

# ICD-10 Health Code Classification with Watson Natural Language Classifier

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Lab disclaimer: This application is used for demonstrative and illustrative purposes only and does not constitute an offering that has gone through regulatory review.

**ICD-10** is the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (**ICD**), a medical classification list by the World Health Organization (WHO).

# Watson Natural Language Classifier (NLC)



Data is yours to classify

Categorize social media or analytics data, sort volumes of written content, and identify key skills.

What it does



You can input:

Text to a pre-trained model

And the service will output:

Classes ordered by confidence

# Current Features

## Classify Multiple Text Phrases

Classify multiple items with a single API call

## DLaaS – Deep Learning as a Service

Train data at faster speeds and in larger quantities (20k).

## Multi-Intent Classification

Extract multiple intents from text


## Chain Multiple Classifiers

Separate text and classify at multiple levels




# Natural Language Classifier – Tooling in Beta

**IBM Watson™ Natural Language Classifier uses machine learning algorithms to return the top matching predefined classes for short text input. You create and train a classifier to connect predefined classes to example texts so that the service can apply those classes to new inputs.**



## Natural Language Classifier


Interpret natural language and classify it with confidence

[Access the beta toolkit](#)  
  
  
Developer resources:

- [Getting started tutorial](#)
- [Demo](#)

### Classifiers

These classifiers are connected to the service instance. You can test and improve the performance of a classifier that has a status of **Available**.



Add training data



Add texts and classes to your training data to create a classifier.


#### IBM Watson Natural Language Classifier

Connected to AMERICA.


Watson needs your data. Begin by adding classes and texts, or import data from a file.

Classes 0

 [Newest first](#) 

 Add class

Texts 0

 Add text

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# Option #1 – Watson Studio Notebook

A Think2018 Lab - Python Application in Watson Studio /  
DSX - JuPyter / IPython NotebookLAB

## OVERVIEW:

This application was built to demonstrate IBM's Watson Natural Language Classifier (NLC). It uses the Watson Python SDK for IBM Watson to create the classifier, list classifiers, and classify the input text.

We also make use of the freely available ICD-10 API which, given an ICD-10 code, returns a name and description. ICD-10 is the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD), a medical classification list by the World Health Organization (WHO).

This lab and data set is for educational purposes only.

<https://www.ibm.com/watson/services/natural-language-classifier/>

<https://www.ibm.com/watson/developercloud/natural-language-classifier/api/v1>



<https://github.com/rustyoldrake/ICD-10-NLC-Python-LAB/blob/master/ICD-10-NLC-Python-LAB-Part-A.ipynb>

My Projects / ICD-10-NLC-Python-LAB / ICD-10-NLC-Python-LAB-Part-A

File Edit View Insert Cell Kernel Help

Run Code

### Test 1 - Shoulder Pain

```
In [ ]: [icd_output, classifier_output] = classify_text('I injured my left shoulder')

hash_map = map_types(json.loads(icd_output)['Search'])

df = create_dataframe(classifier_output)
display(df)
print('Top result is: ', hash_map[json.loads(classifier_output)['top_class']])
```

### Shoulder pain

<https://www.nuemd.com/icd-10/codes/shoulder%20pain> (third party site)

**M75 Family codes include:**

Adhesive capsulitis of shoulder Rotator cuff tear or rupture, not specified as traumatic Bicipital tendinitis Calcific tendinitis of shoulder Impingement syndrome of shoulder

### Test 2 - Nose Injury

```
In [ ]: [icd_output, classifier_output] = classify_text('I broke my nose')

hash_map = map_types(json.loads(icd_output)['Search'])

df = create_dataframe(classifier_output)
display(df)
print('Top result is: ', hash_map[json.loads(classifier_output)['top_class']])
```

# Option #2 – Flask Magic

## ICD-10 Python Application in Flask MicroFramework

<https://github.com/IBM/nlc-icd10-demo>

A simple web app that shows how Watson's Natural Language Classifier (NLC) can classify ICD-10 code. The app is written in Python using the Flask framework and leverages the Watson Developer Cloud Python SDK

<https://www.youtube.com/watch?v=N0eKEZxdwsQ&t=358s>

Steve Martinelli, an Engineering Manager @ IBM, uses Watson's Natural Language Classifier service to classify health injuries using ICD-10 codes. This is a Python web application based on the Flask microframework and is based on earlier work done by Ryan Anderson. It uses the Watson Python SDK to create the classifier, list classifiers, and classify the input text. We make use of the free ICD-10 API which, given an ICD-10 code, returns a name and description.



## NLC Demo

NLC info dump:

```
{
  "url": "https://gateway.watsonplatform.net/natural-language-classifier/api/v1/classifiers/e55175x249-nlc-86898",
  "classifier_id": "e55175x249-nlc-86898",
  "name": "ICD-10Classifier",
  "language": "en",
  "created": "2017-12-13T21:41:07.450Z"
}
```

Text to classify:

Output from Watson NLC classifier:

```
{
  "url": "https://gateway.watsonplatform.net/natural-language-classifier/api/v1/classifiers/e55175x249-nlc-86898",
  "text": "Typhoid fever",
  "classes": [
    {
      "class_name": "A01",
      "confidence": 0.9731324107632953
    },
    {
      "class_name": "A75",
      "confidence": 0.007588392789111579
    },
    {
      "class_name": "A90",
      "confidence": 0.001963022004939276
    }
  ]
}
```

ICD10 code:

Output from ICD10 API:

```
{
  "Search": [
    {
      "Name": "A01",
      "Description": "Typhoid and paratyphoid fevers"
    }
  ]
}
```

# Lets Get Started

Login: `datascience.ibm.com`

Creds: `studentXXXX@ibmlearning.org`

Password: (provided at lab)

Console: `http://ibm.com/cloud/`

DISCLAIMER: This application is used for demonstrative and illustrative purposes only and does not constitute an offering that has gone through regulatory review.

# Thank you

## Resources:

Main page - <https://www.ibm.com/watson/services/natural-language-classifier/>

Documentation - [NLC Documentation](#) and [Best Practices Guide](#)

Natural Language Classifier (NLC) Handbook: <https://ibm.box.com/s/rdlog2sue79178816s0rabkbi7ifu5vg>

Watson Slack Channel - [wdc-community.slack.com](https://wdc-community.slack.com)

**PATH A – WATSON STUDIO - Classify health injuries to ICD-10 codes with IBM Watson Natural Language Classifier**  
<https://github.com/rustyoldrake/ICD-10-NLC-Python-LAB/blob/master/ICD-10-NLC-Python-LAB-Part-A.ipynb>

**PATH B – Classify health injuries to ICD-10 codes with IBM Watson Natural Language Classifier**  
This application is a Python web application based on the [Flask microframework](#)  
<https://github.com/IBM/nlc-icd10-demo>  
<https://www.youtube.com/watch?v=N0eKEZxdwsQ&t=358s>

