学术论文写作

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目录

引言

Patience & Passion

科技论文的特点

学术性　创新性
科学性　可重复性
可读性　规范性

选题与创新

- 如何科学选题
  - 关注国际前沿研究动态
    - ✓课题要有可发展性
      - 中国科技大学的范洪义教授，发展了诺贝尔奖得主狄拉克(Dirac)奠定的量子论的符号法，系统地建立了“有序算符内的积分理论”，1998年有24篇论文被SCI收录；他对自己论文高产的解释是，研究“具有开创性，突破一点以后就可以向纵深发展”。
    - ✓善于利用检索工具，有针对的选择高质量文献
      - 关键词检索、检索某学者、参考文献检索
      - 参考文章的被引次数、刊物的影响因子
    - ✓高效阅读文献
      - Abstract – Introduction – Discussion – Result & Method(结合图表)

选题与创新

- 如何获得好的idea　邢波　凌海滨
  - 大量阅读论文，具有一定的基础知识
    - ✓对研究领域有全局了解，善于总结已读文献
  - 分析相关文献，找出其局限性并设法解决问题
    - ✓论文Introduction和Conclusion部分
  - 拓宽视野，利用领域外的学识进行学科交叉
  - 多交流（导师、讲座、网络、同学）
  - 多努力（集中一段时间）

论文结构

科技论文的写作技巧

论文结构

●Example:

Image denoising via sparse and redundant representations over learned dictionaries

作者: Elad, Michael; Aharon, Michal

IEEE TRANSACTIONS ON IMAGE PROCESSING 卷: 15 期: 12 页: 3736-3745 出版年: DEC 2006

被引频次: 2,190

使用次数

➢ Image Denoising Via Sparse and Redundant Representations Over Learned Dictionaries

- ✓ Abstract
- ✓ Introduction
- ✓ Related work
- ✓ Main body
- ✓ Experiment
- ✓ Discussion
- ✓ Conclusion

Title

●Texture recognition using multifractal spectrum

●A projective invariant for textures

Abstract

●写什么？

1. What to do?
2. Why to do?
3. How to do?
4. Results and conclusion?
5. Contribution?

Image Denoising Via Sparse and Redundant Representations Over Learned Dictionaries

Abstract—We address the image denoising problem, where zero-mean white and homogeneous Gaussian additive noise is to be removed from a given image. The approach taken is based on sparse and redundant representations over trained dictionaries. Using the K-SVD algorithm, we obtain a dictionary that describes the image content effectively. Two training options are considered: using the corrupted image itself, or training on a corpus of high-quality image database. Since the K-SVD is limited in handling small image patches, we extend its deployment to arbitrary image sizes by defining a global image prior that forces sparsity over patches in every location in the image. We show how such Bayesian treatment leads to a simple and effective denoising algorithm. This leads to a state-of-the-art denoising performance, equivalent and sometimes surpassing recently published leading alternative denoising methods.

Abstract

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1. What to do?
2. Why to do?
3. How to do?
4. Results and conclusion?
5. Contribution?

We address the image denoising problem, where zero-mean white and homogeneous Gaussian additive noise is to be removed from a given image.

Since the K-SVD is limited in handling small image patches…

Abstract

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1. What to do?
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Abstract

●怎么写？

- 内容：
  - ✓简述文章主要内容和研究结果，突出创新点
  - ✓独立性与自含性，包含主要内容，不诠释和评价细节
  - ✓不出现图表、非公知公用符号、简称与缩写
  - ✓200-300字左右
- 语法：
  - ✓使用简单句，直接指明观点
  - ✓正确使用时态（现在完成时、过去时、现在时）
  - ✓使用第三人称

Introduction

Introduction

1. 研究背景及研究意义
   - 介绍文章相关课题的研究趋势
     - ✓引用该领域的经典文献或奠基性著作
   - 说明文章研究内容的重要性
2. 研究现状
   - 说明研究概况，指出研究现状的局限性
     - ✓使用but, however等词语直接指出文章待解决的问题

Introduction

*The **image denoising problem is important**, not only because of the evident applications it serves. Being the simplest possible inverse problem, it provides a convenient platform over which image processing ideas and techniques can be assessed. Indeed, **numerous contributions in the past 50 years** or so addressed this problem from many and diverse points of view. …*

*Using redundant representations and sparsity as driving forces for denoising of signals **has drawn a lot of research attention in the past decade or so**. … … several new tailored multiscale and directional redundant transforms were introduced, including the curvelet [11], [12], contourlet [13], [14], wedgelet [15], bandlet [16], [17], and the steerable wavelet [18], [19]. In parallel, the introduction of the matching pursuit [20], [21] and the basis pursuit denoising [22] gave rise to the ability to **address the image denoising problem** as a direct sparse decomposition technique over redundant dictionaries. **All these lead to what is considered today as** some of the best available image denoising methods (see [23]–[26] for few representative works).*

Introduction

3. 研究内容
   - 陈述文章主题（解决的问题和使用的主要方法）
   - 概述文章的核心研究方法和实验结果

*Since dictionary learning is limited in handling small image patches, a natural **difficulty arises**: How can we use it for general images of arbitrary size? In this work, **we propose a** global image prior that forces sparsity over patches in every location in the image(with overlaps). ……We make use of these exact experiments and **show that the newly proposed algorithm performs** similarly, and, often, better, compared to the denoising performance reported in their work.*

Introduction

4. **文章贡献**
   - 总结文章的主要实验结果
5. **文章结构**
   - 后文内容的大致轮廓和探索方向

*To summarize, the **novelty of this paper** includes the way we use local sparsity and redundancy as ingredients in a global Bayesian objective—this part is described in Section II, along with its emerging iterated numerical solver. **Also novel in this work is the idea to** train dictionaries for the denoising task, rather than use prechosen ones. As already mentioned earlier, … … , followed by an update of the dictionary. This is described in Section III in detail. In Section IV, we show some experimental results that demonstrate the effectiveness of this algorithm.*

Related work

- 直指要点，无需详述细节
- 整体结构：总分总
  - 将当前工作分成几大类，每个大类再分成几小类
    - ✓介绍每类方法时先对该类方法做小结（**一句话简介**）
    - ✓基于工作的推进程度或发表时间安排引文顺序
  - 最后介绍文章工作和现有研究的不同点或改进
    - ✓总结各类工作的局限性（在文章中得到解决的）
    - ✓对于新问题提出的方法

* 研究现状可以参考文章的abstract和conclusion部分

Related work

- Introduction 和 Related work 中对于相关工作的介绍侧重点不同
  - Introduction
    - ✓说明文章相关工作的研究价值
    - ✓指出当前工作的局限性
  - Related work
    - ✓详述相关研究方向的发展过程
    - ✓阐述已有研究工作和文章相关工作之间的关联

Related work

- 论文引用的几种写法：
  - **信息强调型**（在Introduction中使用较多）：
    - *"…sources of these problems (Smith 2000)."*
  - **被引作者强调型**（在讨论部分使用较多）：
    - *"As Smith(2000) pointed out, …."*
    - ✓以下引用方法常用于对前部分内容提出不同意见：
    - *"Smith(2000) argued that the algorithm…"*
    - *"However, Jones et al.(2004) found that the algorithm …"*
  - **弱被引作者强调型**（在Introduction使用较多）：
    - *"…the development of RNN (Smith 2000, Wilson 2003)."*
    - 注意引用写在句号前

Main body

- 期刊文章常见的结构
  - OCAR结构
    - ✓ Opening, challenge, action and resolution
  - IMRD结构
    - ✓ Introduction, method, result and discussion
- 基本框架：

Experiment

- 展现模型或算法的性能
  - 效率性、鲁棒性、精确度
- 说明使用的数据集
  - 名称，来源，样本数……
- 和其他方法的实验效果对比
  - Introduction 或 related work 中提到的方法作对比
  - 使用领域权威的数据集
  - 与领域内最新或 state-of-art 的方法作对比
  - 使用合适的图表能更直接的体现对比效果

Experiment

●适当使用图表展示中间过程和结果：
- ➢图表有清晰的标注，比例恰当
- ➢每个图有编号和名称
- ➢可视化结果比文字描述更直观

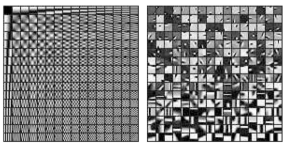

Fig. 2. Left: Overcomplete DCT dictionary. Right: Globally trained dictionary.

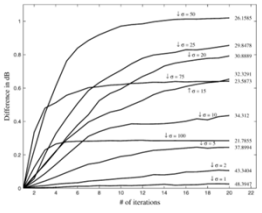

Fig. 5. Improvement in the denoising results after each iteration of the K-SVD algorithm, executed on noisy patches of the image "Peppers."

Experiment

●适当使用图表有助于读者理解文章
- ➢表格名称、编号及简述在表格上方
- ➢在表格中突出文章提出的方法和state-of-art结果的比较

σ/PSNR	Lena		Barb		Boats		Peppers		Average		σ_{PSNR}	
2/42.11	43.23	43.55	43.29	43.61	42.99	43.07	43.00	43.30	43.27	43.47	0.012	0.017
	43.23	**43.58**	43.10	**43.67**	41.86	**43.14**	42.90	**43.33**	43.05	**43.53**	0.018	0.017
5/34.15	38.49	38.51	37.79	37.93	36.97	37.09	37.31	37.67	37.65	37.79	0.014	0.016
	38.48	**38.60**	37.32	**38.08**	36.64	**37.22**	37.65	**37.78**	37.59	**37.95**	0.016	0.017
10/28.13	**35.61**	35.28	34.03	33.97	33.58	33.44	33.77	33.93	34.13	34.03	0.017	0.026
	35.40	35.47	33.07	**34.42**	33.53	**33.64**	**34.32**	34.28	34.04	**34.36**	0.024	0.027
15/24.61	**33.90**	33.38	31.86	31.63	31.70	31.38	31.74	31.76	32.16	31.89	0.024	0.032
	33.60	33.70	30.61	**32.37**	31.63	**31.73**	**32.37**	32.22	32.02	**32.40**	0.030	0.035
20/22.11	**32.66**	32.00	30.32	29.95	**30.38**	29.91	30.31	30.20	30.78	30.37	0.031	0.024
	32.27	32.38	28.87	**30.83**	30.24	30.36	**30.92**	30.82	30.57	**31.01**	0.025	0.027
25/20.17	**31.69**	30.89	29.13	28.65	**29.37**	28.78	29.21	29.01	29.71	29.17	0.037	0.037
	31.20	31.32	27.57	**29.60**	29.17	29.28	**29.84**	29.73	29.42	**29.89**	0.035	0.036
50/14.15	**28.61**	27.44	**25.48**	24.75	**26.38**	25.57	25.90	25.25	**26.47**	25.41	0.049	0.049
	27.77	27.79	24.06	25.47	25.91	25.95	26.12	**26.13**	25.74	26.01	0.051	0.058
75/10.63	**26.84**	25.63	**23.65**	22.83	**24.79**	23.85	**24.00**	23.12	**24.68**	23.3	0.061	0.053
	25.81	25.80	22.54	23.01	24.02	23.98	23.78	23.69	23.54	23.61	0.070	0.060

Experiment

●对结果进行适当的解释和说明

straight reference line). This comparison is presented for the images "Peppers," "House," and "Barbara." Notice that, for these images, the adaptive dictionary outperforms the reported results of Portilla *et al.* for all noise levels lower than $\sigma = 50$, while the global dictionary often achieves very close results. In the image "Barbara," however, which contains high-frequency texture areas, the adaptive dictionary that learns the specific characteristics has a clear advantage over the globally trained dictionary.

Discussion

●Discussion部分是可选的内容
●开始先复述研究问题，然后陈述主要结果
- ➢用过去时叙述结果，现在时谈意义

●将研究结果同现有文献作比较，陈述其意义
●陈述所有结果的意义，就矛盾或争议作出分析解释
- ➢不要在结果部分简单重复其他部分已有的内容
- ➢不得引入新术语/报告新结果，或夸大其词

●给出本研究的不足、局限性和将来研究方向
●结尾用明确的措辞重述本研究的工作成果和重要性

Conclusion

●通常包含以下内容
- ➢重申文章的创新点
- ➢对研究问题得到初步的结论
- ➢说明文章所提出方法比现有工作的优越性（总结实验结果）
- ➢提出对未来工作的展望

●注意以下问题
- ➢切忌过长
  - ✓通常conclusion只占全文2.5%以下篇幅
- ➢避免过多细节

论文修改

"Then rewrite it, then rewrite it, then rewrite it."

注意事项

- 公式、图表格式规范，排版整洁美观
- 注意语法错误及错别字
- 避免出现不确定语句（如should, could, would）
- 调整文章结构，精简冗余表述，尽量使用短句
  - 实事求是说重点，不使用华丽的修饰词
- 文章写作风格一致
  - 使用第三人称写作
  - 公式符号的表示和简称前后一致
    - ✓ 说明公式中出现的每个符号的具体意义
  - 文章中首次出现的缩略语要作解释

参考资料

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