Ref: https://medium.com/@mr_nerdster/unlocking-intent-classification-with-nlp-43aa1df9362f
https://rasa.com/blog/rasa-nlu-in-depth-part-1-intent-classification/

Definition : Intent classification in Natural Language Processing (NLP) is the task of identifying the underlying purpose or goal behind a user's textual input. It involves analyzing a piece of text, such as a user query in a chatbot or an email, and assigning it to a predefined category representing a specific intent.

Characteristics :

Categorization of User Input:
It takes raw text or speech (converted to text) and maps it to a specific, pre-defined "intent" label. For example, in a customer service bot, intents might include "reset password," "check order status," or "contact support."

Foundation of Conversational AI
Intent classification is a crucial component of conversational AI systems like chatbots and virtual assistants, enabling them to understand user requests and respond appropriately

Machine Learning and NLP Techniques:
It typically utilizes machine learning algorithms, often trained on labeled datasets of user utterances and their corresponding intents. Techniques include supervised learning models, deep learning architectures like transformers, and contextual embeddings.

Role in Natural Language Understanding (NLU):
Intent classification is a core part of NLU, which aims to enable computers to comprehend the meaning and context of human language.

How it works

Input:
The system receives user input, which can be text (e.g., a typed query) or speech (which is first converted to text using Automatic Speech Recognition).

Feature Extraction:
NLP techniques are applied to extract relevant features from the input, such as tokenization, stemming/lemmatization, and potentially creating numerical representations like word embeddings.

Classification Model:
A machine learning model, often trained on a dataset of labeled user utterances and their corresponding intents, analyzes these features. Common models include Support Vector Machines (SVMs), neural networks (especially those based on transformer architectures like BERT), or even simpler centroid-based methods.

Intent Assignment:
The model predicts the most likely intent for the given input, often providing a probabilistic score for each potential intent.

Action/Response:
Based on the classified intent, the conversational AI system can then trigger an appropriate action or generate a relevant response.

Key aspects and applications:

- **Categorization:**
It groups diverse phrasings of the same underlying goal into a single intent. For example, "reset my password," "I forgot my password," and "change my login details" could all map to a "password reset" intent.

- **Conversational AI:**
It's fundamental for building intelligent chatbots and virtual assistants that can understand user needs and respond effectively in various domains like customer service, sales, and information retrieval.

- **Supervised Learning:**
Intent classification typically relies on supervised learning, where models are trained on datasets containing pairs of user utterances and their corresponding, manually labeled intents.

- **Natural Language Understanding (NLU):**
It's a key sub-task within NLU, which aims to interpret the meaning and context of human language.

Flow

Data Preparation -> Model Configuration -> Training -> Conversation

Applications

Basic

"Keyword Mapping => Text Processing -> Keyword Matching"

- **Data Preparation:** Keyword-response mapping table (dictionary, conditional statements).
- **Model Configuration:** There's no separate 'model' configuration, but the matching logic itself acts as the model.
- **Training:** Since it's based on pre-defined rules, there's no 'training' phase.
- **Conversation:** Upon input, directly matches and responds.

Use Rasa

Define NLU Training Data (data/nlu.yml)
Define Chatbot Components (domain.yml)
Define Conversation Flow (data/stories.yml and data/rules.yml)
Model Training and Execution