*Editorial Note prepared by the International Bureau*

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**The study of the search and comparison of 3D models and 3D images**

We are delighted to present you with an initial overview addressing the key challenges in the 3D model search.

1. **Search methods. Common information**

The three-dimensional object search is most commonly carried out by metadata or object descriptions. This approach is technically simple to implement, at the same time, the efficiency of searching for similar objects may decrease as the number of objects increases since the conceptual description of the objects does not always correlate with the visual similarity. This method also involves manual input of object descriptions, which would not allow the complete automatization of the process.

The use of computer vision technology to determine the relationship between the visual similarity of an object and its 3D geometrical representation, as well as to compare 3D objects with each other, seems more promising, especially when searching in large amounts of data.

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*To be added*

1. **Criteria for the search quality**

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*To be added*

1. **3D models pre-procession**

It is important to define the similarity criteria for 3D model search. Existing 3D models should be pre-processed to enable neural network training. This may be done either through pre-categorizing objects in the same category using natural language or through using other mathematical techniques for object pre-processing, including feature vectors (descriptors).

3D models may be specific to each object for IPR protection (e.g. three-dimensional trademarks, industrial designs, utility models and inventions).

Currently, even the IP Offices, that accept the applications comprising 3D models, do not possess sufficient IP data to train the neural networks.

We propose to create test and training data sets of 3D models based on any freely available objects selected according to certain criteria, bearing in mind existing 2D images of IPR objects, as well as examiners` and other IP specialists` opinions. In addition, we propose the IP Offices to exchange 3D model data. Content of such test data sets may differ significantly for various IPR objects.

*…*

*To be added*

1. **Mathematical methods** **for 3D models Search**

We suggest using a combined approach to implement search algorithms identifying similarities between 3D objects, i.e. combining the use of mathematical methods (e.g. feature vectors) with already existing IP classification systems (e.g. Vienna Classification, CPC, etc.).

Furthermore, we propose not to consider the creation of a universal algorithm for all IPR objects, but to focus on features of the visual representation of each IPR type. For the next TF meeting, we are also planning to prepare a more detailed analysis related to the use of some algorithms.

The above-mentioned issue requires a more detailed analysis. We propose to analyze existing methods used in search engines for 3D object repositories and to identify the current best practices, as well as to analyze the applicability of such methods to 3D model sets considered as visual representations of objects for IPR protection.

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*To be added (comparison of different mathematical methods of search)*

1. **AI methods for 3D models Search**

We believe it is necessary to envisage additional training of applied neural networks used in information systems, therefore the examiners` decision on similarities of various objects obtained during the examination process should be stored and processed. Accumulation of such data could significantly improve the search quality in the information systems.

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*To be added (comparison of different AI methods of search)*

1. **Comparison between 3D models and 2D images of IP objects**

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*To be added*

1. **Conclusion**

*…*

*To be added*

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