AlpacaTag: An Active Learning-based Crowd Annotation Framework for Sequence Tagging

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http://inklab.usc.edu/AlpacaTag

### Easy-to-use Intelligent Recommendations

(a) the sentence and annotations are at the upper section; tagging suggestions are shown as underlined spans in the lower section.

(b) after click on a suggested span, a floating window will show up near for confirming the types (suggested type is bounded with red line).

(c) after click a suggested type or press a shortcut key (e.g. ‘p’), confirmed annotations will show up in the upper annotation section.

### Overall Workflow of AlpacaTag

- **Consolidation & Incremental Training**: The model is trained on a consolidated set of labeled and unlabeled data.
- **Real-time API**: The model can be used in real-time to make predictions on new data.

### Learning Backend Model with Consolidation

- **Crowd Annotators**: A pool of human annotators provide labels for the data.
- **Instance Sampling via Active Learning**: The system selects the most informative instances for annotation.

### Active Learning for Instance Sampling

- **If \( \# > \) batch size**: The system selects a batch of instances for annotation.

### Performance Evaluation

- **CRF**: Conditional Random Field
- **tags scores**: The scores assigned to each tag
- **Linear**: Linear model
- **BLSTM**: Bi-directional Long Short-Term Memory

### Key Features

- **Active Intelligent Recommendation**: Dynamically suggesting annotations and sampling the most informative unlabeled instances.
- **Annotation Consolidation**: Enhancing real-time inter-annotator agreement by consensus networks.
- **Real-time model deployment**: Users can deploy their models in downstream systems.

### Framework Implementations

- **UI-design**: doccano
- **Front-end**: Vue.js
- **Back-end**: Django
- **Database**: SQLite
- **Language**: PyTorch

### Backend Model

- **Frequent NPs + Dictionary**: Frequently occurring noun phrases and dictionaries are used for annotation.
- **A batch of sampled raw sentences**: A batch of sentences is sampled for annotation.

### Annotator-specific Models

- **Annotator Representation**: Models are tailored to the specific needs of individual annotators.

### Overall Workflow of AlpacaTag

- **Annotating section**: The user provides annotations.
- **Recommendation section**: The system provides recommendations based on the current state of the task.

### Annotation Server

- **Requests**: Requests for annotations are sent to the server.
- **Response**: Responses with annotations are sent back to the client.

### Model Server

- **Sink**: The final output of the model is stored in the sink.
- **Ventilator**: The ventilator distributes work to the workers.