**APPLICATION FORM**

I.Project identification ( short summary, max.1200 ch.) (LP)

II. Partnership (LP/PP)

II.1. General information

II.1.2 RO (XLS)

II.2. Associated partner (NO)

II.3. Quality of partnership (joint development, joint implementation, joint staffing, joint financing, max.500 ch. per each) project management experience max.1700 ch., description of the project team max.1800 ch.)

RO (add/modify sections) (Word)

II.3.1.1. Joint development:

The proposed recommendation system can be realized through joining the components developed by the partners through common interfaces and database solutions. Thus, the co-operation during development is by no means is a key for the successive operation of the system. To assure safe development several personal meetings, but also voice/video conferences will be organized at both of the partners. Moreover, for the safest clarification of software development issues, remote desktop solutions will be also considered.

II.3.1.2 Joint implementation:

The client part of the proposed system is planned to be implemented on a mobile device, while the server part in an application server. For a seamless operation, the components should be implemented as a joint work using the same platforms. For testing and development purposes, the system will be available for both the partners during the development phase, and the partners will be able to test/evaluate/validate the work of each other.

II.3.1.3 Joint staffing:

For flexible and transparent management, the Hungarian (leader) partner provides a project manager and a financial assistant, while the Romanian partner a project assistant to work in a strong cooperation. The project management staff will schedule, organize, supervise all administrative and implementation specific activities. The two teams are balanced with an equal distribution of the tasks between them. Both teams have the necessary human resources to fulfill the desired tasks. The R&D activities are equally shared with assuming a strong cooperation among the team members.

II.3.1.4 Joint financing:

To reflect the equal distribution of the project tasks, the joint budget is divided among the partners also in a balanced way. For both partners, the budget covers the own administrative, management and core activities. Participating experts will be paid on both sides of the border. The budget also covers the dissemination expenses (jointly organized workshop, press releases, conference participations).

II.3.2. Project management experience:

The staff of University of Debrecen participated in the projects SHARE - Mobile Support for Rescue Forces, Integrating Multiple Modes of Interaction (EU FP6-004218, 2860 kEUR), Multi-modal Human-Computer Interaction (EU FP5-HPRN-CT-2000-00111, 1500kEUR), DRSCREEN - Developing a computer based image processing system for diabetic retinopathy screening (NTP TECH08-A2, 320000 kHUF), HuComTech - Human-computer Interaction Technologies (TAMOP – 4.2.2-08/1-2008-0009, 332000 kHUF), Kelet-magyarországi informatika tananyag tárház (TÁMOP 4.1.2-08/1/A, 76000 kHUF), MEDIP - platform independent software system for medical applications (IKTA-6/2001, 52000 kHUF), and several OTKA/TeT projects.

II.3.3. Project team:

The team provided by the Hungarian partner consists of both experienced and young researchers being familiar with the corresponding state-of-the-art methods and also making research in the targeted fields. The HU team members are highly experienced with image processing solutions also on mobile devices, and has a solid background in database and data mining applications mainly for image retrieval purposes. The RO partner provides a solid engineering background for software development, mobile devices, database management, and data mining. Team members have been successfully participated in similar projects like multi modal communication systems for rescue forces, systems integrating human-machine interaction, image database retrieval and mobile applications. As innovation, the project also considers the integration of ensemble-based systems both in the recommendation system and several image processing components. The transfer of the models from the theoretical domain to these application fields will be provided by some team members, who are already familiar with the necessary know-how from other former application fields.

Andras Hajdu (associated professor, vice dean of Faculty of Informatics, University of Debrecen) is the project manager and responsible for all project activities and also participates in the image processing and data mining components. Arnold Pintér (official project account manager at the University of Debrecen) is a financial assistant. The internal experts from the University of Debrecen are Gyorgy Terdik (data mining), Attila Fazekas, Gyorgy Kovacs, Balint Antal, Kornel Bertok (image processing, database retrieval and mining), Lajos Hajdu, Henrietta Toman (ensemble-based systems).

III.Description (LP/PP)

III.1. Justification of the project (problems and challenges max.2000ch., added value of the projectmax.1000ch., contribution of the project to the EU, national, regional and local strategies max.1200ch., contribution of the project t the programme objectives max.1000ch., synergy max.2000ch.)

RO (please try to give input for the components, regarding the above requirements)(Word)

Image processing components:

Age/gender/mood detection based on face

Determining a person’s age, gender and mood will go a long way in monitoring of user activities and making marketing efforts. These features allow us to react differently with a person, based on the information extracted visually from his or her face. For these and some other reasons, the computer-based facial analysis is becoming widespread, covering applications such as a visual-based recommendation system.

Our system is consists of the following steps: first a picture of the user is taken by a mobile phone, and then it is forwarded to the server, where the age, gender and mood are extracted from the user’s face. Finally from these features a proposal is made by the system. (Kornél Bertók, HU)

Augmented reality (looking for a building), (the user looks for a building, information is retrieved from the database based on which the building is highlighted on the camera image),

The application of the Scale Invariant Feature Transform (SIFT) is a well known technique for the recognition of buildings on images, based on a database of buildings. SIFT provides a set of translation, rotation and scale invariant descriptors of keypoints, which can be used efficiently to compare structures with specific (mainly rectangular) texture. Another similar approach is the use of Speeded Up Feature Transform (SURF) which is based on Haar wavelets approximated from integral images, therefore it is much faster than SIFT. Beside working out a framework for the identification of buildings on photos taken by a cellphone, there are several ways in which the SIFT or SURF can be extended: interesting and valuable work could be done by examining the performance of the SIFT and SURF descriptors when the histogram of gradient directions (SIFT) or Haar wavelet responses (SURF) is computed in hexagonal windows instead of square ones, since the optimal sampling grid of the 2D space is closer to the hexagonal grid than to the square grid. (György Kovács, HU),

Data mining, recommendation system:

A recommendation for the user is consists of the following steps: first, an image of the user is taken with the camera of a mobile phone. The uploaded picture is analysed, and the extracted information (age/gender/mood) is forwarded to a recommendation engine. This software recommends programmes / sights / … to the user based on the input data and the historical information. Each recommendations are rated by the user. To recommend such information to a user, a technique called collaborative filtering is used.

Travel information retrieval from internet sites:

…sites are integrated to give information about a selected POI (RO).

GUI development for mobile platform:

RO

Communication interfaces:

RO

Composing the database:

Joint for the content, database scheme HU. The content of the database should be defined for the proposal (touristical sights, hotels, cultural programs, educational institutes, …)

Server application:

Engine that controls image processing and data mining algorithms, and communicates with mobile devices (Joint, HURO)

III.2. Objectives (objectives and indicators)

III.3. Target groups (direct beneficiaries max. 1200ch, indirect beneficiaries max.1000 ch., added value for the target groups max1000 ch.)

RO (please try to give input for the components, regarding the above requirements)(Word)

HU (working on it)

IV. Activities

IV.1. Project activities

IV.2. Risk management

IV.3. Timeframe

V. Cross-border character

V.1. Cross-border character and impact (max.1500 ch.)

Recommendations for the opposite border can be taken by the recommendation engine.

V.2. The innovative aspects of the project (max.1000ch)

Bertók Kornél

Multiple algorithms for recommendations are used.

We filter each face image using a one-class classifier, which is an effective technique to detect outlier images when only characteristic class (images containg faces) is available.

For face segmentation, multiple segmentation algorithms combined with different preprocessing methods are used, while the different regression (age estimation) and classification task (gender, mood recognition).

V.3. Multiplying effects (max.1000 ch)

V.4. The operational, financial and institutional sustainability of the project (1700 max)

V.5. The mid- and long term impact of the project (max.1200 ch)

VI. Horizontal Issues

VII. Co-financing (detailed budget, partner budget, other sources, budget lines-period)

VIII. Declaration