ANALYSIS OF THE VQEG BENCHMARK DATA

Correlations between the subjective DMOS values and objective video quality ratings (VQRs) by the ten proponents participating in the VQEG benchmark. The correlations are calculated by a cubic polynomial fitting and limiting the VQRs to the interval over which the fit is monotonic using all data (50/60/low and high quality). All calculations and optimizations were carried out by KPN Research (Beerends) using the SYSTAT STATISTICA software on the data provided by Sarnoff/Tektronix (Lubin).

As a comparison the NIST data are also given. They used a moniticity restriction by only manipulating the regression coefficients.

DATASET (LAB)	p0 = PSNR	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10
50/60/LQ/HQ (KPN)	**0.782**	**0.794**	**0.812**		**0.636**	**0.782**	**0.322**	**0.774**	**0.831**	**0.790**	
50LQ (KPN)	0.770	0.866	0.793		0.577	0.706	0.338	0.789	0.872	0.776	<0.3
50LQ (NIST)		0.869	0.740		0.564	0.704	0.332	0.758	0.869	0.779	<0.3
50HQ (KPN)	0.793	0.672	0.645		0.691	0.657	<0.3	0.717	0.779	0.714	0.300
50HQ (NIST)		0.662	0.641		0.683	0.635	<0.3	0.649	0.775	0.686	<0.3
60LQ (KPN)	0.745	0.872	0.858	0.761	0.681	0.895	0.475	0.735	0.803	0.785	0.336
60LQ (NIST)		0.874	0.830	0.745	0.663	0.877	0.367	0.704	0.798	0.772	0.807
60HQ (KPN)	0.772	0.738	0.729	0.652	0.562	0.754	0.395	0.746	0.597	0.549	<0.3
60HQ (NIST)		0.749	0.734	0.683	0.542	0.761	0.401	0.764	0.615	0.567	0.619

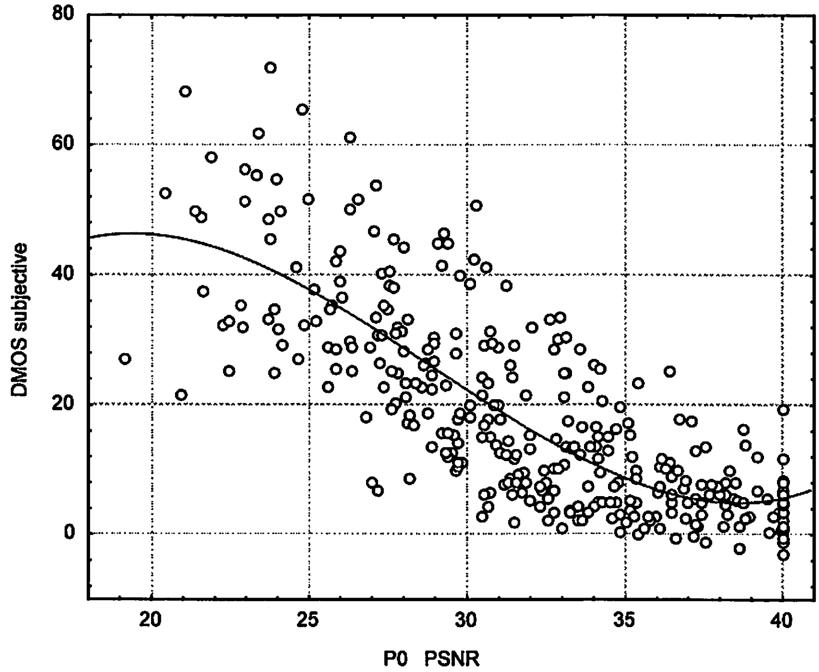
Table 1 overview of all the correlations

Conclusions based on the KPN cubic monotone fit and KPN PSNR calculations.

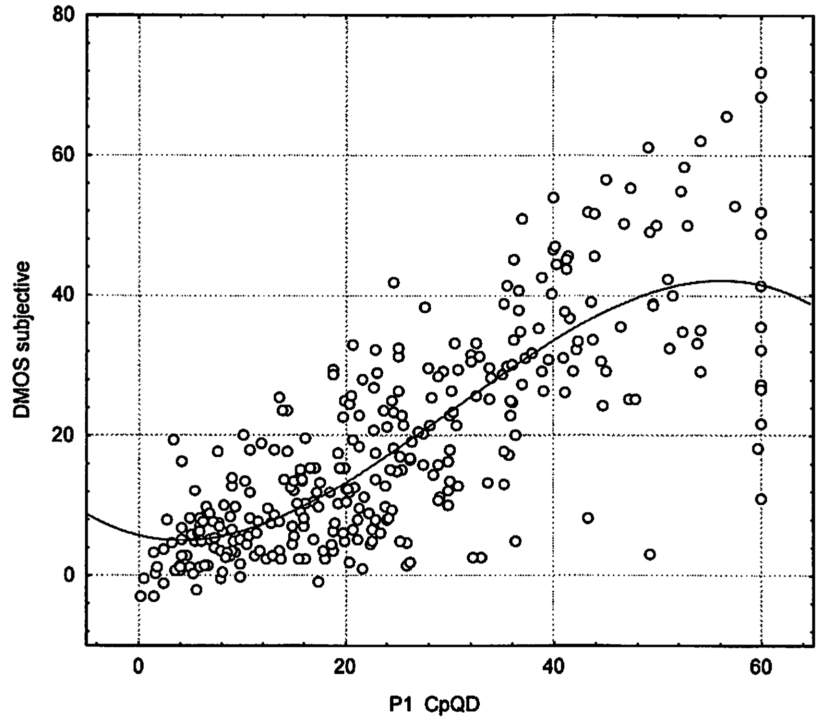
1. **For high quality video the best model is PSNR with a correlation of about 0.78. The next best are P1 and P5 with a correlation of about 0.70.**
2. **For low quality the best model is P1 with a correlation of about 0.87, being significantly better then PSNR (0.76). The next best are P2 and P8 with correlations of about 0.83.**
3. **When averaging over all data (50/60/Low and High Quality) the best overall model is P8 with a correlation of 0.83, being significantly better then PSNR (0.78). The next best is P2 with a correlation of about 0.81.**

4.

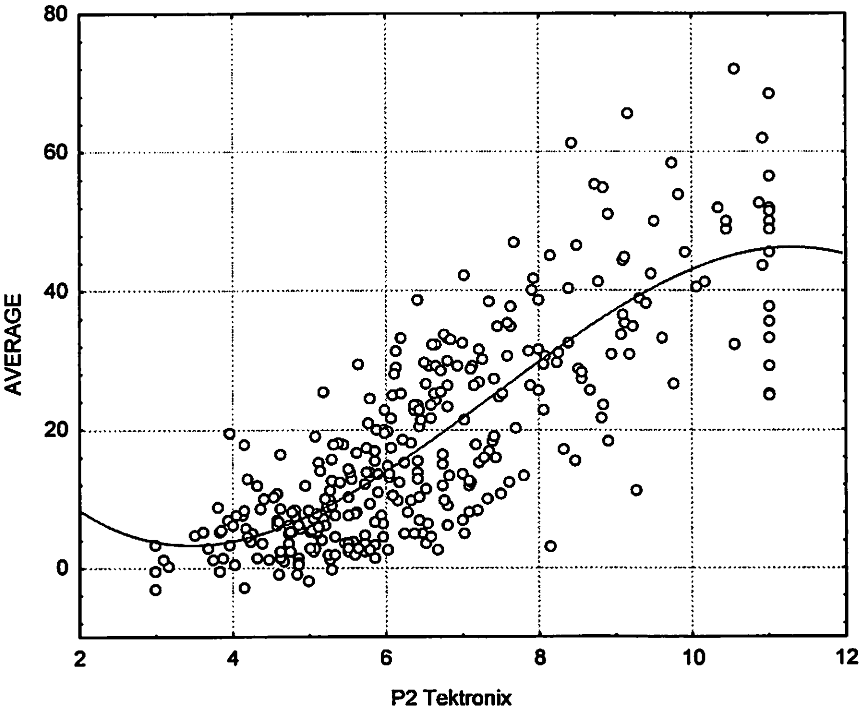
Model: average=a+b*psnr+c*psnr**2+d*psnr**3
y=(-167.0145)+(26.416)*x+(-1.023025)*x**2+(0.0117635)*x**3
r=0.782



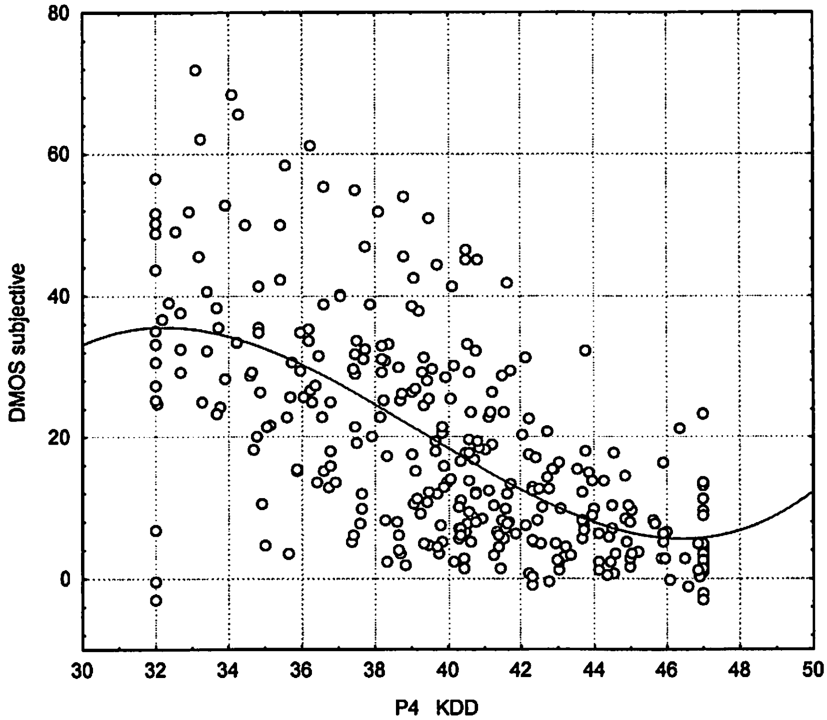
Model: average=a+b*p1+c*p1**2+d*p1**3
y=(5.77642)+(-0.3583593)*x+(0.0472729)*x**2+(-0.0005231)*x**3
r=0.794



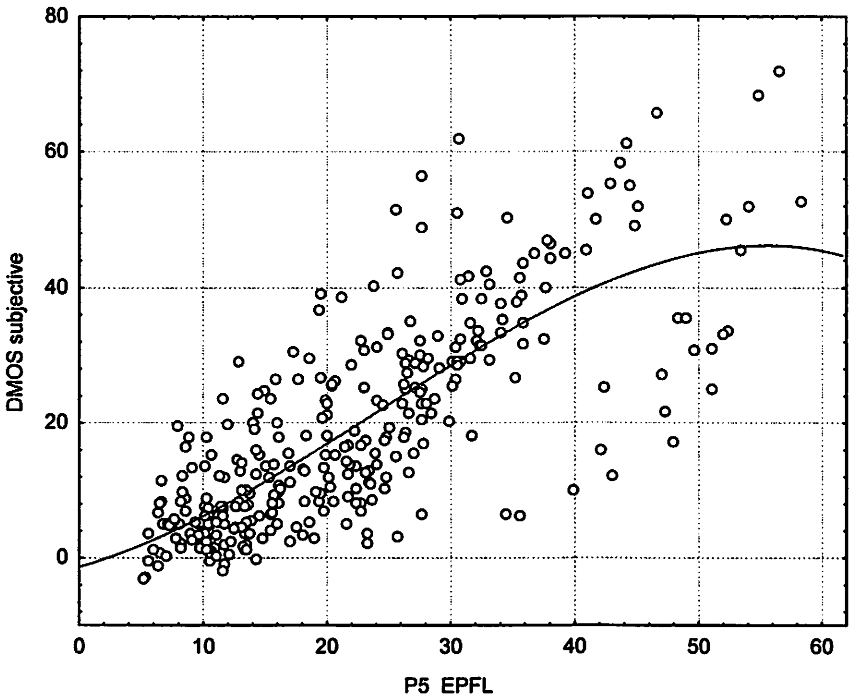
Model: average=a+b*p2+c*p2**2+d*p2**3
y=(35.99174)+(-21.01097)*x+(3.959513)*x**2+(-0.178701)*x**3
r=0.812



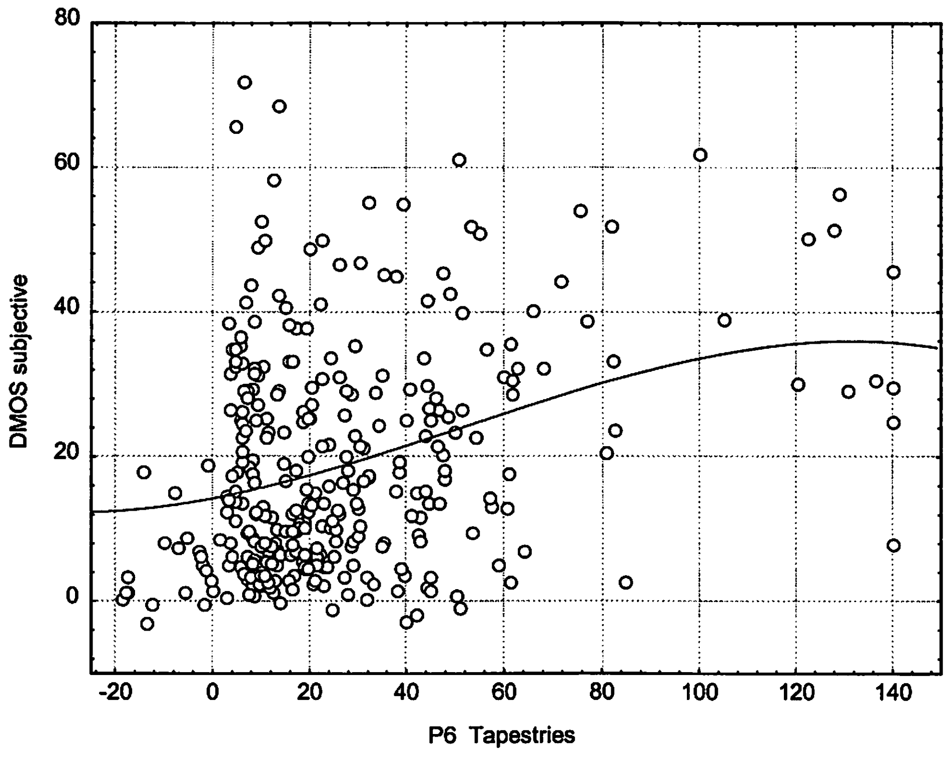
Model: average=a+b*p4+c*p4**2+d*p4**3
y=(-1126.7)+(93.85576)*x+(-2.46734)*x**2+(0.0209164)*x**3
r=0.636



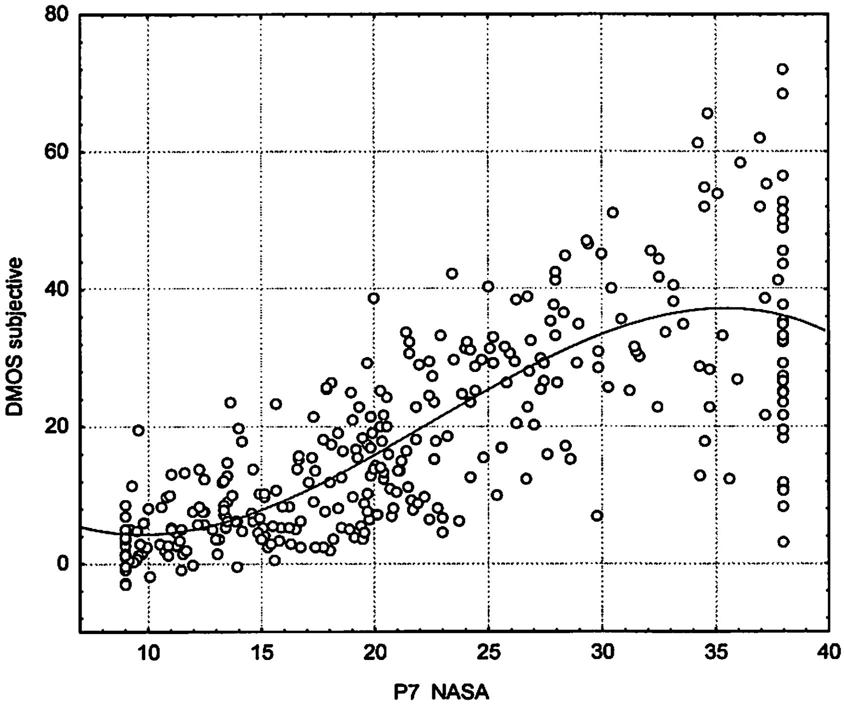
Model: average=a+b*p5+c*p5**2+d*p5**3
y=(-1.324866)+(0.513008)*x+(0.0276514)*x**2+(-0.0003869)*x**3
r=0.782



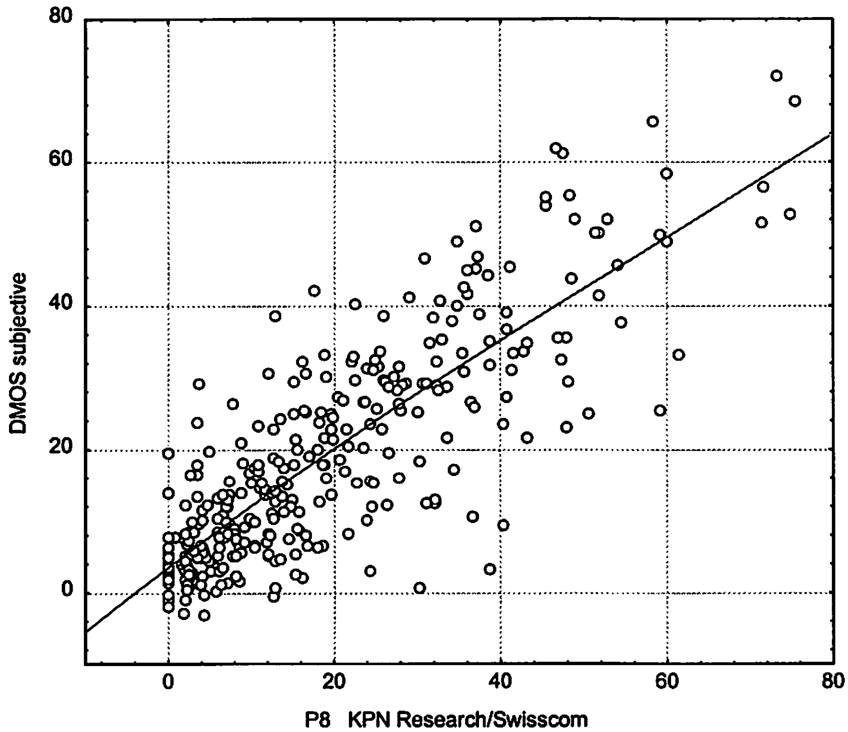
Model: average=a+b*p6+c*p6**2+d*p6**3
y=(14.26673)+(0.1282745)*x+(0.0018055)*x**2+(-0.0000116)*x**3
r=0.322

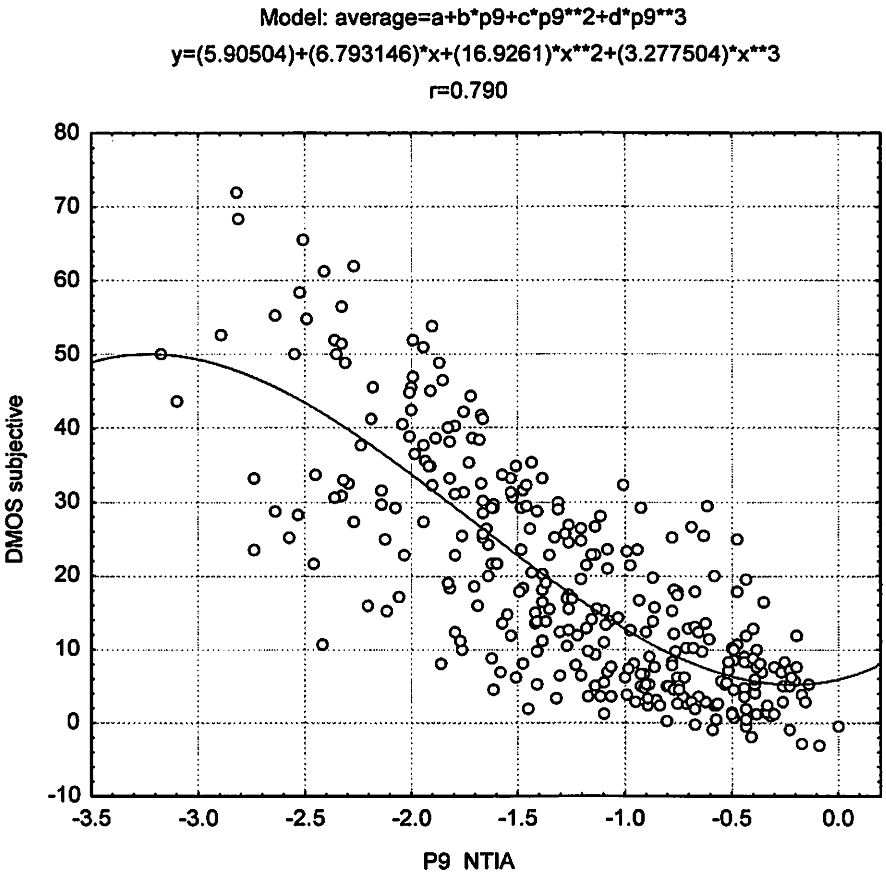


Model: average=a+b*p7+c*p7**2+d*p7**3
y=(22.03276)+(-4.02048)*x+(0.263306)*x**2+(-0.0038875)*x**3
r=0.774



Model: average=a+b*p8+c*p8**2+d*p8**3
y=(3.497263)+(0.876934)*x+(-0.0027447)*x**2+(0.0000153)*x**3
r=0.831




Model: average=a+b*p9+c*p9**2+d*p9**3
y=(5.90504)+(6.793146)*x+(16.9261)*x**2+(3.277504)*x**3
r=0.790
80
70
60
50
40
30
20
10
0
-10
DMOS subjective
-3.5
-3.0
-2.5
-2.0
-1.5
-1.0
-0.5
0.0
P9 NTIA