Subband Adaptive Filtering. Theory and Implementation

Subband adaptive filtering is rapidly becoming one of the most effective techniques for reducing computational complexity and improving the convergence rate of algorithms in adaptive signal processing applications. This book provides an introductory, yet extensive guide on the theory of various subband adaptive filtering techniques. For beginners, the authors discuss the basic principles that underlie the design and implementation of subband adaptive filters. For advanced readers, a comprehensive coverage of recent developments, such as multiband tap-weight adaptation, delayless architectures, and filter-bank design methods for reducing band-edge effects are included. Several analysis techniques and complexity evaluation are also introduced in this book to provide better understanding of subband adaptive filtering. This book bridges the gaps between the mixed-domain natures of subband adaptive filtering techniques and provides enough depth to the material augmented by many MATLAB® functions and examples.

Key Features:
- Acts as a timely introduction for researchers, graduate students and engineers who want to design and deploy subband adaptive filters in their research and applications.
- Bridges the gaps between two distinct domains: adaptive filter theory and multirate signal processing.
- Uses a practical approach through MATLAB®-based source programs on the accompanying CD.
- Includes more than 100 M-files, allowing readers to modify the code for different algorithms and applications and to gain more insight into the theory and concepts of subband adaptive filters.

Subband Adaptive Filtering is aimed primarily at practicing engineers, as well as senior undergraduate and graduate students. It will also be of interest to researchers, technical managers, and computer scientists.

Contents:
About the authors.
Preface.
Acknowledgments.
List of symbols.
List of abbreviations.
1 Introduction to adaptive filters.
1.1 Adaptive filtering.
1.2 Adaptive transversal filters.
1.3 Performance surfaces.
1.4 Adaptive algorithms.
1.5 Spectral dynamic range and misadjustment.
1.6 Applications of adaptive filters.
1.7 Transform-domain and subband adaptive filters.
1.8 Summary.
References.
2 Subband decomposition and multirate systems.
2.1 Multirate systems.
2.2 Filter banks.
2.3 Paraunitary filter banks.
2.4 Block transforms
2.5 Cosine-modulated filter banks.
2.6 DFT filter banks.
2.7 A note on cosine modulation.
2.8 Summary.

References 69.

3 Second-order characterization of multirate filter banks.
3.1 Correlation-domain formulation.
3.2 Cross spectrum.
3.3 Orthogonality at zero lag.
3.4 Case study: Subband orthogonality of cosine-modulated filter banks.
3.5 Summary.

References.

4 Subband adaptive filters.
4.1 Subband adaptive filtering.
4.2 Subband adaptive filter structures.
4.3 Aliasing, band-edge effects and solutions.
4.4 Delayless subband adaptive filters.
4.5 MATLAB examples.
4.6 Summary.

References.

5 Critically sampled and oversampled subband structures.
5.1 Variants of critically sampled subband adaptive filters.
5.2 Oversampled and nonuniform subband adaptive filters.
5.3 Filter bank design.
5.4 Case study: Proportionate subband adaptive filtering.
5.5 Summary.

References.

6 Multiband-structured subband adaptive filters.
6.1 Multiband structure.
6.2 Multiband adaptation.
6.3 Underdetermined least-squares solutions.
6.4 Stochastic interpretations.
6.5 Filter bank design issues.
6.6 Delayless MSAF.
6.7 MATLAB examples.
6.8 Summary.
References.

7 Stability and performance analysis.
7.1 Algorithm, data model and assumptions.
7.2 Multiband MSE function.
7.3 Mean analysis.
7.4 Mean-square analysis.
7.5 MATLAB examples.
7.6 Summary.
References.

8 New research directions.
8.1 Recent research on filter bank design.
8.2 New SAF structures and algorithms.
8.3 Theoretical analysis.
8.4 Applications of the SAF.
8.5 Further research on a multiband-structured SAF.
8.6 Concluding remarks.
References.

Appendix A Programming in MATLAB.
A.1 MATLAB fundamentals.
A.2 Signal processing toolbox.
A.3 Filter design toolbox.

Appendix B Using MATLAB for adaptive filtering and subband adaptive filtering.
B.1 Digital signal processing.
B.2 Filtering and adaptive filtering in MATLAB.

B.3 Multirate and subband adaptive filtering.

Appendix C Summary of MATLAB scripts, functions, examples and demos.

Appendix D Complexity analysis of adaptive algorithms.

Index.

Ordering:

Order Online - http://www.researchandmarkets.com/reports/2251989/

Order by Fax - using the form below

Order by Post - print the order form below and send to

Research and Markets,
Guinness Centre,
Taylors Lane,
Dublin 8,
Ireland.
Fax Order Form
To place an order via fax simply print this form, fill in the information below and fax the completed form to 646-607-1907 (from USA) or +353-1-481-1716 (from Rest of World). If you have any questions please visit
http://www.researchandmarkets.com/contact/

Order Information
Please verify that the product information is correct.

- **Product Name:** Subband Adaptive Filtering, Theory and Implementation
- **Web Address:** [http://www.researchandmarkets.com/reports/2251989/](http://www.researchandmarkets.com/reports/2251989/)
- **Office Code:** SCEJISJC

Product Format
Please select the product format and quantity you require:

### Quantity

- [ ] **Hard Copy (Hard Back):** USD 149 + USD 28 Shipping/Handling

* Shipping/Handling is only charged once per order.

Contact Information
Please enter all the information below in BLOCK CAPITALS

<table>
<thead>
<tr>
<th>Title:</th>
<th>Mr □</th>
<th>Mrs □</th>
<th>Dr □</th>
<th>Miss □</th>
<th>Ms □</th>
<th>Prof □</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Name:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last Name:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email Address: *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Title:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postal / Zip Code:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Number:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fax Number:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Please refrain from using free email accounts when ordering (e.g. Yahoo, Hotmail, AOL)
Payment Information

Please indicate the payment method you would like to use by selecting the appropriate box.

☐ Pay by credit card: You will receive an email with a link to a secure webpage to enter your credit card details.

☐ Pay by check: Please post the check, accompanied by this form, to:
Research and Markets,
Guinness Center,
Taylors Lane,
Dublin 8,
Ireland.

☐ Pay by wire transfer: Please transfer funds to:
Account number 833 130 83
Sort code 98-53-30
Swift code ULSBIE2D
IBAN number IE78ULSB98533083313083
Bank Address Ulster Bank,
27-35 Main Street,
Blackrock,
Co. Dublin,
Ireland.

If you have a Marketing Code please enter it below:

Marketing Code: ____________________________

Please note that by ordering from Research and Markets you are agreeing to our Terms and Conditions at http://www.researchandmarkets.com/info/terms.asp

Please fax this form to:
(646) 607-1907 or (646) 964-6609 - From USA
+353-1-481-1716 or +353-1-653-1571 - From Rest of World