

March 6, 2020

Richard E. Ashooh  
Assistant Secretary for Export Administration  
Bureau of Industry and Security  
Department of Commerce

Subject: BIS-2019-0031

Thank you for the opportunity to comment on the addition of software specially designed to automate the analysis of geospatial imagery to the Export Control Classification Number (ECCN) 0Y521 Series.

SPIE, the international society for optics and photonics, represents over 20,000 scientists and engineers and 650 companies that produce optic and photonic products. After reviewing this interim final rule on artificial intelligence software, we would suggest the following considerations as the U.S. Commerce Department considers more permanent regulations on this technology and a proposal for Wassenaar consideration.

Several key terms in the temporary Y521 control lack definition, including “geospatial imagery”, “deep convolutional neural network”, “rotational normalization”, and “rotational pattern.” This could lead to unintentional confusion or overcontrol based on broad interpretation. Unintentional confusion would increase burden on Commerce as industry submits CCATS to help clarify their software classifications. As currently written, the rule is open to a broad interpretation that could capture certain neural network software used in ground-based mapping, vehicle localization (determining position and pose/orientation) and object recognition.

The lack of a formal definition of a “deep convolutional neural network” (“DCNN”), including minimum number of layers required to be “deep”, may hamper industry efforts to self-classify software and may result in a substantial burden for Commerce in reviewing CCATS requests as there is no widely accepted industry criteria for how many layers constitute a “deep” versus multi-layer but relatively shallow neural network.

“Geospatial imagery” could be read broadly to relate to any data associated with a location including ground-based data collected by civil automobiles commonly used for creating three-dimensional road maps and associated point clouds. Some readers may construe the term more narrowly and understand “geospatial imagery” to be limited to only imagery or light detection and ranging (LIDAR) point clouds from a satellite, surveillance aircraft, or drones. Given the national security sensitivity and emergency nature of the control, it seems likely that Commerce intended to restrict aerial geospatial imagery analysis software rather than ground-based geo-imagery analysis software. Adding a technical note excluding software specially designed for analysis of ground-based imagery or defining “geospatial imagery” as “satellite or aerial imagery including pixel level geolocation information” could eliminate this confusion.

Additionally, certain sensors and camera configurations on ground-based mapping and autonomous vehicles rotate to collect a 360-degree view of vehicle's surroundings, which is used to create a point cloud three-dimensional point cloud of the areas surrounding the vehicle. It is not clear whether software that accounts for the rotation of the sensors and cameras in the creation of a point cloud, vehicle localization and object recognition would be captured under paragraphs 2 or 4. If the emergency control is aimed at addressing specific national security risks related to automated aerial or satellite imagery analysis software, adding a technical note excluding ground-based imagery analysis software used to create 3 dimensional point clouds from collected by ground-based vehicles applications equipped with fixed or rotating sensors and imaging equipment would eliminate a potential overcontrol of these items.

Although it appears the control is only intended to capture automated geospatial image analysis software that features a supervised DCNN and learns rotational transformation from positive and negative sample data identified by the user directly in the software's graphical user interface, confusion over the definition and application the terms "rotational normalization" and "rotational pattern" may result in a burden to Commerce from CCATS requests related to specific network architectures like Rotational Equivariant Vector Field Networks (RotEqNet) or Harmonic Networks (H-Nets) that are hard-coded to address rotation transformations and can be used in either supervised or unsupervised neural networks. A RotEqNet architecture network involves encoding rotation equivariance, invariance and covariance to establish predefined behavior with respect to rotation rather than simply training the network using positive and negative samples. Similarly, H-Nets replace regular CNN filters with circular harmonics to help address challenges with rotational object recognition, rather than relying only on positive and negative sample data to train the network to recognize rotational patterns. Definitions and technical notes, or examples and FAQs, would aid industry efforts to self-classify software.

Under § 734.13 EXPORT, export means not only the actual shipment or transmission out of the U.S. but also per 734.13(a)(2) "releasing or otherwise transferring "technology" or source code (but not object code) to a foreign person in the United States (a "deemed export)". Generally people think of deemed export risk only where there is a technology control. Here there is the potential that the regulation could be interpreted to mean that a deemed export of associated source code to non-Canadian foreign nationals within the US would require a deemed export license. It would be helpful if Commerce could specifically address whether a deemed export license is necessary for non-Canadian foreign nationals to access source code related to the OD521 software.

Additionally, there is concern that similar technology already exists outside of Wassenaar member countries. Several Chinese companies presented at the 2019 Computer Vision and Pattern Recognition (full program is attached). Papers titled "Adaptive NMS: Refining Pedestrian Detection in a Crowd" and "Learning RoI Transformer for Oriented Object Detection in Aerial Images" (both attached) seem to indicate advances in China in this technology area. Depending on the interpretation of the control text, autonomous vehicle and maps efforts by AutoNavi, Didi, Baidu and possibly Alibaba already meet or exceed the control threshold.

SPIE understands the potential military utility of artificial intelligence software technology that could be used for military intelligence, such as automated analysis of satellite or aerial imagery to identify specific objects of interest (targets) or assess disaster or conflict zones. We stand ready to serve as a resource as

the U.S. government seeks to balance export control policies that do not put undue burden on U.S. companies or stifle innovation, while still securing sensitive technology.

Thank you again for the opportunity to provide comment and for your consideration.

Sincerely,

A handwritten signature in black ink that reads "Kent Rochford". The letters are cursive and slightly slanted to the right.

Kent Rochford

CEO

SPIE, the international society for  
optics and photonics

The logo for SPIE, consisting of the letters "SPIE" in a bold, black, sans-serif font, followed by a solid red period.