NPFL123 Dialogue Systems

5. Dialog Authoring Tools

https://ufal.cz/npfl123

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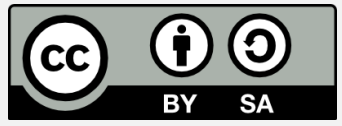

Short Intro of Jan Cuřín

Education

- IFAL, MFF UK – PhD in 2006 (Statistical Machine Translation)

Work Experience

- MAMA AI – 2021- Co-Founder
  - Natural Language Processing, Conversational Agents, AI
- IBM – 2004-2021 – Research Scientist, Manager at IBM Watson R&D Lab
  - Conversational Systems, NLU Technologies, AI
- IFAL, MFF UK – 2002-2004 – Researcher, PhD Student
  - Machine Translation, NLU Technologies
- Schemantix – 2000-2001 – Software Engineer
  - Machine Translation, XML Technologies

IBM Watson Services
- Watson Assistant
- Watson Speech (STT/TTS)
- Watson Language Translator

Business Use Of Dialogue Systems

- Chat bots on web pages
  - Navigation through the content of the web pages (smart search)
  - Frequently asked question (FAQ)
- Mobile applications with open text input
  - Domain specific apps with chatting functionality, even banking apps
  - Intra company systems
- Assisting systems
  - Intra company “expert” system
  - Support for human operators
- Speech based systems
  - Call centers automation – handling top x% of traffic
- Automotive applications
  - Search, calls, navigation, infotainment/entertainment (music, POIs)
- Infotainment systems
  - Infotainment systems for hotels, banks’ lobbies, home, etc …

Challenges of Creating Good DS

- Data
  - Use of existing of human-to-human logs
  - Use of intracompany structured and unstructured data
  - No data, just ideas
  - No idea at all

- Scenarios, use-cases
  - Single domain
  - Single domain with chit-chat capability
  - Multi-domain

Authoring a Dialogue

Restaurant booking scenario

- System: Hello, this is Chez Pépé restaurant reservation system. How may I help you?
- User: I would like to reserve a table for tomorrow for 5 people
- System: From what time?
- User: From 7pm
- System: OK, I will make a reservation for tomorrow at 7pm, table for 5.
- User: Great!
- System: Looking forward to see you soon.

Authoring a Dialogues

Restaurant booking scenario

Intents

#reserve_table
- I would like to reserve a table for 5
- Can I make a reservation?
- I need a reservation for tomorrow

#opening_hours
- Until when are you open?
- What are the opening hours?

#cancel_reservation
- I made my reservation yesterday, I want to cancel it.
- We could not make it today, may I cancel the reservation?

Entities

I need reservation for 5 people for tomorrow at 7pm

Next Friday from 6pm

For two.

@date
@time
@number
@restaurant_location

Dialogue

Welcome
Book a table

Entity	Context variable	Req.
@date	$res_date	Y
@time	$res_time	Y
@number	$guests	Y

Opening hours
Cancel reservation
  Yes
  No
<default answer>

Intents

- Collection of example how users will trigger the intent
- Usually corresponds to the actions supported by the dialog

- Intent model can be trained even on a small set of examples
- Word and sentence embeddings, stemmer, lemmatizer
- Bigger data collection needed for production system

- Ordered n-best lists with confidences
- Use of intent n-bests in the dialog – disambiguation

Intents

#reserve_table
I would like to reserve a table for 5
Can I make a reservation?
I need a reservation for tomorrow

#opening_hours
Until when are you open?
What are the opening hours?

#cancel_reservation
I made my reservation yesterday,
I want to cancel it.
We could not make it today,
may I cancel the reservation?

Entities

~ Named entities recognition (NER)

- Different type of entities
  - Prebuilt (system) entities
    - Numbers, dates, time, GEO location, person names, units, currency
  - Domain catalogues
  - User defined entities
    - Gazetteers – fixed list of entities/synonyms
    - Regular expression based
    - Sequence labelling model based on sample annotations (contextual entities)

Entities

I need reservation for 5 people for tomorrow at 7pm

Next Friday from 6pm

For two.

@date
@time
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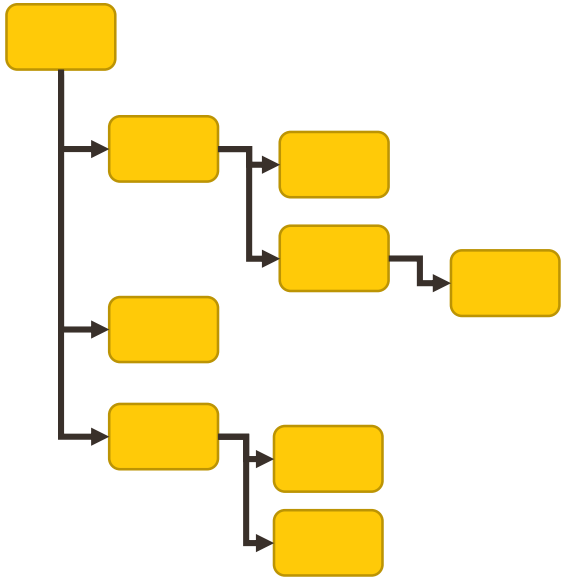
Dialogue Flow/Tree

- Slot filling style (linear dialog)
  - Set of slots to fill is (required/optional)
  - Able to fill all slots partially or at once
  - Asking just for missing information
  - Ability to customize questions and answer for a particular slot
  - Ability to correct already filled information
  - Tight to user variables

Entity	Context variable	Req.
@date	$res_date	Y
@time	$res_time	Y
@number	$guests	Y

- Dialogues tree (non-linear dialog)
  - Dialogue flow driven by a tree or graph structure
  - Conditions to get to the individual nodes of the tree/graph
  - Fallback strategies (none of the conditions is specified)



Demo

- Sample chatbot in Watson Assistant

Restaurant booking scenario

Features used in runtime

- Dialogue context / history
  - Condition on context variables collected in previous turns
  - Reference/anaphora resolution using collected variables
- Fallback strategies / Digression
  - Allow "jumping" to different topic for a while and then return back
- Disambiguation support
  - Similar confidence of multiple choices – ask user to select
- Calling external APIs
  - Webhooks/Cloud functions ...

Deployment and Usage

- Authoring tools usually go with an integration support
  - WebWidget - chatting console
  - Slack
  - Facebook
  - Intercom (voice) …
- APIs
  - To include it in customer apps, integration to other solutions
  - Using sessions or conversation ids to track context/history
  - REST API with JSON request/response
- Watson SDK
  - Python, Java, Node.js, .NET
  - https://github.com/watson-developer-cloud

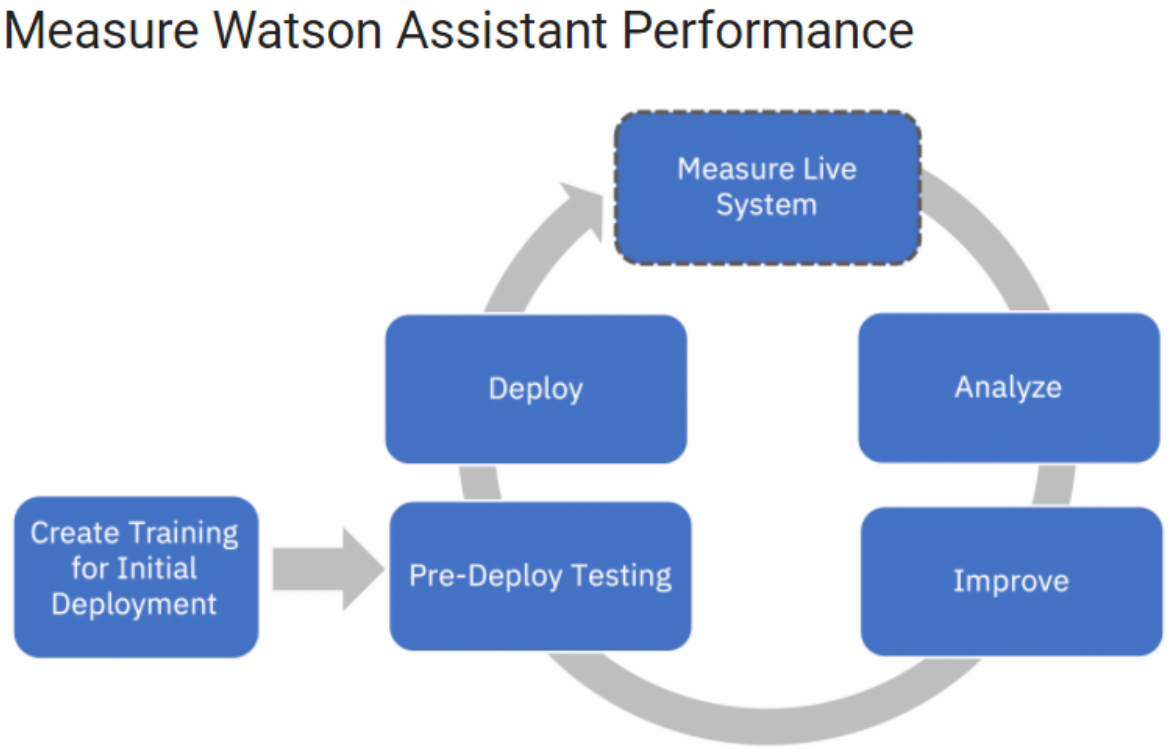
Maintaining and improving chatbot in production

- Automatically
  - Learning from user selections
  - Statistics on user selections – automated "pre-selection" for next users

- Semi-automatically or manually
  - Chat log analysis
  - Used Measures:
    - **Coverage** ... rate at which your chatbot is confident that it can address the user's request (per dialogue turn)
    - **Containment** ... rate at which your chatbot can satisfy a user's request without human intervention, i.e. connect to human agent not requested (per conversation)
  - Content updates
    - To increase the measures above
    - To cover new topics, entities, situations

Chat log analysis - IBM Watson Assistant example

- Python notebook provided to analyze chat log data
  - Covered – check the most frequent
  - Not Covered – extend the coverage
- Visualization of the statistics
  - Number of conversations
  - Conversation length (in turns) stats
  - Coverage and containment history
  - Most frequent intents and entities recognized
  - Low confident intents
  - …



Source: Measure Watson Assistant Performance Python notebook

20+ Metrics for Chatbot Analytics in 2021 by AI Multiple:
https://research.aimultiple.com/chatbot-analytics/

Authoring tools

- IBM Watson Assistant
  - https://www.ibm.com/cloud/watson-assistant/
  - Video tutorial: https://console.bluemix.net/docs/services/assistant/tool-overview.html
- Google Dialog Flow
  - https://dialogflow.com/
  - Video tutorials: https://cloud.google.com/dialogflow/docs/video
- Amazon Alexa Skills
  - https://developer.amazon.com/alexa-skills-kit
  - Video tutorial: https://www.alphavoice.io/video/alexa-developers/alexa-skills-kit-developer-console-build
- Microsoft Cortana Skills
  - https://developer.microsoft.com/en-us/cortana
- Apple SiriKit (Siri-enabled iOS apps)
  - https://developer.apple.com/sirikit/

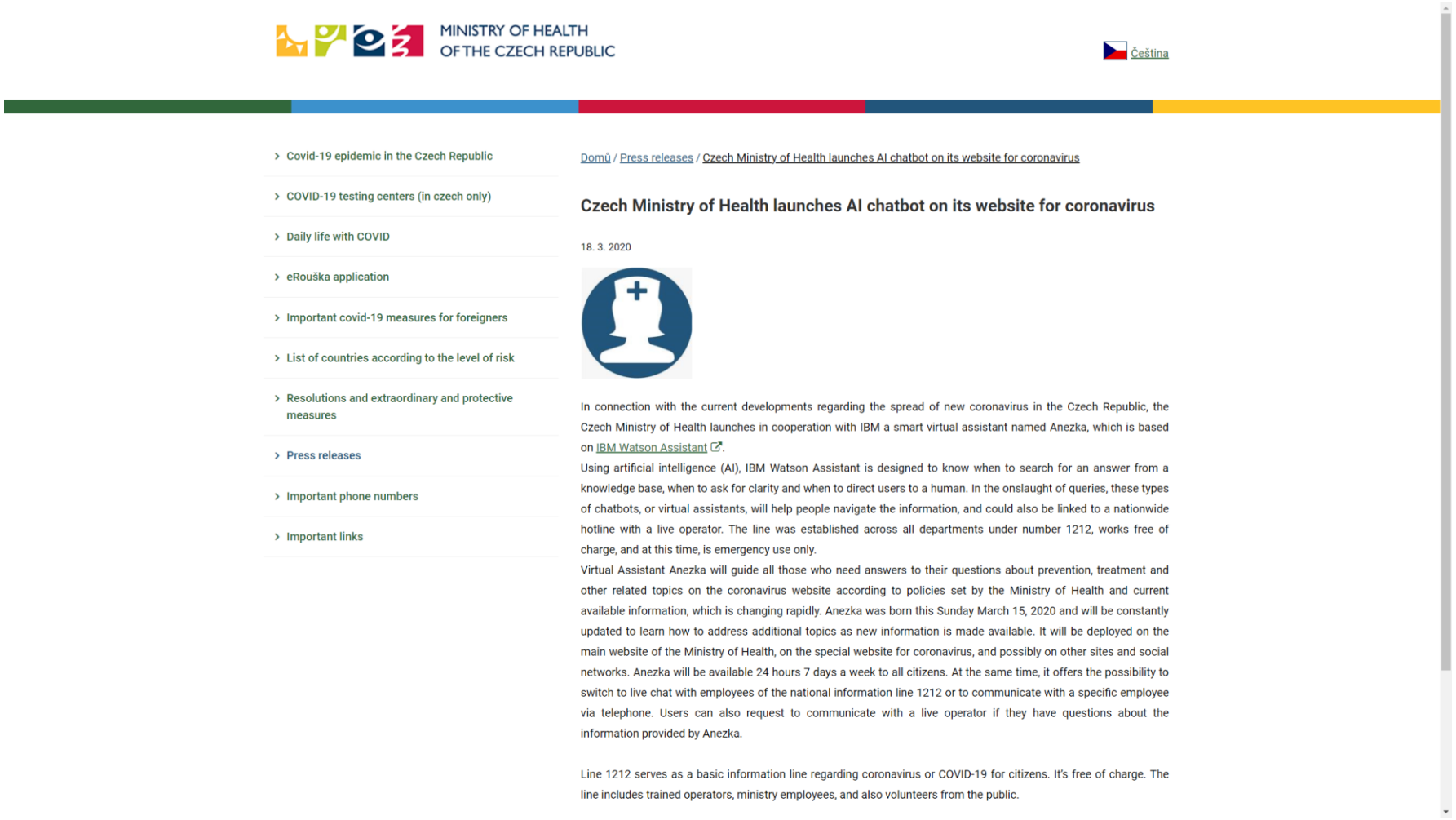
Bots on Czech Market

- Vodafone CZ – Tobi
- Česká Spořitelna – George
- AirBank – Aneta

Past

- *Ministerstvo zdravotnictví, ČR – covid-bot Anežka*
- *ING – bot on mobile app*

Virtual Assistant Anežka (Mar-Dec 2020)



MINISTRY OF HEALTH
OF THE CZECH REPUBLIC

Čeština

- Covid-19 epidemic in the Czech Republic
- COVID-19 testing centers (in czech only)
- Daily life with COVID
- eRouška application
- Important covid-19 measures for foreigners
- List of countries according to the level of risk
- Resolutions and extraordinary and protective measures
- Press releases
- Important phone numbers
- Important links

Domů / Press releases / Czech Ministry of Health launches AI chatbot on its website for coronavirus

Czech Ministry of Health launches AI chatbot on its website for coronavirus

18. 3. 2020

In connection with the current developments regarding the spread of new coronavirus in the Czech Republic, the Czech Ministry of Health launches in cooperation with IBM a smart virtual assistant named Anezka, which is based on IBM Watson Assistant.

Using artificial intelligence (AI), IBM Watson Assistant is designed to know when to search for an answer from a knowledge base, when to ask for clarity and when to direct users to a human. In the onslaught of queries, these types of chatbots, or virtual assistants, will help people navigate the information, and could also be linked to a nationwide hotline with a live operator. The line was established across all departments under number 1212, works free of charge, and at this time, is emergency use only.

Virtual Assistant Anezka will guide all those who need answers to their questions about prevention, treatment and other related topics on the coronavirus website according to policies set by the Ministry of Health and current available information, which is changing rapidly. Anezka was born this Sunday March 15, 2020 and will be constantly updated to learn how to address additional topics as new information is made available. It will be deployed on the main website of the Ministry of Health, on the special website for coronavirus, and possibly on other sites and social networks. Anezka will be available 24 hours 7 days a week to all citizens. At the same time, it offers the possibility to switch to live chat with employees of the national information line 1212 or to communicate with a specific employee via telephone. Users can also request to communicate with a live operator if they have questions about the information provided by Anezka.

Line 1212 serves as a basic information line regarding coronavirus or COVID-19 for citizens. It's free of charge. The line includes trained operators, ministry employees, and also volunteers from the public.

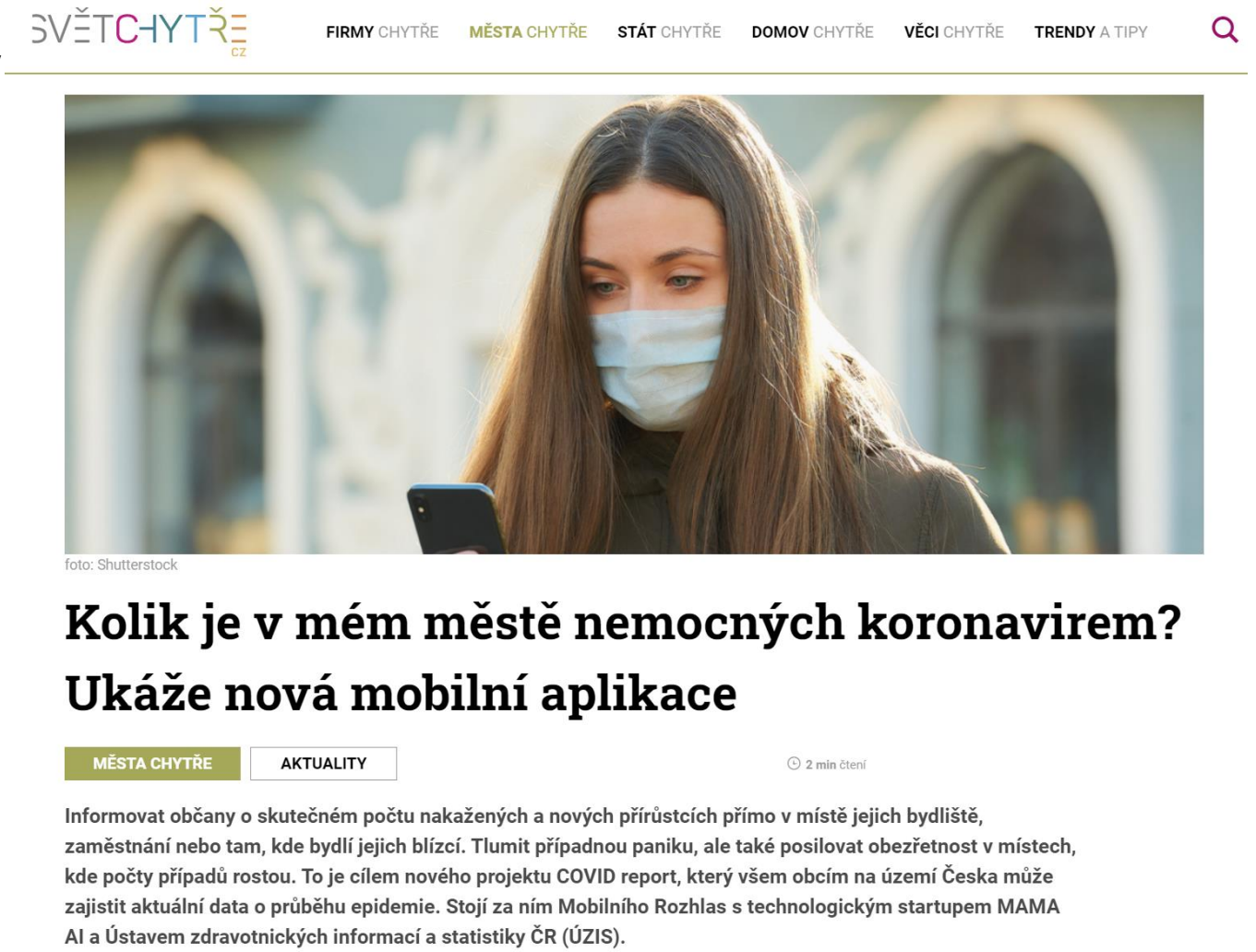
Covid reports for Municipalities via Mobilní Rozhlas

Detailed Covid reports generated by MAMA AI every morning for all 6500 municipalities (for free)

Article in SvětChytře

Czech TV News Report:
https://ct24.ceskatelevize.cz/3289705-mobilni-rozhlas-spustil-aplikaci-ktera-nabizi-presnejsi-data-o-pandemii-je-zdarma

Reports generated for Prague and Turnov:
https://praha7.mobilnirozhlas.cz/covid-report
https://turnov.mobilnirozhlas.cz/covid-report



SVĚTCHYTŘE.cz FIRMY CHYTŘE MĚSTA CHYTŘE STÁT CHYTŘE DOMOV CHYTŘE VĚCI CHYTŘE TRENDY A TIPY

foto: Shutterstock

Kolik je v mém městě nemocných koronavirem? Ukáže nová mobilní aplikace

MĚSTA CHYTŘE AKTUALITY 2 min čtení

Informovat občany o skutečném počtu nakažených a nových přírůstcích přímo v místě jejich bydliště, zaměstnání nebo tam, kde bydlí jejich blízcí. Tlumit případnou paniku, ale také posilovat obezřetnost v místech, kde počty případů rostou. To je cílem nového projektu COVID report, který všem obcím na území Česka může zajistit aktuální data o průběhu epidemie. Stojí za ním Mobilního Rozhlas s technologickým startupem MAMA AI a Ústavem zdravotnických informací a statistiky ČR (ÚZIS).