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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte LU YU, CIXUN ZHANG, QICHAO SUN,
and LIANHUAN XIONG

Appeal 2016-000106
Application 12/170,476
Technology Center 2400

Before JEAN R. HOMERE, KARA L. SZPONDOWSKI, and AARON W. MOORE, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants[1] appeal under 35 U.S.C. § 134(a) from a Final Rejection of claims 22–34, which are all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

THE INVENTION

The application is directed to an "interpolating method and a device for interpolating in grade video compression." (Abstract.) Claim 22, reproduced below, is representative:

> 22. A method for performing interpolation in scalable video coding, which is used for interlayer prediction in scalable video coding, the inter-layer prediction comprising performing interpolation filtering processes on luminance components and chrominance components by using independently different interpolation filters with the same pel accuracy,
>
> wherein, in use of an Extended Spatial Scalability (ESS) technology, the interpolation filters comprise:
>
> 4-tap interpolation filters with a 1/16-pel accuracy for the luminance components, and 2-tap interpolation filters with a 1/16-pel accuracy for the chrominance components;
>
> wherein the 2-tap interpolation filters with a 1/16-pel accuracy are in a form of $\{Fo_1, Fo_2\}/[Fo_1 + Fo_2]$, Fo_i being the tap coefficients of the filters, where $i = 1...2$, where Fo_i is the adjustment of Fo_i' according to $Fo_i = Fo_i' \times 2^j$ or $round\ (Fo_i' \times 2^j) \pm 1$, where $i = 1...2$, and j is an arbitrary integer.

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[1] Appellants identify Huawei Technologies Co., Ltd. as the real party in interest. (*See* App. Br. 2.)

THE REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Cismas	US 2004/0190632 A1	Sept. 30, 2004
Sato	US 2004/0213470 A1	Oct. 28, 2004

E. Francois et al., *Generic Extended Spatial Scalability* (Proposal JVT-0041), Joint Video Team of ISO/IEC MPEG & ITU-T VCEG, 13th Meeting: Palma de Mallorca, Spain, October 18–22, 2004 ("Francois")

Sheng Zhong et al., *Improved Sub-Pel Interpolation Filters* (Proposal VCEG-N51), ITU - Telecommunications Standardization Sector, Video Coding Experts Group (VCEG), 14th Meeting: Santa Barbara, CA, USA, September 24–27, 2001 ("Zhong")

THE REJECTIONS

1. Claims 22–25, 27–29, and 31–33 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Francois, Cismas, Zhong, and Sato. (*See* Final Act. 7–10.)

2. Claims 26, 30, and 34 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Francois, Cismas, Zhong, Sato, "and further in view of tools and knowledge available to those skilled in the art." (*See* Final Act. 11–12.)

APPELLANTS' CONTENTIONS

Appellants argue that the rejections are in error for the following reasons:

1. The "combination fails to teach or suggest '4-tap interpolation filters with a 1/16-pel accuracy for the luminance components, and 2-tap

interpolation filters with a 1/16-pel accuracy for the chrominance components,' as recited in claim 22." (*See* App. Br. 5–9.)

2. The Examiner fails to establish a *prima facie* case of obviousness with regard to the specific tap coefficients recited in claims 32, 33, and 34. (*See* App. Br. 10–14.)

ANALYSIS

Claim 22

The Examiner found that although Francois does not teach "4-tap interpolation filters with a 1/16-pel accuracy for the luminance components, and 2-tap interpolation filters with a 1/16-pel accuracy for the chrominance components," such an arrangement would have been obvious in light of the combination of Francois, Cismas, Zhong, and Sato. (*See* Final Act. 7–8.) Specifically, the Examiner found as follows:

> As those references teach in combination, many tap/phase combinations can be applied to pixel interpolation. Given the well-known phenomenon that human visual perception is more sensitive to luminance components than chrominance components, and as Cismas teaches, it is appropriate to apply smaller, simpler tap/phase configurations to chrominance than to luminance. This approach is obvious to one skilled in the art striving to achieve an optimal balance between the best interpolation (best picture) and limited computational resources. In fact, practitioners in the field faced with limited resources often devote a greater percentage of resources to luminance components.

(Final Act. 8.) The Examiner further explained that "Cismas discloses a 6-tap filter for the luminance component and a 2-tap filter for the chrominance components" such that it "teaches independently different interpolation filters as in claim 22" and that "although Cismas does not explicitly teach . . . using the same pel accuracy . . . using the same pel

accuracy is merely an obvious design choice." (Final Act. 3–4.) The Examiner further explained that it would have been obvious to employ the well-known 4:4:4 sampling scheme (i.e., no down-sampling), which would have resulted in the same accuracy for each filter. (*Id.* at 4.)

Appellants argue that "Cismas fails to disclose that the different filters have the same pel accuracy and the pel accuracy is 1/16-pel accuracy." (App. Br. 7.) Appellants further argue that "the Examiner's assertion is untenable, because no convincing evidence was provided by the Examiner to support the assertion that the interpolation pel accuracy relies on the sampling schemes." (App. Br. 7.)

The Examiner acknowledges that "it may seem as though Examiner shifted away from Appellants' claims regarding interpolation filter accuracy, toward an unrelated discussion of chrominance subsampling (sampling ratios)," but notes that "the two concepts are closely intertwined." (Ans. 10.[2]) The Examiner further cites Dang (US 2006/0133506 A1; published June 22, 2006), finding it to suggest that a 4:4:4 sampling ratio would suggest equal interpolation precision. (*Id.* at 11.) Appellants do not respond to that finding.

On this record, we conclude that Appellants have not shown error in the Examiner's analysis. In particular, we agree that it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a sampling ratio that would have resulted in the luminance and

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[2] Certain comments by the Examiner at this point in the Answer and elsewhere in the prosecution stray from the appropriate decorum. The Examiner is reminded to conduct all USPTO business in a professional manner.

chrominance filters having the same accuracy. Appellants argued the Examiner's finding that a known 4:4:4 sampling ratio would have resulted in equal accuracy was not supported by evidence (*see* App. Br. 7), the Examiner provided further support in the Answer (*see* Ans. 11), and Appellants did not reply. We also agree with the Examiner that the degree of accuracy (e.g., 1/16 pel) would have been an obvious matter of design choice, not invention. The Specification does not ascribe any particular significance to that degree of accuracy, and Appellants do not identify any in the briefing.

For these reasons, we sustain the Section 103 rejections of claims 22–24, 27–29, and 31.

Claims 25, 26, 30, 32, 33, and 34

Appellants argue that these claims are non-obvious due to their recitations of specific coefficients. (*See* App. Br. 10–14.) In particular, Appellants argue that "the Examiner erred by using the 'obvious to try rationale,'" because:

> The specific tap coefficients are derived from considerable effort, which requires the inventor to consider many factors that might influence the quality of the filter, for example, the phase, the application scenario, the texture of an image frame in base layer and so on, and to tune the coefficients of each filter scrupulously, and finally a group of candidates of coefficients that were obtained. The candidates of coefficients then went through a series of contesting experiments and finally a best one was identified. All of those experiments surely follow some general principle/guide, such as the Lanczos filter design guide, but guide is not enough to derive such a set of specific tap coefficients without any inventive action, even when considering the teaching of the combination of any of the cited references.

(App. Br. 11.)

With respect to claim 26, the Examiner explained that "fairly straight-forward MATLAB code (or similar mathematical software) can generate such coefficients for the tap/phase combinations listed in the claim" and one of ordinary skill in the art would have been motivated to do that "because such tools are part of the general knowledge available to those skilled in the art and because it is preferable to leave complex, computationally intensive mathematical calculations to computer programs." (Final Act. 11.) The Examiner further cited a reference "disclosing 5-tap, 16 phase filter coefficients generated using a Matlab script." (*Id.*)

We are not persuaded by Appellants' discussion of the "considerable effort" involved in arriving at the claimed coefficients because it is only attorney argument, which may not take the place of evidence. *See, e.g.*, *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984). Instead, we agree that "the prior art teaches the coefficients are balanced or weighted according to position" and that, "[t]herefore, there are only a small handful of possibilities for coefficients to try and the skilled artisan would be able to experiment with this very small number of possibilities to fit the coefficients to desired outcomes." (Ans. 16.) Again, Appellants do not provide evidence sufficient to overcome this finding. We are also unpersuaded by Appellants' argument concerning MATLAB because, as the Examiner explains (*see* Ans. 16–17), it was identified for illustrative purposes only and does not form a basis for the rejection. Appellants do not argue or provide evidence that MATLAB or similar mathematical software was not well known.

We thus agree that, on this record, the selection of the particular coefficients claimed would have been an obvious matter of routine

experimentation and, accordingly, sustain the Section 103 rejections of claims 25, 26, 30, 32, 33, and 34.

DECISION

The rejections of claims 22–34 are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED