia
Imacalosaurus
Justrasaurus
Macajkraceosaurus
Xusrangma
Cacdron
Trochasaurus
```

```
Abbosaurus
Toeleria
Airokaansaurus


Iteration: 33700, Loss: 21.472523

Mawutrin
Klia
Lutyrasaurus
Madalosaurus
Xtrolnes
Daamosaurus
Trochepratitit
Abcmphedopns
Toligosaurus
Altondansaurus


Iteration: 33800, Loss: 21.446633

Mewushanosaurus
Kokaalus
Lutronlkus
Macalosaurus
Xuspangosaurus
Daaerun
Totandoraurus
Baissalaptor
Tohaerus
Agrula


Iteration: 33900, Loss: 21.355856

Mevrosaurus
Kpacamosaurus
Lutyrasaurus
Macalosaurus
Xuxoeosaurus
Daalosaurus
Troeogosaurus
Abasthadosaurus
Tognchratisaurus
Allophanus


Iteration: 34000, Loss: 21.387412

Meyutoniaosaurus
Inhaagosaurus
Juwxong
Macalosaurus
Yutognetious
Daagosaurus
Troclenhix
Abbusaurus
Toemeronus
Alttha


Iteration: 34100, Loss: 21.500216

Mbytosaurus
Hoidagosaurus
Iwutoeona
Macalosaurus
Yutocephalus
Daadosaurus
Trochenigus
Abastohalops
Toengosaurus
Aistocanthomemus


Iteration: 34200, Loss: 21.496718

Leystonia
Goldanosaurus
Hyrskangosaurus
```

```
Lacalosaurus
Yustenkon
Cachysaurus
Trodiacimugosees
Abchondarsaurus
Traninonylus
Alrria


Iteration: 34300, Loss: 21.593330

Mawusiankosaurus
Imebanosaurus
Jutosaurus
Macanosaurus
Yutoingosaurus
Daaersamaurus
Troangosaurus
Abbosaurus
Trengosaurus
Akrona


Iteration: 34400, Loss: 21.605527

Leytprosaurus
Hogaadosaurus
Hyrosaurus
Labacosaurus
Yusranimeluclus
Cabaroncaps
Trobia
Abbosaurus
Todochoeylong
Agrona


Iteration: 34500, Loss: 21.496689

Mewtosaurus
Jiacaltor
Juxtojia
Macalotimanthus
Yutodonamaurus
Dabertia
Trtangronsaurus
Abcothecosaurus
Treolosaurus
Akstrcepterraptordychsia


Iteration: 34600, Loss: 21.460195

Mawusoeon
Hucbaeropeestisaurus
Hyrosaurus
Macagntaeaptor
Xuwoceratosaurus
Caadrope
Trochenonypus
Aadosaurus
Toeniancurus
Airodeiskus


Iteration: 34700, Loss: 21.516316

Matrosaurus
Hohaadrope
Iustriomer
Macalosaurus
Xuroceratops
Caagosaurus
Trochenodynisuchus
Abcisaurus
Toemaronydosaurus
Ahmogaceratops


Iteration: 34800, Loss: 21.476202
```

Meutrogmanonyppsia
Holcamosaurus
Jutosaurus
Macalosaurus
Xuspanasaurus
Caahosaurus
Toraphosaurus
Abbosaurus
Tmemenomus
Ahtona

Iteration: 34900, Loss: 21.476825

Mevusodone
Imeca
Juxtoenisaurus
Macagptia
Xuvuengosaurus
Caakotafanrosaurus
Torenitimunosaurus
Abcoteia
Tmemannkugnotaranius
Ajtola