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# Tutorial: Integrating AI4Media modules into AI4EU Experiments

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AI4Media Workshop on the European AI-on-Demand Platform

11 November 2021

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# Goal of this tutorial

- Enabling the participants of this workshop to **integrate their own modules into AI4EU Experiments**
- With a focus on the implementation rather than the deployment

```
public NewsCategory classify(final String newsText) {  
    final int categoryCode = determineCategoryCode(newsText);  
    final String categoryText = getCategoryTextFor(categoryCode);  
  
    return new NewsCategory(categoryCode, categoryText);  
}
```



## Marketplace



NewsClassifier

Martin Welss | 07/05/2021 | **New**

# Overview of the integration process

## 1. Defining the modules

## 2. Publication in the AI Catalogue

- Registration
- Required and recommended fields
- Process for uploading

## 3. Integration into AI4EU Experiments

- Resources and documentation
- Registration
- Defining the protobuf signature
- Implementing the API
- Upload to the marketplace

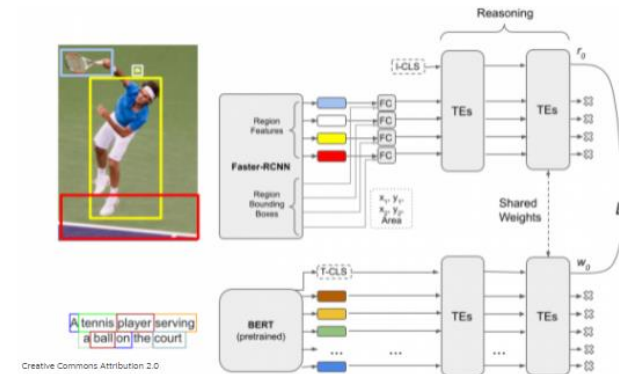
## 4. Presentation at the AI4EU Web Café

### Text-to-Visual Search Engine

A Text-to-Visual Search Engine which enables to search images given natural language sentences as a query

Docker container

<https://github.com/mesnico/TERN>

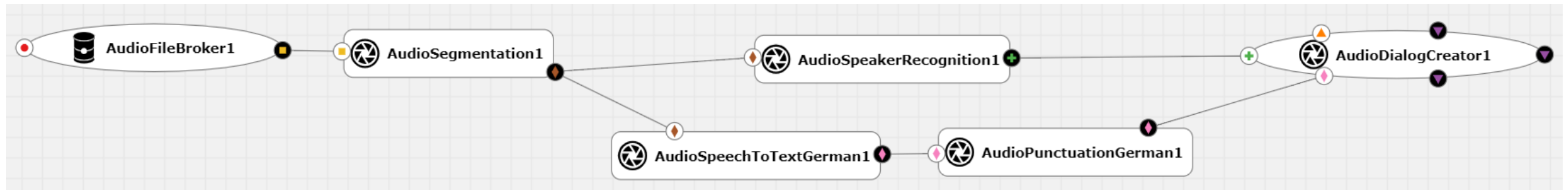


Text2ImageSearch

Nicola Messina | 05/26/2021 | New

# Defining the modules

- Modules (or “models”) are the building blocks for the AI pipelines.
- The main criterion is **reusability**.
- Separate the modules!
- Define input and output!



If you fail at this step, you will run into problems at the next steps!

# Publication in the AI Catalogue

## Registration

- Go to <https://www.ai4europe.eu/>
- Go to login, choose EU Login
  
- The EU Login to the AI-on-demand platform will be functional soon!
- The beta testing phase will be announced to members of AI4Media and other ICT-48/49 projects.
- After the beta testing phase, access will be public.

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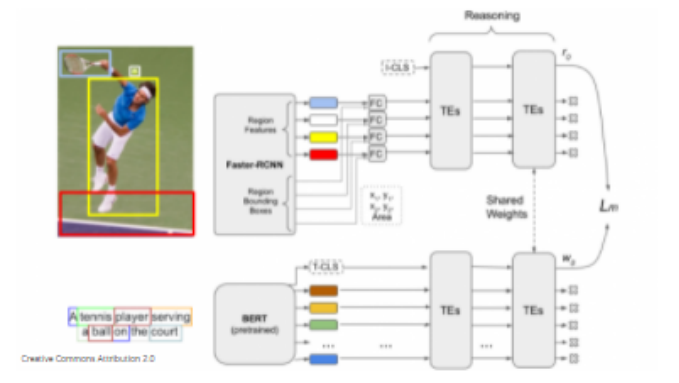
E-mail language

English (en)

By checking this box, you acknowledge that you have read and understood the [privacy statement](#)

Create an account

Cancel



**Developed by**  
National Research Council

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Apache License 2.0 (Apache-2.0)

## Main Characteristic

The *Text-to-Visual Search Engine* takes a sentence as input and returns the images that are most inherent to it, accessing an available image database. It internally uses a multi-modal deep neural network for creating multi-modal descriptors, and a similarity search engine for efficiently computing similarities among them. The pipeline first computes visual descriptors from an existing database of images (offline indexing phase). Then, during the search phase, a sentence is used to search the multi-modal index for related images.

## Research areas

Physical AI

## Technical Categories

Computer vision Machine learning  
Natural language processing

## Keywords

#Cross-modal searching #Deep Learning  
#Transformer-encoder #BERT

## Last updated

02.06.2021 - 21:11

## Detailed Description

### Additional information:

- Instructions on how to setup, train and evaluate the model can be found in the GitHub repository: [URL](#).
- A new version of the model is published as an Acumos component in the AI4EU Experiments marketplace: [URL](#).

### References:

- If you found this code useful, please cite the following paper:  
• Messina N, Falchi F, Esuli A, Amato G. Transformer reasoning network for image-text matching and retrieval. In: 2020 25th International Conference on Pattern Recognition (ICPR) 2021 Jan 10 (pp. 5222-5229). <https://arxiv.org/abs/2004.09144>

# Publication in the AI Catalogue

## Required and recommended fields

### Required:

- Title
- Summary
- Main characteristics

### To be considered carefully:

- Image
- License
- Website
- GDPR requirements
- Relation to Trustworthy AI

# Publication in the AI Catalogue

## Process for uploading

- The uploading process is straightforward.
- The image should have a ratio of 16:9.
- Assets can be saved as drafts and be changed later on.
- Good examples are:
  - [AI for Visual Vehicles Counting](#)
  - [Text-to-Visual Search Engine](#)
  - [LioNets](#)
- Respect the copyright of everything you upload!
- Do not forget to link your asset to AI4Media!

### Create AI Assets

[Home](#) » » [Add content](#)

Title \*

Summary \*

Main Characteristic \*

**B** *I* U ~~S~~ <sup>x²</sup> <sub>x₂</sub> *I<sub>x</sub>* | | | | Styles ▾ |  
 | Format ▾ | Source

Text format Basic HTML ▾

[About text formats](#) ?

Asset Type

- None - ▾

# Integration into AI4EU Experiments

## Resources and documentation

- Homepage: <https://aiexp.ai4europe.eu/>
- Acumos Wiki: <https://wiki.acumos.org/>
- Examples and container specification: <https://github.com/ai4eu/tutorials>
- [AI4EU Experiments playlist](#) in the [AI4EU Youtube Channel](#)
- Protocol Buffers: <https://developers.google.com/protocol-buffers>
- gRPC: <https://grpc.io/>
- Direct support: [ai4eu-experiments-support@iais.fraunhofer.de](mailto:ai4eu-experiments-support@iais.fraunhofer.de)





# Integration into AI4EU Experiments

## Registration


- For now, an **extra account** is needed for AI4EU Experiments.
- Martin is working on the integration of the **EU Login** into the AI4EU Experiments homepage.

Sign up to continue ×


First Name \*  Last Name \*

User Name \*


Email ID \*


Password \*  


Your password must contain at least eight characters, which should have at least one upper case and one lower case letter, numbers and symbols like, ! # @ \$ \* &.


Confirm Password \*  

Already have an AI4EU Experiments ID? [Sign In](#)

 Sign In with Github

 Sign In with Facebook

 Sign In with Google

 Sign In with LinkedIn

or By signing up, you agree to our [Terms and Conditions and Privacy Policy](#).

# Integration into AI4EU Experiments

## Example: Keyword counting

As a toy example, we want to integrate the following functionality into AI4EU Experiments:

```
public int countOccurrences(final String document, final String keyword) {  
    return StringUtils.countMatches(document, keyword);  
}
```

# Integration into AI4EU Experiments

## Defining the protobuf signature

```
syntax = "proto3";

message KeywordCountingRequest {
  string document = 1;
  string keyword = 2;
}

message KeywordCountingResult {
  int32 numberOfOccurrences = 1;
}

service KeywordCounter {
  rpc count(KeywordCountingRequest) returns (KeywordCountingResult);
}
```

- Save as src/main/proto/keyword\_counter.proto.
- Generate classes using protoc, see [gRPC Documentation](#).
- Works similarly for other languages such as Python, Go, C++, Ruby and many more.

# Integration into AI4EU Experiments

## Implementing the API

```
public class KeywordCounter extends KeywordCounterGrpc.KeywordCounterImplBase {  
  
    @Override  
    public void count(final KeywordCountingRequest request,  
        final StreamObserver<KeywordCountingResult> responseObserver) {  
        final int numberOfOccurrences = countOccurrences(request.getDocument(), request.getKeyword());  
  
        final KeywordCountingResult result = KeywordCountingResult.newBuilder()  
            .setNumberOfOccurrences(numberOfOccurrences).build();  
  
        responseObserver.onNext(result);  
        responseObserver.onCompleted();  
    }  
}
```

# Integration into AI4EU Experiments

## Upload to marketplace

### ON-BOARD DOCKERIZED MODEL URI

Model Name \*

Host \*

Port

Set values for Docker Hub

Image \*

Tag

Upload Protobuf File \*

Supported files type: .proto

Add License Profile

On-Board Model

Reset Form

- Dockerize your model following the [container specification](#)
- Fill in the form available at “On-boarding model”
- Access the uploaded model in the section “My models”
- Publish the model to the marketplace

# Integration into AI4EU Experiments

## Designing and deploying pipelines

- Go to “Design Studio” > “Acu-Compose”
- Drag your modules to the canvas
- Connect input and output ports
- Choose “Deploy”

The screenshot displays the Acu-Compose interface within the Design Studio. The left sidebar contains navigation options: HOME, MARKETPLACE, MY MODELS, ON-BOARDING MODEL, DESIGN STUDIO BETA, Q AND A, and ML LEARNING PATH. The main workspace is titled 'Sudoku Tutorial' and features a 'New' button and a toolbar with 'Probe', 'Clear', 'Validate', 'Save', and 'Deploy' options. The interface is divided into three main sections: 'Marketplace', 'Data Transform Tools', and 'Data Sources'. The 'Marketplace' section lists 'Sudoku Tutorial (2)', 'Sudoku Tutorial (1)', and 'Sudoku-Tutorial-Stream (1)'. The 'Data Transform Tools' section lists various tools like 'ai4eu-icd-10 (1.0.0)', 'ai4industry-gui (1.0.0)', 'ai4industry-planner (1.0.0)', and 'ai4industry-skillmatcher-dummy (1.0.0)'. The 'Data Sources' section lists tools like 'AudioFileBroker (1.0.0)', 'edm-env (1.0.1)', 'edm-env (1.0.3)', 'edm-env (1.0.0)', 'edm-env (1.0.2)', 'grpc\_hydro\_hubeau (1.0.3)', and 'grpc\_piezo\_hubeau (1.0.0)'. The central canvas shows a pipeline diagram with three modules: 'sudoku-tutorial-gui1' at the top, 'sudoku-tutorial-design-evaluator1' in the middle, and 'aspsolver-clingo-oneshot1' at the bottom. The modules are connected by lines representing data flow, with colored ports (blue, yellow, red, green) indicating input and output connections. The bottom right corner of the interface indicates 'Composition Engine 3.0.12'.

# AI4EU Web Café

## Presenting your module

- Community building using the AI-on-demand platform
- Offering a series of live web sessions on AI
  - Insights into the international AI scene
  - Sharing knowledge and experiences
  - Meeting stakeholders from various areas of AI research and application
- Recordings of past web cafés available on GoToStage
- Resources:
  - [www.ai4europe.eu/news-and-events/events/webcafes](http://www.ai4europe.eu/news-and-events/events/webcafes)
  - [www.gotostage.com/channel/ai4eucafe](http://www.gotostage.com/channel/ai4eucafe)
  - [carmen@grassroots-arts.eu](mailto:carmen@grassroots-arts.eu)



Welcome to the public AI4Media@AI4EU Café on May 25th, at 3 pm (CET)



The Speaker is:

Nicu Sebe (Professor in the University of Trento, Italy)

with his talk on:  
" Image and Video Generation: A deep Learning Approach"



*The Moderator & Café Manager is Carmen Mac Williams (Grassroots Arts),  
Contact: [carmen@grassroots-arts.eu](mailto:carmen@grassroots-arts.eu)*

Please take notice that this session will be recorded.  
The link for the recording you may find on the AI4EU youtube and gotostage channel, if the Speaker gives the permission afterwards.  
No confidential information shall be shared in this Café session.  
All Speakers express their personal views and opinions, this is not the official AI4EU project opinion.

# Integrating AI4Media modules into AI4EU Experiments

## Summary

1. Defining the modules
2. Publication in the AI Catalogue
3. Integration into AI4EU Experiments
4. Presentation at the AI4EU Web Café





# Integrating AI4Media modules into AI4EU Experiments

## Views on AI4EU Experiments

- **“Integrating my module into AI4EU Experiments means to implement yet another API.”**  
There is no fixed API to be implemented. You actually expose the existing API of your module to this platform via gRPC.
- **“Integration into AI4EU Experiments is a lot of work.”**  
The integration is pretty easy. If your module is well prepared, it will take less than one day.

# Integrating AI4Media modules into AI4EU Experiments

## Outlook for AI4Media partners

- **There will soon be a playground available where you can deploy your pipelines for testing.**
  - The playground will use the EU login.
  - The plan is to open the playground in March 2022.
  
- **Please go ahead:**
  - Get a EU login
  - Publish your assets in the AI Catalogue
  - Design AI pipelines and integrate the relevant modules into AI4EU Experiments
  
- **How can we further support you with this?**

