

ML/NLP Interview Chatbot A Task-Oriented Dialog System

**Special Topics in Language Technology: Multimodal
and Dialogue Systems and Voice Assistants**

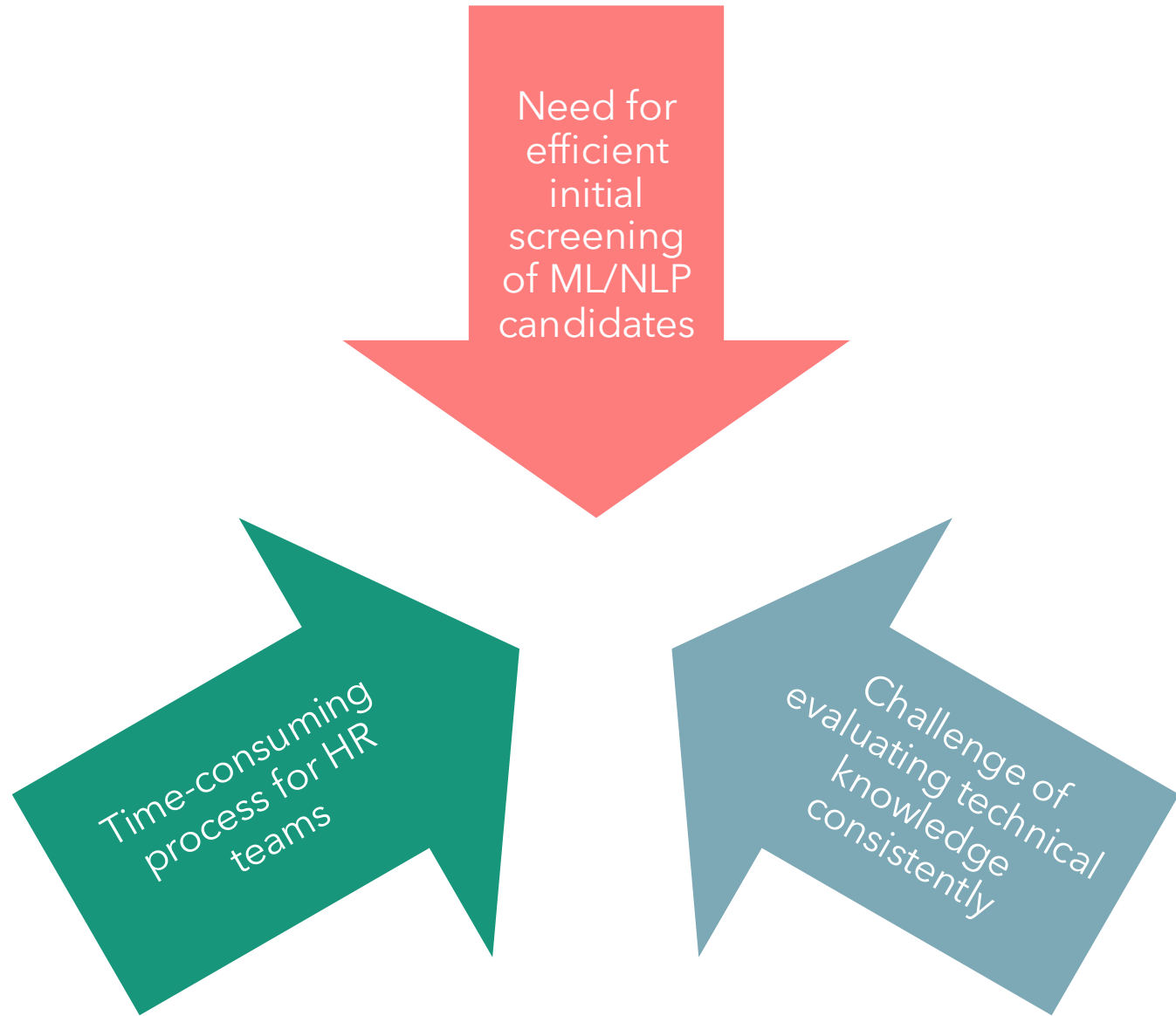
M932 - Giorgos Paraskevopoulos, Nassos Katsamanis

Assignments - Task-Oriented Dialog System Prototype

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Problem Statement



Solution

1

Automated interview
chatbot using RASA
framework

2

Integration with educational
database

3

Systematic technical
assessment capabilities

Interaction Scenarios

Scenario 1	Initial Screening	Basic information collection	Educational background verification	Experience assessment
Scenario 2	Technical Assessment	NLP knowledge evaluation	ML framework experience	Problem-solving approach
Scenario 3	Career Discussion	Future goals exploration	Role alignment	Availability check

Example conversation (1)

```
Your input -> Hi
Hello! I'm conducting interviews for ITML's Junior ML Engineer position. Before we begin, could you tell me your name?
Your input -> I'm Kostas
Great to meet you, Kostas! How are you feeling about our conversation today?
Your input -> I'm good
That's wonderful to hear, Kostas! Let's talk about your interest in the ML Engineer position.
Let me tell you about the Junior Machine Learning Engineer (NLP) position at ITML.
Key Responsibilities:
• Develop and implement NLP solutions
• Work on EU research projects
• Build and optimize ML models
• Process and analyze textual data
• Collaborate with research teams
• Create technical documentation
Required Skills & Qualifications:
• BSc/MSc in Computer Science, Data Science or related field
• Strong programming skills in Python
• Experience with ML frameworks (PyTorch, TensorFlow)
• Knowledge of NLP techniques and deep learning
• Good understanding of NLP algorithms and architectures
• Experience with version control systems (e.g., Git)
• Good communication skills in English
Now, Kostas, could you tell me about your education? Which university did you attend?
Your input -> I studied at MIT
I see you studied at MIT in USA.
I notice your university offers relevant courses:
NLP courses:
• Natural Language Processing
• Advanced Natural Language Processing
The curriculum includes experience with: Python
Could you share your practical experience with ML and NLP technologies?
Your input -> I've worked extensively on speech recognition systems using deep learning. I've implemented attention mechanisms and transformer architectures for speech-to-text applications.
Your approach aligns well with how we work at ITML, Kostas.
Thank you for sharing your experience, Kostas. Let's move on to some technical questions now:
Could you explain your understanding of word embeddings and their importance in NLP?
Your input -> Word embeddings are fundamental in deep learning approaches to NLP, transforming text into vector representations. I've used frameworks like PyTorch to implement transformers
```

Example conversation (2)

Your approach aligns well with how we work at ITML, Kostas.

Thank you for sharing your experience, Kostas. Let's move on to some technical questions now:

Could you explain your understanding of word embeddings and their importance in NLP?

Your input -> Word embeddings are fundamental in deep learning approaches to NLP, transforming text into vector representations. I've used frameworks like PyTorch to implement transformers

former models like BERT, which use contextual embeddings for text processing and classification tasks.

Excellent Kostas! Your technical knowledge is impressive. Let's talk about your future goals. Where do you see yourself professionally in 5 years?

[Your input -> I aim to become a Senior ML Engineer, focusing on developing innovative NLP solutions.]

Your career goals align well with ITML's growth trajectory, particularly in Senior ML Engineer.

If we proceed with your application, when could you join the team, Kostas?

[Your input -> I could start in two weeks.]

The position is based in Athens, Greece. Would this location work for you?

[Your input -> Yes, that works perfectly]

We've covered a lot of ground, Kostas. Is there anything else you'd like to know about the position?

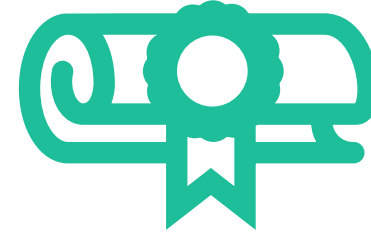
[Your input -> No, thank you for your time.]

Thank you for your time today Kostas. Our team will review your profile and contact you soon about next steps.

I appreciate your time and insights, Kostas. We'll contact you soon about the next steps.

[Your input ->

NLU Implementation (1)



Education Intent

- intent: provide_education_info

examples: |

- I studied at [National Technical University of Athens](university_name)
- I graduated from [University of Patras](university_name)
- I did my [Computer Science](study_program) at [MIT](university_name)
- Bachelor's in [Machine Learning](study_program)

- intent: share_experience

examples: |

- I've worked extensively on speech recognition systems
- I've implemented attention mechanisms
- I've used frameworks like PyTorch

NLU Implementation (2)



- intent: share_future_goals

examples: |

- I aim to become a [Senior ML Engineer](future_role)
- I see myself as a [Technical Lead](future_role)
- Want to develop innovative solutions

Domain Configuration



version: "3.1"

entities:

- name
- university_name
- study_programs
- future_role

responses:

utter_welcome:

- text: "Great to meet you, {name}! How are you feeling about our conversation today?"

utter_technical_question:

- text: "Could you explain your understanding of word embeddings and their importance in NLP?"

slots:

name:

type: text

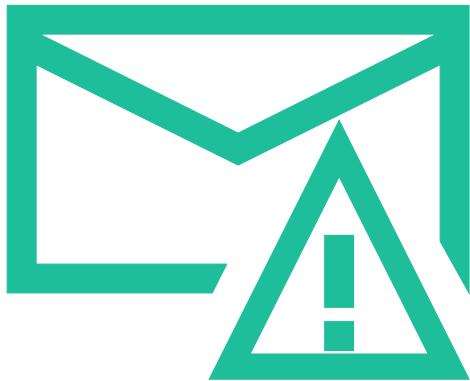
influence_conversation: true

mappings: - type: from_entity

entity: name

Stories & Rules

(1)



Example Story

- story: happy path technical discussion

steps:

- intent: greet

- action: utter_greet

- intent: provide_name

entities:

- name: "Kostas"

- action: utter_welcome

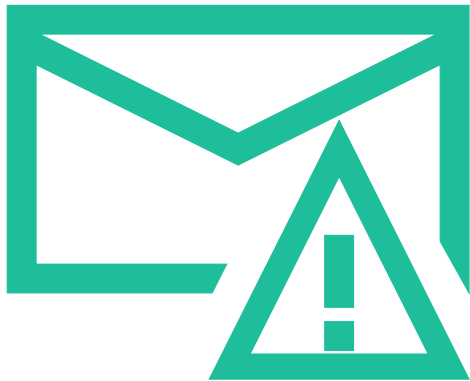
- intent: share_experience

- action: utter_technical_question

- intent: discuss_technical

- action: utter_ask_five_years

Stories & Rules (2)



rules:

- rule: Handle technical clarification

condition:

- active_loop: null

- slot_was_set:

- interview_progress: technical

steps:

- intent: ask_clarification

- action: utter_technical_clarification

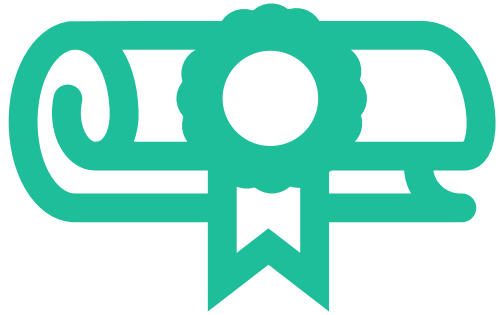
- rule: Location confirmation

steps:

- intent: affirm

- action: utter_wrap_up


Data Integration



University Course Database

```
{  
  "universities": [  
    {  
      "name": "MIT",  
      "courseList": [  
        { "name": "Natural Language Processing",  
          "level": "Both",  
          "languages": ["Python"],  
          "type": "NLP"  
        }  
      ]  
    }  
  ]  
}
```

Data Processing



Fuzzy matching
for university
names

Course
relevance
analysis

Programming
language
expertise
extraction

Custom Actions



Education Analysis

- University verification
- Course relevance checking
- Skills assessment

Technical Validation

- Keyword-based analysis
- Multi-category matching
- Progressive assessment

Candidate Management

- Profile creation
- Data persistence
- Interview progress tracking

Error Handling

Implemented Mechanisms

Database
access error
handling

Input
validation

Fallback
responses

Context
recovery

Example Implementation

```
try:
    with open(json_path, "r") as file:
        data = json.load(file)
except FileNotFoundError:
    logger.error("Database not found")
    return fallback_response()
except json.JSONDecodeError:
    logger.error("Invalid data format")
    return error_response()
```

System Limitations

Technical Limitations

Limited
context
understanding

Basic technical
validation

Template-
based
responses

Fixed
conversation
paths

Practical Limitations

No real-time
API integration

Static
university
database

Limited
assessment
depth

Basic error
recovery

Future Improvements

Technical Enhancements

Advanced NLP for response analysis

Integration with coding platforms

Dynamic technical assessment

Real-time university API integration

Functional Improvements

Multi-language support

Personality assessment

Interactive coding challenges

Video interview integration

Conclusion

Key Achievements

- Successful implementation of automated interview system
- Integration with educational database for verification
- Systematic technical assessment implementation

Impact

- Streamlined initial candidate screening process
- Consistent evaluation methodology
- Foundation for future AI-driven HR tools

